MINISTRY OF HEALTH OF UKRAINE

ODESA NATIONAL MEDICAL UNIVERSITY

Faculty *Medicine*

Department *of Surgery with Postgraduate Education*

APPROVED BY

Vice-Rector for Scientific and Pedagogical Work

Eduard Buriachkivskyi

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METHODOLOGICAL RECOMMENDATIONS FOR PRACTICAL CLASSES OF THE ACADEMIC DISCIPLINE

Faculty, course Medical 6th year

Academic discipline Surgery

(name of the discipline)

PRACTICAL CLASSES

Practical class № 8

Topic: "Acute intestinal obstruction syndrome. Etiology, pathogenesis. Diagnostics. Treatment tactics"

Approved:

At the meeting of the Department *of Surgery with Postgraduate Education* of Odesa National Medical University

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Head of Department _____ Volodymyr Grubnik

Developers: Professor, Doctor of Medicine Mishchenko V.V., Associate Professor, PhD in Medicine Poliak S.D., PhD in Medicine, Associate Professor Vorotyntseva K.O., Associate Professor, PhD in Medicine Parfentiev R.S., Associate Professor, Koichev E.A., Assistant Burhidze Z.D., Associate Professor, PhD in Medicine Goryachiy V.V, Assistant, PhD in Medicine Degtiarenko S.P., Assistant Korchovyi D.V., Assistant Ponomarenko A.V, Assistant, PhD in Medicine Grubnyk V, Assistant Ishchenko V. S., Assistant, PhD in Medicine Iliashenko V. V., Assistant Sliepov V.V

PRACTICAL CLASSES

Practical class № 8

Topic of the practical class: "Acute intestinal obstruction syndrome. Etiology, pathogenesis. Diagnostics. Treatment tactics"- 6 hours

1. Relevance of the topic. Acute intestinal obstruction is one of the most frequent and dangerous diseases in emergency surgery. A positive outcome depends on the timely diagnosis, tactics and choice of the correct treatment of patients with acute intestinal obstruction.

The high mortality rate, which reaches 80% in severe cases, is due to severe haemodynamic disorders that occur. One of the ways to reduce mortality is timely hospitalisation and early surgical intervention.

2. Objectives of the lesson

2.1. Learning objectives

The student should learn to:

1. Identify anamnestic and objective signs of diseases**.** **Level II**
2. Basic principles of diagnosis and differential diagnosis of intestinal obstruction. **Level III**
3. To prescribe a plan of examination of patients using laboratory, instrumental, radiological methods of examination. **Level III**
4. Prescribe conservative therapy and conduct preoperative preparation for the patient **Level III**
5. Determine indications for surgical interventions and theoretically know the method of their implementation Level II

2.2. Educational objectives

1. Formation of a professionally significant personality of a doctor.
2. Emphasise the role of national surgeons in the development of modern methods of treating intestinal obstruction (D.Chukhrienko, A. Synovets, etc.).

3. **Interdisciplinary integration**.

№	Discipline	To Know	To Be able to
1	**2**	**3**	**4**
1. Previous disciplines			
1.	Anatomy	Anatomical structure of the colon and small intestine.	Be able to distinguish between different sections of the colon and small intestine on diagrams and during surgery.
2.	Physiology and pathophysiology.	The role of the intestine in food processing and nutrient absorption. Pathophysiological significance of the accumulation of food and intestinal juices	To assess the severity of the patient's condition depending on the timing and level of intestinal occlusion.

		in the enteric appendage	
3.	Biochemistry	The significance of toxic substances formed in the adventitious part of the intestine for assessing the patient's condition.	Be able to interpret changes in blood chemistry in intestinal obstruction.
4.	Pharmacology	Mechanism of action of drugs for homeostasis regulation in intestinal obstruction.	Prescribe conservative therapy to regulate electrolyte disorders.
II. Intersubject integration			
1.	Mechanical intestinal obstruction	Clinical signs. Mechanical obstruction, biochemical changes.	Perform differential diagnosis, make a diagnosis. Prescribe treatment.
2.	Dynamic intestinal obstruction	Causes of occurrence, features of the clinic.	Prescribe conservative therapy.

