Ministry of Education and Science of Ukraine
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Sumy State University
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6040 Methodical instructions

for practical lessons
on the topic **"*Functional and laboratory examinations in children with gastrointestinal disorders*"**
in the discipline **"Pediatric propaedeutics"**
(in accordance with the conditionsof the Bologna process)
for students of the specialty *222 "Medicine"*
of full-time course of studies

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CONTENTS

FUNCTIONAL AND LABORATORY INVESTIGATIONS IN CHILDREN WITH GASTROINTESTINAL DISORDERS

INTRODUCTION

Relevance of the topic

Diseases and functional disorders of the digestive system are widespread among the pediatric population, affecting children from birth.

Therefore, it is essential to consider the generalized reaction of the child's body to the pathological process when dealing with digestive organ diseases. In this way, prescribing a comprehensive examination for the child, taking into account their constitutional features and premorbid background, becomes crucial. Only through a comprehensive comparison of anamnestic data, results of objective, laboratory, functional, and instrumental examinations can a complete understanding of the overall functional and morphological changes in the body be obtained. This approach helps to clarify the features, course, and severity of the process, make an accurate diagnosis, and choose a rational treatment method.

The overall goal is to be proficient in conducting examinations of the digestive organs in children, recognizing pathological signs, identifying the cause of their occurrence, and making a diagnosis. It also involves acquiring skills for caring for children with this pathology.

The primary laboratory methods for investigating blood in cases of gastrointestinal tract diseases include a complete blood count, biochemical blood analysis, serological studies for diagnosing infectious diseases of the digestive organs, and bacteriological studies (cultures performed in multiple media simultaneously). A complete urine analysis is prescribed for almost any disease, while a biochemical urine analysis is more often ordered for diseases of the biliodigestive system (hepatitis, cholecystitis, liver cirrhosis, pancreatitis).

Instrumental methods of investigation constitute a section of comprehensive examination for patients with gastrointestinal organ diseases. They include radiological, endoscopic, ultrasonographic, electrophotographic, and electrometric examination methods. Depending on the nature of the disease, the doctor prescribes a specific examination that is most informative in a particular case. Instrumental methods of investigation allow characterizing specific morphological or functional features of the examined organ. Prescribing multiple instrumental investigation methods in the diagnostic program for a patient helps unveil all aspects of numerous processes occurring in the development of diseases within the examined system. It also reveals the nature of its functional and morphological relationships with other organs and tissues.

Definition of specific goals:

1 Instrumental methods of examination of the gastrointestinal tract (GIT):

a) Radiological methods of examination of the digestive organs

b) Computed tomography and magnetic resonance imaging

c) Ultrasound examination of parenchymal organs

d) Endoscopic examination of the upper and lower digestive tract, duodenal probing

2 Laboratory methods of GIT investigation

a) Complete and biochemical blood analysis

b) Gastric juice pH measurement

c) Examination of gastric secretions and biopsies

d) Blood tests for liver function

e) Urine analysis for amylase

f) Coprogram, stool analysis for dysbiosis, stool analysis for helminth eggs, stool analysis for occult blood

3 Interpretation of the data obtained.

4 Characteristics of care for children with gastrointestinal diseases.

As a result of studying this topic the learner should be able to:

1 Interpret the data obtained.

2 Analyse the main syndromes affecting the digestive system in children.

3 Prescribe laboratory and instrumental methods for studying the digestive system in children.

4 Document the results obtained in the patient's medical record and in the child's developmental history.

5 Care for sick children.

Learning outcomes:

– Prescribe a comprehensive set of laboratory and instrumental tests for diseases of the gastrointestinal tract.

– Collect analyses from a patient with a disease of the digestive organs.

– Carry out examinations of the digestive organs, taking into account the age-specific features of the child.

– Interpret the research data obtained.

To determine whether your knowledge and skills match the required outcomes, complete the following tasks and check the accuracy of your answers by comparing them with the answer key.

Theoretical questions on the topic:

1 Additional methods of examination of digestive organs: fractionated gastric juice probe, duodenal probe, ultrasound examination of abdominal organs.

2 Laboratory and instrumental methods of examination digestive organs:

a) Fractiontedl gastric juice examination

b) gastric juice pH measurement (Appendix A)

c) Duodenal probing

d) Endoscopic examination of the upper and lower parts of the digestive tract

e) Ultrasound examination of parenchymal organs

d) Radiological examination of organs of the digestive system

3 Endoscopic diagnostic methods for diseases of the digestive system organs (endoscopic retrograde cholangiopancreatography (ERCP), colonofibroscopy, laparoscopy rectosigmoidoscopy, chromogastroscopy).

4 Morphological investigations (oesophagus, stomach, duodenum, small intestine, appendix, colonic mucosal examination, liver biopsy).

5 Radioisotope diagnostics (hepatoscintigraphy, examination of the insular apparatus); ultrasound diagnostics, thermovision diagnostics.

6 Radiological examinations (oesophagus, upper gastrointestinal tract, gall bladder, barium-free duodenography, retrograde pancreatocholangiography).

7 Functional diagnostics (fractional gastric probing, intragastric pH-metry, alkaline test, atropine test, intracavitary digestion research).

8 Functional diagnostics of intestinal diseases (intestinal digestive function, intestinal absorptive function, coprological examination).

9 Biochemical blood analysis (cytolysis, cholestasis, protein synthesis deficiency syndromes).

Table 1 - Relationship between stomach volume and secretion in children at different ages

Age of the child	**Stomach volume**	**Gastric acidity**	
		Total acid	**Free acid**
1–2 months	80–100	3.6–10	0.8–4,5
12 months	300	12–21	6–10
4–7 years	400–600 ml	30–36	10–15
8–12 years	1300–1500	40–60	15–20

Guidelines for practical session:

Conduct a pre-test at the beginning of the session to assess basic knowledge. This will be followed by a brief review of the material studied and independent student work on analysis. Under the guidance of the tutor, explore the main additional methods used to examine patients with gastrointestinal disease, discuss the clinical significance of these methods and interpret the results obtained. Towards the end of the session, summarise key points and undertake situational tasks related to the topic.

LABORATORY AND INSTRUMENTAL INVESTIGATION METHODS

Laboratory tests:

The main laboratory tests for diseases of the gastrointestinal tract are general blood tests, biochemical blood tests, serological tests for the diagnosis of infectious diseases of the digestive organs, and bacteriological tests (culture in several environments at the same time). General urinalysis is prescribed for almost all diseases, while biochemical urinalysis is more often ordered for diseases of the biliary tract (hepatitis, cholecystitis, cirrhosis, pancreatitis).

Instrumental methods of investigation form part of the comprehensive examination of patients with gastrointestinal diseases. They include radiological, endoscopic, ultrasonographic, electrographic and electrometric approaches to the examination of patients. Depending on the nature of the disease, the physician prescribes the specific tests that are most informative in each individual case. Instrumental methods make it possible to characterise specific morphological or functional features of the organ under investigation. Prescribing several instrumental methods of examination in the diagnostic programme for one patient makes it possible to uncover all aspects of numerous processes involved in the formation of diseases in the examined system, to reveal the nature of its functional and morphological relations with other organs and tissues.

The standard biochemical blood test is used to determine the substances produced by the liver and those that the liver should normally process for subsequent elimination from the body, as well as those produced by the breakdown of liver tissue.

Blood biochemistry includes indicators of pigment, nitrogen and lipid metabolism, protein fractions, enzymes, metabolites of glucose and carbohydrate metabolism and specific proteins.

Normal values for key biochemical tests:

1 Total bilirubin – 8.5–20.5 μmol/L (direct to indirect ratio – 3:1)

2 Blood amylase – 28.0–100.0 U/L

3 ALT (alanine aminotransferase) – 0.1–0.75 μmol/L
4 AST (aspartate aminotransferase) – 0.1–0.45 μmol/L
5 Alkaline phosphatase – 20-140 U/L

Diastase (α-amylase) is a digestive enzyme, mainly synthesised in the pancreas and salivary glands, involved in the breakdown of complex carbohydrates. Diastase is secreted into the digestive tract, absorbed into the blood after digestion and excreted from the body with urine. There are two types of α-amylase in the blood: P-type and 5-type. In the urine, about 65 % is P-type, while in the blood up to 60 % is 5-type. Urinary P-type α-amylase is called diastase in biochemical studies to avoid confusion. Urinary diastase is used in the diagnosis of pancreatic disease. The normal range for urinary diastase is 4-64 U/L and blood amylase is 28.0-100.0 U/L. Elevated amylase levels are seen in pancreatitis (128, 256 and above), mumps, perforation of a hollow organ, acute peritonitis and renal failure.