4. Content of the lesson

Intestinal obstruction

Intestinal obstruction is a syndrome that occurs in various diseases of the gastrointestinal tract and is manifested by impaired peristalsis and evacuation function with morphological changes in the affected part of the intestine.

Intestinal obstruction is observed in 9% of all patients with acute surgical pathology of the abdominal cavity. The disease occurs at any age, but more often between 25-50 years. Men are more often affected (66.4%) than women (33.6%). The mortality rate is up to 17% and is the highest among acute surgical pathologies of the abdomen.

Anatomical and physiological data

The small intestine is a tube located between the pyloric jejunum and the cecum; its length is about 4/5 of the total length of the gastrointestinal tract. The total length of the small intestine is proportional to human height (approximately 160% of body length). The small intestine is divided into 3 parts.

a. Duodenum - no mesentery (anatomy is described in the section Diseases of the stomach and duodenum).

b. The jejunum is the proximal (oral) part of the small intestine, making up approximately 40 % of the total length. This section of the small intestine has the largest diameter, thicker wall, and more pronounced circular mucosal folds. The mesentery of the jejunum contains less fatty tissue than the mesentery of the ileum.

c. The ileum, which accounts for 60 % of the total length. In the distal part, it contains pronounced accumulations of lymphoid tissue (peyer's plaques) located in the submucosa.

The ileum and jejunum are located intraperitoneally and have a long mesentery that fixes them to the posterior abdominal wall.

Blood supply. Arterial blood enters the small intestine from the superior mesenteric artery, whose branches form the following arteries: 1. Inferior pancreaticoduodenal artery; 2. Small intestinal arteries, which form numerous arcuate anastomoses (arcades) in several tiers; 3. Cecum-coeliac artery - one of its branches supplies the terminal part of the ileum. Venous outflow is carried out in the system of

the portal vein. The superior mesenteric vein carries blood from the small intestine to it.

Lymphatic drainage. The lymphatic vessels of the small intestine are called milky because of their characteristic milky-white colour after a meal. The lymph from the small intestine passes through numerous lymph nodes in the root of the mesentery and enters the common mesenteric trunk. The latter, after connecting with the abdominal lymphatic trunk, flows into the left lumbar lymphatic trunk.

Innervation. The innervation of the small intestine involves parasympathetic (vagus nerves) and sympathetic (sympathetic borderline trunks) nerve fibres. They are part of the nerve plexuses: 1. Abdominal aortic plexus; 2. Solar plexus; 3. Superior mesenteric plexus. Parasympathetic innervation accelerates the contractile movements of the intestinal wall, and sympathetic innervation weakens them.

The structure of the small intestine wall: 1. The mucosa is lined with intestinal villi, which increases its absorption area to approximately 500^{m2}. The mucosa is assembled in circular Kerkingian folds, which give it its characteristic appearance; 2. The submucosa is very well expressed, in fact, it provides the capacity of intestinal anastomoses. The loose fibrous connective tissue of the submucosa contains Meissner's nerve plexus, blood and lymphatic vessels; 3. The muscularis consists of 2 layers: the outer longitudinal and the inner circular. Between them is the intermuscular nerve plexus, Auerbach's; 4. Serous membrane. The jejunum and ileum are covered with peritoneum on all sides and throughout.

The root of the mesentery of the small intestine is attached to the posterior wall of the abdomen along a line running from top to bottom from the left side of the body of the second lumbar vertebra to the right sacroiliac joint.

Physiology. Food, water and fluids secreted by the stomach, liver and pancreas (about 10 litres per day) enter the small intestine. The main functions of the small intestine are secretory, endocrine, motor, absorptive and excretory.

There are two types of contractile movements of the intestinal wall: pendulous and peristaltic. As a result of pendulous movements, the ring moves with the digestive juices, and peristaltic movements move the food mass through the intestine in the distal direction.

Etiology and pathogenesis

Postoperative intestinal obstruction should be considered separately.

It can be early and late.