Low diastase/amylase activity is seen in cystic fibrosis, acute and chronic hepatitis and pancreatic necrosis.

To determine amylase activity, blood is taken from a vein in the morning on an empty stomach or from the midstream of the morning urine. Fatty and spicy foods should be avoided the day before the analysis.

Indications for evaluating amylase/diastase:

1 Pancreatic diseases
2 Diseases of the salivary glands (epidemic parotitis)
3 Cystic fibrosis
4 Acute abdomen syndrome

Alanine aminotransferase (ALT) is predominantly found in liver cells and, to a lesser extent (in decreasing order), in the kidneys, myocardium, skeletal muscles, and pancreas. ALT is a highly sensitive indicator even for minimal liver damage. ALT is more specific for liver damage than aspartate aminotransferase. However, absolute ALT values do not directly correlate with the severity of liver damage and the prognosis of the pathological process, so it is most reasonable to determine ALT dynamically.

Aspartate aminotransferase (AST), unlike ALT, is present in many tissues: myocardium, liver, skeletal muscles, kidneys, pancreas, brain tissue, and spleen. AST is a less characteristic indicator of liver function. In infectious mononucleosis, the increase in AST level is proportional to liver damage.

Alkaline phosphatase is present in all tissues, with particularly high concentrations in the liver, bile ducts, kidneys, and bones. Blood biochemical analysis for alkaline phosphatase is performed to diagnose diseases of the skeletal system, liver, biliary tract, and kidneys. The level of alkaline phosphatase increases in case of liver diseases, infectious mononucleosis, calcium and phosphate deficiency in food, and bone tissue pathology.

A reduced level of alkaline phosphatase occurs less frequently than an elevated level, and it is associated with genetic hypophosphatemia, protein deficiency, and hypothyroidism. The concentration of alkaline phosphatase is significantly higher in children and pregnant women.

Coprogram is a comprehensive analysis of physical, chemical, and microscopic examination of feces. This examination helps diagnose disorders in the acid-forming and enzymatic functions of the stomach, intestines, pancreas, absorption disorders, and inflammatory processes in the gastrointestinal tract.

When planning a coprogram 3-4 days before the examination, the following principles should be observed

1 Stop taking laxatives.
2 Stop taking rectal suppositories.
3 Avoid enemas.
4 Do not use barium.

Coprogram is used to diagnose diseases of the digestive organs and to monitor the results of treatment. For example, in cystic fibrosis, the presence of neutral fat in the coprogram during dynamic evaluation is an indicator of the adequacy of enzyme replacement therapy.

Stool culture for pathogenic microflora is performed to diagnose intestinal infections and identify carriers. The material for

examination is collected with a loop and placed in a sterile vial with saline solution.

It is important to note that the widely used fecal analysis for dysbacteriosis is not performed in any country with advanced medicine. This is primarily due to the fact that the results of fecal culture do not accurately reflect the actual state of intestinal flora, which consists of over 1000 microbial species, many of which do not grow even on standard nutrient media.

Analysis of feces for helminth eggs and cysts of protozoa helps to detect specific parasites localized in the intestine within the biological cycle:

1 Protozoa: Giardia lamblia, Trichomonas intestinalis, Entamoeba spp., Blastocystis hominis.

2 Nematodes: Ascaris lumbricoides, Trichuris trichiura, Enterobius vermicularis, Strongyloides stercoralis.

3 Cestodes: Taenia spp.

To increase the sensitivity of the test, it is recommended that three consecutive tests be performed 7 days apart. When testing for Giardia, a negative result may be obtained in the early stages of infection, during chronic infestation, and in patients who cyclically excrete the parasite. False-negative results may occur if the patient takes bismuth preparations, mineral oils, tetracycline, antidiarrheal, and antacid agents during the week prior to testing.

The Enterobiasis Anal Swab is used when Enterobius vermicularis infection is suspected. The swab is taken in the morning before hygiene and defecation, using a transparent adhesive strip applied to the perianal folds, then placed on a glass slide for direct microscopy.

Instrumental methods:

Radiography is one of the main methods of studying pathology of the gastrointestinal tract. Contrast radiography of the abdominal cavity is used in cases of suspected intestinal obstruction, diagnosis of pneumoperitoneum and foreign bodies.

Signs of free gas in the abdominal cavity are detected in patients with perforation of a hollow organ and abdominal injuries.

In the plain abdominal X-ray, 1 ml of gas can be detected in the subdiaphragmatic space in the direct projection, and in the lateral projection with the patient in the left lateral position, 10 ml of gas can be observed, which is more lateral than the right part of the liver.

Barium sulfate is used for contrast radiography. Patient preparation is essential due to the increased gas content in the intestine, which significantly affects the quality of the X-ray image. Patient preparation includes elimination of gas-forming foods from the diet 2-4 days prior to the examination, fasting for 10-12 hours prior to the examination, and two cleansing enemas the night before and the morning of the examination.

Contrast X-ray capabilities:

1 Determine the location and shape of the organ.

2 Detect developmental defects.

3 Evaluate peristaltic activity by assessing contrast evacuation time.

4 Assess intestinal patency.

A barium sulfate suspension is prepared at a ratio of 80 g powder to 100 ml water. For young children, barium is dissolved in a mixture or milk. The volume of the solution administered for the examination of the stomach, duodenum and intestine in infants is approximately equal to a single feeding, but not more than 200 ml. It should be noted that a colorless stool with a lime-like consistency may be observed in the patient for 1-2 days. To evaluate the condition of the esophagus, radiographs are taken after the patient swallows several sips of barium. Barium suspension to evaluate the colon is introduced rectally using an enema - barium enema.

Very rarely, air is used as a contrast agent. This study is performed during intussusception by introducing air through the rectum using the Richardson apparatus during pneumatic colonic compression.

Gastrointestinal fibroscopy includes fibrogastroscopy and colonoscopy. Fibrogastroscopy is used to diagnose diseases of the upper gastrointestinal tract - the esophagus, stomach, and duodenum. The procedure is usually performed on an empty stomach, usually in the morning. The type of anesthesia depends mainly on the patient's

age. Colonoscopy and sigmoidoscopy allow the examination of either the entire colon or its distal part.

Possibilities of fibrogastroscopy:

1 Visualization of the esophagus, stomach and duodenum.

2 Biopsy of the mucosa.

3 Assessment of treatment efficacy.

4 Therapeutic applications such as drug delivery and bleeding control.

Gastric acid measurement (pH-metry) is a diagnostic procedure that measures acidity directly in the stomach or esophagus. pH-metry is commonly used to study stomach acid production and diagnose gastroesophageal reflux. The most informative is 24-hour pH-metry, in which a probe is inserted through the right nasal passage.

Features of 24-hour gastric pH monitoring:

1 Assessment of acid production throughout the day, taking into account various factors (food, body position).

2 Evaluation of the effect of various medications on gastric acidity.

3 Identification of nocturnal acid breakthrough - a condition in which the pH falls below 4 for more than an hour despite medication.

4 Development of an effective regimen for the use of antisecretory drugs.

Computed tomography of the abdominal and retroperitoneal spaces allows differentiation of tissues based on a density difference of 0.5%, making it the most accurate and informative method. Computed tomography can be native, noncontrast, or contrast-enhanced. Contrast-enhanced CT is used for targeted examination of any organ.

Computed tomography of the gastrointestinal organs provides information about the structure of the parenchymal organs, the presence of inflammatory processes, perifocal (around the focus) inflammation, the size, location, and shape of the organ, tumors, and abdominal metastases (Table 1.2).