Early postoperative intestinal obstruction (functional or mechanical) occurs in the early (before discharge from the hospital) postoperative period.

Late postoperative obstruction is always mechanical, occurring after the patient is discharged from the hospital, in a few months or years.

Causes of early postoperative intestinal obstruction:

1. Abdominal cavity fistula;
2. Technical errors of the surgeon (foreign bodies left in the abdominal cavity, stitching of the posterior wall of the anastomosis, stenosis of the anastomosis zone, wrapping of the intestine around drainage).
3. Obstruction as a result of anastomosis, infiltration or abscess of the abdominal cavity, trapping of the intestine in the aponeurosis defect during eversion.

Late postoperative intestinal obstruction occurs as a result of the development and progression of the adhesion process, as well as in cases where, due to the new

topographic and anatomical relationships of the organs arising after surgery, there are conditions for wrapping, nodulation, invasion and entrapment of the intestinal loops.
The pathogenesis of acute mechanical intestinal obstruction is based on shock. The first and most obvious consequence of mechanical obstruction is the entry and accumulation of large amounts of fluid and electrolytes in the intestinal lumen above the level of obstruction with a simultaneous sharp suppression of reverse absorption in this part of the intestine. This leads to overstretching of the intestinal wall and increased fluid secretion with a simultaneous deterioration in the blood supply to the mucous membrane. The section of the intestine above the level of obstruction loses its ability to absorb electrolytes and water. Since the intestinal lumen is not the body's internal environment, the fluid that is secreting cannot be used to maintain haemostasis and is lost. Stagnation of the intestinal contents promotes the development of microorganisms and the accumulation of gases in the intestine. Bloating and distension of the stomach and intestines leads to irritation of the vomiting centre, antiperistalsis and vomiting, during which the patient loses a lot of fluid containing a large amount of electrolytes and protein. The amount of fluid lost depends primarily on the level of obstruction, the state of secretory and absorption properties of the intestine. The higher the obstruction, the greater the fluid loss. In case of high obstruction accompanied by vomiting, gastric and pancreatic duodenal juice, as well as bile and small intestinal juice, are lost to the outside. The fluid that accumulates in the intestinal lumen and is lost during vomiting has almost the same electrolyte composition as plasma. Therefore, in the initial period of the disease, dehydration occurs mainly due to losses from the extracellular space without significant changes in blood electrolytes. At the same time, there is a decrease in the volume of circulating plasma and blood thickening.

In case of low intestinal obstruction, dehydration is observed for a longer period of time without changes in plasma electrolytes.

General dehydration gradually develops, first extracellular and then intracellular. The volume of circulating blood decreases. The clinical manifestations of this are arterial hypotension and a decrease in central venous pressure. Due to the loss of the liquid part of the blood, the haematocrit rises, the rheological properties of the blood change, and its viscosity increases, which leads to significant microcirculatory disorders. The permeability of the vascular wall increases. A large amount of sodium ions, the main electrolyte of extracellular fluid, is lost along with the liquid part of the blood, which leads to stimulation of aldosterone release, which retains sodium and chlorine in the body.However, potassium ions continue to be excreted in the urine. This results in a condition known in the literature as Dorrow's syndrome. Three potassium ions are excreted from the cell, while two sodium ions and one hydrogen ion are replaced by two sodium ions and, as a result, acidosis develops in the intracellular space and alkalosis in the extracellular space.

Losses of water, proteins and electrolytes lead to a decrease in glomerular filtration rate and a decrease in diuresis. Two forms of azotemia occur sequentially: productive and retentive. That is, initially, the level of residual nitrogen increases as a result of hyperproduction of nitrogenous compounds due to increased protein breakdown, and then - due to a decrease in diuresis.

If the obstruction lasts for more than a day, the described disorders increase: the glycogen stores in the liver and muscles are depleted, the breakdown of proteins and fats of the body's own tissues begins, accompanied by the accumulation of acidic

products, as a result of which extracellular alkalosis is replaced by acidosis. Cell death and decay results in the release of intracellular potassium, but since oliguria is observed, it is not excreted from the body. Thus, hypokalaemia changes to hyperkalaemia. The concentration of nitrogen and urea increases.