Table 2 - Additional methods for studying the gastrointestinal tract

Research methods	Pathology	Diagnostic value
1	2	3
Biochemical Blood Analysis	Hepatobiliary zone Polyclonal gammopathy of the pancreatic gland	– Cytolysis syndrome – increased levels of AST, ALT, LDH, LDH (hepatitis); – Cholestasis syndrome – increased bilirubin, cholesterol, alkaline phosphatase, leucine aminopeptidase, gamma-glutamyl transpeptidase (cholecystocholangitis); – Protein-synthetic deficiency syndrome; – Decrease in albumin fractions, prothrombin, butyrylcholinesterase activity (hepatitis, cirrhosis); – Increase in total protein, globulins, positive sedimentation tests, elevated levels of Ig, M, G; – Elevated levels of amylase, trypsin, lipase
Fecal analysis	Stomach Duodenum Small intestine Pancreas of hepatobiliary system	– Gastric syndrome (undigested muscle fibers, connective tissue) – Pyloroduodenal syndrome (undigested muscle fibers, connective tissue, plant fibers) – Enteral syndrome (leukocytes, epithelial cells, crystals of fatty acids) – Ileocecal syndrome (undigested starch grains, iodophilic flora) – Syndrome of secretory insufficiency of the pancreas (neutral fats, muscle fibers)

Continuation of Table 2

1	2	3
Fecal analysis	Large intestine	– Gastric syndrome – Bile secretion deficiency syndrome (abundant fatty acids, negative reaction to stercobilin) – Ileocecal syndrome; colitis syndrome (leukocytes, blood, epithelial cells)
Stool for occult blood	Gastric and intestinal	–Positive for gastric ulcer, duodenal ulcer, hemorrhagic diathesis, enterocolitis
Bacteriological examination of stool	Colonic	Identification of the pathogen and determination of its sensitivity to antimicrobial agents
Stool for dysbiosis	Colonic and small intestinal	Assessment of the depth of dysbiosis and predominance of certain flora representatives
Stool for helminth eggs	Intestinal	Determination of the type of helminthiasis
- pH measurement of gastric contents	Stomach	Hypoacidity, normoacidity, hyperacidity
Fractional study of gastric contents	Stomach	Determination of secretory and acid-forming capacity
Determination of urinary diastase, blood amylase	Pancreas	– Elevated (exocrine pancreatic insufficiency) – above 32 g/h/L – Decreased (chronic pancreatitis, nephritis) – below 16 g/h/L
Determination of urobilin in urine	Liver	– Presence of urobilin in urine (cirrhosis of the liver, prodrome of viral hepatitis, sepsis, biliary atresia)

Continuation of Table 2

1	2	3
Ultrasonic examination of internal	Hepatobiliary zone	– Increased parenchymal echogenicity (cirrhosis, hepatitis) – Dilated bile ducts (cholangitis) – Deformation of the gallbladder (congenital anomalies), thickening of the walls (cholecystitis)
	Pancreas	– Enlargement, increased density of structure (pancreatitis, dyspancreatism)
	Esophagus Stomach	– Depth of the inflammatory process, presence of congenital or acquired defects, foreign body
	Duodenum	– Depth of the inflammatory process, presence of refluxes, erosions, neoplasms, ulcers, foreign body – Depth of the inflammatory process, presence of ulcers, stenosis – Atresia of the bile ducts – absence of bile in the contents of the duodenum
Colonoscopy	Biliary tract of the large intestine	– Depth of the inflammatory process, presence of new formations
Radiological examination of the gastrointestinal tract (GIT)	Esophagus	– Presence of foreign bodies, new formations, depth of stenosis
	Stomach	– Inflammatory changes, ulcers, new formations, foreign bodies
	Intestines	– Intestinal obstruction, invagination, new formations – Foreign bodies

Examples of Test Control for the Topic "Functional and Laboratory Examinations in Children with Gastrointestinal Disorders"

1 Which contrast agent is used for radiography of the stomach in the early neonatal period:

+ Verografin
– Barium sulfate
– Calcium gluconate
– Calcium sulfate?

2 Which contrast agent is used for an X-ray of the stomach in infants and older children:

– Verografin
+ Barium sulfate
– Calcium gluconate
– Sodium sulfate?

3 What is the amount of contrast needed for an X-ray of the stomach in an infant up to 2 weeks old, ml:

– 20–40
+ 50–60
– 90
– 110–120?

4 Volume of contrast medium for an X-ray of the stomach of an infant up to 1 month, ml:

– 20–40
– 50–60
+ 90
– 110–120

5 Volume of contrast medium for an X-ray of the stomach of a 5-month-old infant, ml:

– 50–60
– 60–90
– 90–120
+ 175–19

6 The average amount of contrast used for a stomach X-ray is, ml:

– 110–120
– 150
– 175–195
+ 200

7 Fibrogastroscopy is a method to study:

– Liver function
– Gallbladder function
+ Esophagus, inner surface of the stomach
– Duodenum and biliary secretion

8 Cholecystography is a method of studying:

+ Liver function, gallbladder
– Esophagus and stomach lining
– Duodenum and biliary secretion
– Tonus of various parts of the biliary system

9 Elevated gastric pH:

– 1.0–0.5
+ 1.3–1.0
– 1.3-1.5
– 1.5–1.7

10 Decreased gastric pH:

+ 1.7–2.5
– 1.7–1.5
– 1.5–1.3
– 1.3–1.0

11 Normal gastric pH:

– 1.0–0.5
– 1.3–1.0
+ 1.7–1.3
– 1.7–2.0.

12 Numbe of portions obtained by duodenal probing in children:

– 2
+ 3
– 4
– 5

13 Part I (A) of duodenal probing is obtained from:

+ Duodenal content
– Gallbladder content
– Hepatic bile content
– The 12th duodenal ulcer content

14 Part II (B) of duodenal probing is obtained from:

– Duodenal content
+ Gallbladder content
– Hepatic bile content
– The 12th duodenal ulcer content

15 Part III (C) of duodenal probing is obtained from:

– Duodenal content
– Gallbladder content
+ Hepatic bile
– The 12th duodenal ulcer content

16 Fecal analysis for hidden blood will be positive for:

– Enterobiosis
+ Trichocephalosis
– Epistorchosis
– Strongyloidosis

17 The total number of intestinal rods in the feces of children is allowed up to:

– 10–20 thousand
– 100–200 thousand
+ 1–200 million
– 20–200 million

18 Bifidoflora in the feces of children is limited to:

– 105–108
+ 108–109
– 109–10^12
– 10^12–10^15

19. Preparation of a patient for ultrasound examination of internal organs requires:

+ It is carried out on an empty stomach
+ On the eve – a light dinner, cleansing enema
– In the evening dense
+ Give activated charcoal, enzyme preparations

20 Preparation of a patient for X-ray examination of internal organs:

+ Performed on an empty stomach

– Performed on a full stomach

+ Cleansing enema the day before

+ Cleansing enema on the day of the examination

21 Preparation of a patient for endoscopic examination includes:

– Psychological preparation

– Light-absorbing diet the day before

– Performed on an empty stomach

+ Subcutaneous injection of atropine before the examination

22 The rate of bile outflow from the common bile duct in children under conditions of continuous fractional probing, ml/min:

+ 1.0–1.5;

– 1.5–2.0;

– 1.0–2.0;

– 2.0–2.5.

23 Continuous fractional duodenal probing allows:

+ Detect lamblia

+ Assess the motility of the biliary tract

+ Study the composition of bile

– Detecrmine the shape and contractility of the gallbladder

24 Methods to detect H. pylori infection include:

+ Microscopic examination of a biopsy of the antral mucous the stomach

+ Urease test

+ Detection of anti-Helicobacter antibodies in serum

+ Fecal ELISA

– Continuous fractional probing

25 Signs of cholestatic syndrome:

+ Increased alkaline phosphatase activity

+ Elevated cholesterol

– Elevated total and especially indirect bilirubin

+ Elevated total and direct bilirubin

26. The indicator of regeneration and tumor growth in the digestive organs is:

+ Fetoprotein in urine;

– Fetoprotein in blood;

– Fetoprotein in blood;

– Globulin in blood.

27 Which of the listed pancreatic enzymes, which ones can be detected in serum:

+ Amylase

+ Lipase

+ Trypsin

– Gastrin?