In strangulated intestinal obstruction, in addition to protein loss, there is also exclusion from the circulation of red blood cells, which occurs as a result of red blood cells leaving the transudate and being deposited in the vessels and wall of the strangulated intestine. It is known that the volume of blood excluded from the circulation is proportional to the length of the intestinal loop excluded by strangulation. In cases where the strangulated part of the small intestine exceeds one third of the entire small intestine, the volume of blood excluded from circulation reaches 40% or more within a few hours of the onset of the disease.

Overexertion and hypoxia cause a decrease in intestinal wall tone. Increased lactate production and catecholamine release are accompanied by changes in extracellular and intracellular potassium content and a subsequent decrease in intestinal muscle excitability. This is the cause of paralytic intestinal obstruction that occurs in the postoperative period.

A long-term increase in pressure in the intestinal lumen causes severe blood supply disorders and leads to microcirculatory changes. Edema and necrosis of the mucous membrane appear, and intestinal perforation occurs.

In addition to increasing intra-intestinal pressure, the accumulation of fluid and gases in the intestine contributes to an increase in intra-abdominal pressure, which leads to high diaphragmatic pressure and deterioration of respiratory function. High intra-abdominal pressure impairs blood circulation in the inferior vena cava, leading to a decrease in the minute volume.

These changes are accompanied by a significant toxic factor. Along with bacterial intoxication, an important role is played by the toxic effect of autolytic products of the intestinal mucosa, aggressive vasoactive polypeptides and lysosomal enzymes are formed and enter the bloodstream.

Classification.

I. According to the etiopathogenesis are distinguished:

1. Dynamic (functional) obstruction.

A. Spastic. Causes: diseases of the nervous system, hysteria, spasmophilia, dyskinesia, worm infestation, colon polyps.

B. Paralytic. Causes: inflammatory processes in the abdominal cavity (peritonitis), phlegmon, retroperitoneal haematoma, post-laparotomy condition, spinal and pelvic trauma, reflex effects of pathological conditions of extra-abdominal localisation (pneumonia, pleurisy, myocardial infarction), mesenteric vascular thrombosis, infectious diseases (toxic paresis).

1. Mechanical obstruction

A. Obstruction.

1. Intra-organic - worm infestation, foreign bodies, faecal, biliary stones;
2. Intramural - tumours, Crohn's disease, tuberculosis, scarring strictures.
3. Extra-organic - mesenteric cyst, retroperitoneal tumour, ovarian cyst, tumours of the uterus and appendages.

B. Strangulation.

1. Nodulation;

2. Torsion;
3. Strangulated hernia (external, internal).

C. Mixed.

1. Invagination;
2. Adhesive obstruction.

II. By origin:

1. Congenital;
2. Acquired.

III. By the level of obstruction:

1. High;
2. Low.

IV. By clinical course:

1. Acute;
2. Chronic;
3. Complete;
4. Partial.

Clinical symptoms.

There are three phases in the clinical course of intestinal obstruction:

1. 'Ileus cry';
2. Intoxication;
3. Terminal - the stage of peritonitis.

The first and most common symptom of intestinal obstruction is abdominal pain, which in the initial stages is cramping and at the beginning of the disease is determined in the part of the abdomen where the obstruction has formed. Later, it becomes constant, spreads throughout the abdomen, and becomes dull. In the terminal stage of obstruction, the intensity of pain decreases dramatically.

Nausea and vomiting are unstable signs of intestinal obstruction, which are observed in 60 % of cases. The higher the obstruction, the more severe the vomiting. The first vomit consists of stomach contents with bile, then intestinal contents join them. In later stages, vomit acquires a faecal odour. In case of obstructive forms of intestinal obstruction, vomiting does not appear immediately, but once it starts, it becomes continuous.

Delayed stool and gas are frequent and important symptoms of intestinal obstruction. In this pathology, distally located parts of the intestine are not immediately involved in the pathological process. In this regard, in case of intestinal obstruction, especially in its high forms, in the first hours there may be faeces and gas. During conservative measures, it is also possible to obtain the passage of intestinal contents.