28 Duration of the "Odi sphincter closed" phase in children during continuous fractional probing, min:

– 1–2 min

+ 2–6 min

– 6–8 min

– 8–10 min

29. Amount of gallbladder bile secreted in children during continuous fractional probing, ml:

– 11–22

– 20–22

+ 22–44

– 44–66

30. Gastrography is a method for:

– Recording gastric biopotentials

+ Assessment of blood flow in the gastric mucosa

– Microscopy of a biopsy of the mucous membrane of the antral part of the stomach

– Evaluation of the gastric evacuation function

Self-Preparation and Self-Assessment Tasks for Initial Skill Level

Task 1

A 7-year-old boy complains of loss of appetite and pain in the right abdomen, especially when he runs. He has been ill for about 6 months. On examination - pallor of the nasolabial triangle, capillary "stars" on the hand, capillary wall in the interscapular area, tongue with white coating. The liver protrudes 4 cm under the edge of the costal arch, it is painful. Ortner's symptom is positive.

Questions:

1 What pathology is suspected in the child?

2 What examinations are necessary for the patient?

Model answers:

1 Chronic disease of the hepatobiliary system.

2 Ultrasound, duodenoscopy, biochemical analysis of bile (bile acids), biochemical analysis of blood (AST, ALT, alkaline phosphatase, protein, fractions, bilirubin, cholesterol).

Task 2

According to the district pediatrician, an 8-year-old boy is suspected of having peptic ulcer disease and has been sent to the hospital.

Question:

What tests should the boy have to confirm the diagnosis?

Model answer:

Endoscopic examination (esophagogastroduodenoscopy), fecal occult blood test, pH measurement, and gastric juice fraction.

Task 3

An 8-year-old boy was admitted to the clinic with complaints of abdominal pain at night, fasting, occurring 1.5-2 hours after eating, sometimes accompanied by vomiting. He has been ill for 7 months. His mother has a duodenal ulcer. On examination, the skin is

clean, pale; the subcutaneous fat layer is moderately thin. The tongue is moist, with a white coating near the root. The abdomen is painful in the pyloroduodenal area. Stool tends to be constipated.

Fractional study of gastric secretion results:

1st portion 70 mL - free hydrochloric acid (HCl) - 20,000 units, total - 30,000 units.

2nd portion: 70 mL – HCl – 22,000 units, total – 40,000 units.

3rd portion: 30 mL – HCl – 40,000 units, total – 60,000 units.

4th portion: 30 mL – HCl – 48,000 units, total – 80,000 units.

Stimulator – 0.1 % histamine solution.

5th portion: 80 mL – HCl - 50,000 units, total – 70,000 units.

6th portion: 60 mL – HCl – 80,000 units, total – 100,000 units.

7th portion: 50 mL – HCl – 80,000 units, total – 100,000 units.

8th portion: 60 mL – HCl – 90,000 units, total – 200,000 units.

Hourly rate of free hydrochloric acid in the 1st phase – 10mEq/L, in the 2nd – 16 mEq/L.

Fibrogastroduodenoscopy reveals an active ulcer of 3×4 mm on the posterior wall of the duodenal bulb.

Questions:

1 How to diagnose according to the classification?

2 How do you interpret the fractional study of gastric secretion?

Model answers:

1 Duodenal bulb ulcer, active ulcer.

2 Hourly secretion in the 1st and 2nd phases is increased. The nature of the acid curve is excitatory. Total and free acidity are increased in both phases of secretion.

Examples of Situational Tasks for Self-Preparation and Self-Monitoring in Preparation for the KROK-2 Exam

1 A 1-month-old baby experiences projectile vomiting after each feeding. The vomit consists of curdled milk and exceeds the volume of the previous feeding. The baby has gained 200 g of weight in the first month. Urination is scanty, bowel movements are scanty and irregular. Which diagnostic method would you prescribe to confirm the diagnosis:

a) * Gastrofibroscopy
b) Ultrasound examination
c) Biochemical analysis
d) Abdominal X-ray
e) Coprological examination?