Abdominal distention is particularly characteristic of obstructive forms of intestinal obstruction. Uniform abdominal distention is most often observed in small bowel obstruction. If abdominal distention occurs in one part of the abdominal cavity, such symptoms are more typical for colonic obstruction.

During the objective examination, attention is paid to the general condition of the patient, which initially remains satisfactory in case of obstruction, but can deteriorate significantly in the first hours of the disease in case of strangulated obstruction. Pulse acceleration and blood pressure decrease directly depend on the signs of dehydration and the degree of circulating blood volume reduction. The tongue

is wet at first, then becomes dry. Abdominal examination allows to detect a moderate degree of bloating and asymmetry in patients. The shape and asymmetry of the abdomen depend on the location of the obstruction. Uniform abdominal distention is characteristic of small bowel paresis and low forms of small bowel obstruction. In case of high obstruction, abdominal enlargement is observed in the upper parts; in case of torsion, in many cases, a median localisation is noticeable, in case of invaginations, asymmetry is most often in the right hypochondrium. Tumours and invaginations of the abdominal cavity are detected by palpation. Assess the nature, location of pain, and severity of peritoneal irritation symptoms. A ‘splashing noise’ (Sklyarov's symptom) is detected in the intestine. In case of colonic obstruction, there is significant flatulence in the right hypochondrium (Anschutz's symptom).

Percussion is used to detect tympanitis.

Auscultation can reveal high-pitched sounds caused by the movement of fluid and gas. In advanced cases, no intestinal sounds are detected when listening to the abdomen. There are no sounds in the abdominal cavity. This phenomenon is called ‘grave silence’.

Pathognomonic symptoms of intestinal obstruction include: Val's symptom visible asymmetry in the lower abdomen, visible intestinal peristalsis, palpation of a resistant tumour, tympanitis during tumour percussion, Schlange's symptom - visible intestinal peristalsis; Sklyarov's symptom - intestinal splash noise; Kivul's symptom - metallic sound over a distended loop during percussion with a plethysmometer; Spasokukotsky's symptom - falling drop noise. Intestinal invasion is characterised by a triad of symptoms: Tilliax's symptom - periodic appearance of cramping abdominal pain; Roush's symptom - presence of an elastic, low-painful tumour in the abdomen and tenderness during its palpation; Cruvellier's symptom - bloody discharge from the rectum; Babuk's sign - presence of meat slop in the enema contents, detection of red blood cells in the intestinal contents during enema.

All patients with intestinal obstruction are subject to rectal or vaginal examination. Rectal examination makes it possible to detect Grekov's symptom (‘Obukhiv Hospital symptom’) - an empty, stretched rectum, sphincter prolapse, which indicates bowel obstruction. Zege-Manteuffel symptom: it is impossible to introduce more than 500 ml of fluid into the rectum.

Taking into account the time factor, there are three phases in the clinical course of the intestinal obstruction syndrome: ‘ileus cry’, intoxication, and peritonitis.

The phase of ileus cry lasts 12-16 hours, is characterised by acute paroxysmal pain, which is periodically repeated and sometimes so severe that it leads to shock. In the ‘light periods’, in the absence of pain, the condition of patients does not deteriorate. These ‘light intervals’ can be the cause of a diagnostic error during the examination of the patient during this period. In addition to pain, patients are concerned about nausea, vomiting, and retention of faeces and gas. Val's symptoms are almost always positive.

The intoxication phase lasts 12-36 hours. During this period, the pain loses its paroxysmal nature and becomes constant, bloating and abdominal asymmetry appear, vomiting is frequent, and the peralytics disappear. The pulse is accelerated, blood pressure is normal or slightly reduced, and there is complete retention of stool and gas. Val's, Sklyarov's, Kivul's, Shchotkin-Blumberg's symptoms are positive, and clear radiological signs of intestinal obstruction appear during this period.