2 A 9-year-old boy complains of weakness, body temperature rising to 38 °C, abdominal pain, and bowel movements 10-12 times a day with the presence of mucus and blood. His medical history reveals allergy to citrus fruits, milk and chocolate. He was treated several times in the Department of Infectious Diseases with diagnoses of dysentery and salmonellosis, which were not confirmed bacteriologically. Nonspecific ulcerative colitis was suspected. Which diagnostic method is most likely to confirm the diagnosis:

a) * Colonoscopy
b) Coprological examination
c) Immunologic blood test
d) Allergometric testing
e) Rectosigmoidoscopy?

3 A 10-month-old boy, on the 6th day of taking antibiotics for pneumonia, developed intestinal dysfunction. Bowel movements occur 4–5 times a day, watery with a significant amount of fluid. Which additional examination is most important to confirm the diagnosis:

a) * Fecal analysis for dysbiosis
b) Bacteriological examination of feces

c) Coprogram
d) Fecal analysis for the presence of helminth eggs
e) Complete blood count?

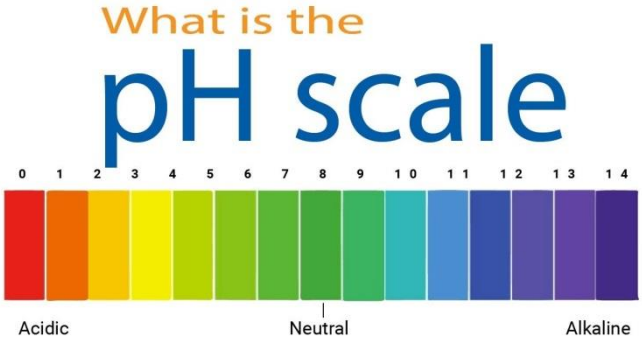
4 A 12-year-old girl has been complaining of abdominal pain for 2 years, especially after eating, nausea, heartburn, and acid belching. Which study is most appropriate to confirm the diagnosis:
a) * Fibrogastroduodenoscopy
b) Fractional study of stomach contents
c) Gastric contrast study
d) Intragastric pH measurement
e) Electrogastrography?

5. An 8-year-old boy complains of severe pain around the umbilicus on an empty stomach and after eating, nausea, loss of appetite, and lethargy. His father has peptic ulcer disease. Which is the most appropriate examination to perform on the child to confirm the diagnosis:
a) * Esophagogastroduodenoscopy (EGD);
b) Ultrasound (US);
c) X-ray of abdominal organs;
d) Fractional examination of stomach contents;
e) Duodenal sounding?

6. A 5-year-old child, who had been in contact with viral hepatitis in a kindergarten, developed a temperature rise to 38 ºC, weakness, decreased appetite, one-time vomiting, and dull pain in the right hypochondrium. Suspicion of viral hepatitis. Which test is most helpful in confirming the diagnosis:
a) * Blood ALT activity;
b) Urine analysis for bile pigments;
c) Fecal analysis for stercobilin;
d) Blood test for bilirubin;
e) Blood test for thymol?

APPENDIX A
(Mandatory)

Table A1 - PH indicators of gastric juice



APPENDIX B
(Mandatory)

Figure B1-Ultrasound examination of a child’s abdominal organs

APPENDIX C
(Mandatory)

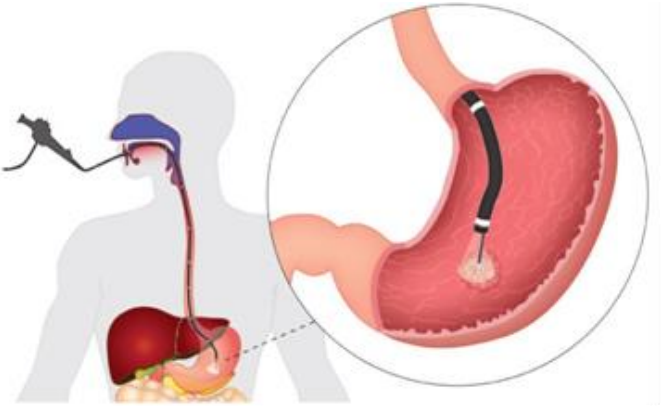


Figure C1- Fibrogastroduodenoscopy

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Методичні вказівки

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з дисципліни **«Пропедевтика педіатрії»**
(згідно з умовами Болонського процесу)
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