The terminal phase (peritonitis) develops 36 hours after the onset of the disease. This period is characterised by a marked disturbance in the general condition and functions of a number of organs and systems.

The abdomen is sharply distended, there is no peristalsis. Free fluid is clearly detectable in the free abdominal cavity, the tongue is dry, with a brown coating, and vomiting with a faecal odour occurs periodically. The blood pressure is low, the pulse is frequent and small. All the symptoms of intestinal obstruction and the Shotkin-Blumberg symptom are positive. Patients are in a state of euphoria. Due to profound metabolic disorders, rapid development of infection in the abdominal cavity and severe intoxication, this period of obstruction is called terminal.

Certain forms and types of mechanical intestinal obstruction.

Strangulated intestinal obstruction.

Strangulated intestinal obstruction is a separate type of intestinal obstruction when, in addition to compression of the intestinal lumen, there is compression of the vessels and nerves of the mesentery, which quickly leads to impaired blood circulation in the intestine and can cause necrosis of the intestinal area.

There are three types of strangulated intestinal obstruction: torsion, nodulation and strangulation.

The reversal is observed in those parts of the intestine where there is a mesentery. It is caused by scars and fusions in the abdominal cavity, a long mesentery, fasting with subsequent overfilling of the intestine with roughage, and increased intestinal peristalsis.

Nodule formation can occur at any level of the small and large intestine where the mesentery is mobile. Most often, nodes are formed from the loops of the small intestine and sigmoid colon.

The pinch ring is formed by the small intestine, and the sigmoid colon is pinched.

Small intestine torsion is more commonly observed in the ileum. Distinguish between twisting and mesenteric axis twists. The onset of the disease is acute, the pain is cramping and localised in the upper abdomen or near the navel. Along with pain, nausea and vomiting appear, which does not bring relief. All patients quickly experience retention of faeces and gas. The face is pale, cyanosis of the lips, a pained expression, the tongue is dry. The pulse is frequent, weak, and blood pressure is low. At the onset of the disease, peristalsis is visible to the eye (Schlange's symptom), auscultation reveals increased peristaltic bowel sounds, the abdomen is of normal kinfiguration, soft, painful at the site of strangulation.

Wahl's syndrome quickly appears. After 6-8 hours, all the symptoms somewhat decrease. Intestinal peristalsis is weakened or absent. The Mathieu-Sklyarov, Kivul, and Spasokukotsky symptom can often be detected. A blood test shows neutrophilic leukocytosis, erythrocytosis, increased haemoglobin, decreased albumin, and hypochloraemia. X-ray diagnosis of Kloiber's bowls located in the mesogastric region.

A cecum ileus is accompanied by significant distention of a single loop of the colon on X-rays in the supine position of the patient. Due to the fact that a well-moving cecum can develop a twist, it can take one of three positions

a) under the right half of the diaphragm;

b) in front of the spine

c) to the left of the spine, where the sigmoid colon would be expected to be. Most often, the twisted cecum is located on the left, sometimes in front of the spine, and very

rarely on the right side. Twisted, distended cecum can have a kidney-shaped or oval-round shape. It has a funnel-shaped shape when the distended loop is located on the right or left, and a round-oval shape when it is located in front of the spine. The kidney-shaped shape of the cecum occurs when it is twisted around the transverse or longitudinal axis, and the round-oval shape - when it is twisted around the oblique axis. In the area of distended intestine, contraction of the cecum wall and pronounced haustration are clearly visible, the disappearance of which indicates the possibility of intestinal necrosis.

Ileocecal angle torsion occurs in 4 % of all torsions. There are three types of ileocecal angle torsion: around the mesenteric axis, around its longitudinal axis and kink, and around its transverse axis. Torsions are most often observed in older people, as the mobility of the intestine increases with age. The disease begins acutely, with severe abdominal pain, mainly in the right hypochondrium and around the navel, vomiting, and retention of stool and gas. In most cases, the distended cecum causes abdominal asymmetry, the Wahl symptom. This type of obstruction is characterised by false urges to defecate and prolapse of the right ileum - the Schiman-Dance symptom. X-ray examination of the right ileum reveals a distended cecum and a wide horizontal level, and several small bowls on the left.

Lumbo-colonic volvulus is rare and accounts for 0.5 % of all bowel volvulus. The clinical picture resembles the symptoms of acute strangulated obstruction. On examination and palpation, painful tumour-like masses can be detected in the mid-abdomen. The Mathieu-Sklyarov, Obukhiv Hospital symptoms are positive.

X-ray examination reveals a wide Kloiber's bowl in the mesogastric region. Immediate irrigography and colonoscopy play an important role in establishing the diagnosis, which can determine the level of obstruction.

Sigmoid colon is the most common form of strangulated intestinal obstruction. It mainly affects elderly men. Sigmoid colon is associated with the development of mucosal folds due to scarring changes in the intestinal wall. It occurs in the presence of a long sigmoid colon and a narrow mesenteric root. The onset of the disease is acute. The pain is cramping and is located more often on the left side. Vomiting may be absent for a long time, and then becomes frequent, with a faecal odour. The skin is pale, the pulse is rapid. The tongue is dry. There is always a delay in stool and gas. In the early stages of the disease, Val's syndrome is detected, positive symptoms of Mathieu-Sklyarov, Kivul, Spasokukotsky are determined. Patients have severe intoxication and impaired haemodynamics. Positive symptoms are those of Obukhov Hospital, Zege-Manteuffel. An X-ray examination reveals a gas-inflated sigmoid colon in the form of a large horseshoe and wide levels at its base, a symptom of ‘light abdomen’.

Nodule formation is the most severe form of strangulated obstruction. There are cases of death within 12 hours of the onset of the disease, which is explained by early intestinal gangrene, exclusion of a significant part of the intestine, and shock.

Nodule formation results in a very high mortality rate, which reaches 40-50% despite early surgical intervention. It occurs more often at night (75 %).

The disease begins with the appearance of sharp cramping pain in the abdominal cavity. Patients are restless and cannot find a place in bed. The skin is pale with a greyish tint, covered with cold sweat. Facial features are sharpened, and there is a feeling of fear on the face. At the beginning of the disease, bradycardia occurs, which then turns into tachycardia with a weak pulse filling. The abdomen is unevenly

distended, soft and painful to palpate in the early stages. Sometimes a tumour-like mass can be palpated. Later, intestinal motility is weakened or absent, and fluid appears in the abdominal hollows. The Mathieu-Sklyarov, Kivul, and Val's symptoms are positive. Patients quickly develop peritonitis, intoxication, and dehydration. Two parts of the intestine are always involved in nodule formation, most often the sigmoid and small intestine.

Intestinal obstruction.

It occurs as a result of complete or partial blockage of the intestinal lumen without disturbance of blood circulation in its mesentery. The clinical picture depends on the causes of the obstruction. In case of obstruction caused by gallstones, patients have a history of hepatic colic. They are disturbed by cramping abdominal pain, vomiting, which may have a 'faecal character', suddenly appear and disappear. Delayed stool and gas are intermittent. An abdominal examination reveals asymmetry, and intestinal peristalsis is visible during pain attacks. Val's symptoms are positive, and sometimes a stone can be palpated in the intestine. During auscultation, noises of different timbre are heard, which then disappear with the development of bowel paresis. Sometimes it is possible to palpate the stone through the rectum and vagina. X-ray shows the presence of air in the biliary tract. The level of fluid in the gallbladder when the patient is lying down, dilation of the ileal loop, sometimes a stone, change in the shadow of the stone during treatment.

Obstruction based on ***gallstone blockage*** is diagnosed on the basis of:

1. Patterns of obstruction of the lower small intestine.
2. The presence of gas in the bile ducts of the extrahepatic ducts.

This is best seen on an X-ray taken on the left side. It should be remembered that gas in the biliary tract can also be detected in case of obstruction of the sphincter of Oddi, gallbladder fistula and inflammation of the biliary tract, and therefore, when diagnosing a gallstone, this symptom is important in combination with the picture of obstruction.

Intestinal blockage by ***hookworms*** is acute with the development of spastic intestinal obstruction. The condition of patients deteriorates rapidly (general intoxication along with intoxication by worm decay products). Palpation reveals round or oval tumours of doughy consistency in the terminal small intestine. The blood test shows eosinophilia and worm eggs in the faeces.

Intra-intestinal obstruction, which comes from the intestinal wall, can be caused by ***small bowel tumours*** (0.4-4.0%), ***colon tumours*** (85.0%), and inflammatory changes in the intestine. Diagnosis is always difficult, sometimes the diagnosis is made during surgery. It most often occurs in old age and senility, and is characterised by weight loss, fever, constipation followed by diarrhoea, cramping abdominal pain, vomiting, and abdominal asymmetry. The Val's, Kivul's, and Sklyarov's symptoms are positive. Abdominal radiography shows Kloiber's bowls and pneumatisation of the intestine. A fecal test shows a positive Gregersen's reaction. Changes in blood and urine occur late: on the verge of the second and third stages of the course of obstructive bowel obstruction. Obstructive intestinal obstruction can also occur with extraintestinal obstruction - compression of the intestinal lumen by tumours and cysts from the outside. Diagnostics is carried out with a detailed analysis of all symptoms of obstructive intestinal obstruction, with a careful examination of the patient through the rectum and vagina. When establishing the diagnosis of tumour intestinal obstruction,

one should always remember the ‘small signs syndrome’, which is typical for tumours of the body.

Obstruction of the cecum causes a characteristic picture of small bowel obstruction.

Obstruction of the right half of the colon in case of bauchial sphincter dysfunction is accompanied by distention of the small and large intestine between the obstruction and the bauchial sphincter. In case of an intact sphincter, distention occurs only in the colon upstream of the obstruction. As a result of dysfunction, which is more common, almost the entire small intestine and the corresponding part of the colon are distended, and fluid levels are clearly visible. With a closed bauhinia flap in the colon, a closed-loop obstruction occurs in the colon with significant distention of the cecum and ascending colon and even half of the lumbar colon. The distension can be so significant that it leads to difficulties in the differential diagnosis with cecum ileus. Significant distention of the obstructed bowel indicates the possibility of circulatory disorders in the wall.

Invagination is the entry of one part of the intestine into another. It is considered a mixed type of intestinal obstruction.

Invagination occurs mainly in the first four years after the birth of a child, is acute, and is common in adults and the elderly. Untreated intussusception causes a significant obstruction of a mixed type with subsequent peritonitis, toxaemia or, rarely, part of the intestine coming out through the rectum.

While it is difficult to identify the cause of intussusception in children, in adults, polyps, polypoid cancer, Meckel's diverticulum, submucosal lipoma, appendix, long stump after appendectomy, etc. are found at the top of the intussusception. These pathological changes cause increased peristalsis, which leads to increased invasion. Thus, functional and organic disorders of intestinal motility are among the factors that contribute to invasion.

Invagination mostly occurs when an overlying segment of the intestine enters the underlying segment, but in some cases, the entry can also take place in an ascending manner. Invasion can be lateral, when a part of the intestinal wall is involved, and central, when the entire intestine is invaded. There are three types of invasions: small intestinal, large intestinal, and small-colon.

Most often, the small intestine enters the large intestine at the ileocecal angle. In simple invagination, a cylinder is formed, which includes the mesentery. The place where the inner cylinder bends inside is called the head or apex of the invagination, and the circumference around which the outer cylinder bends is called the neck. In addition to simple invaginates, there may be more complex ones consisting of 5-7 cylinders.

Morphological changes in the invaginate are characterised by obstruction and strangulation of the entering intestine and mesentery, which leads to impaired blood supply to the intestine and gangrene.

The clinical picture of intussusception varies and depends on the location of the intussusception, the degree of mesenteric compression, and the duration of the disease. The main signs of intussusception are: cramping abdominal pain, vomiting, tenesmus of stool and gas - Tilliax's symptom, a doughy tumour on palpation, pain and tenesmus on palpation - Roush's symptom, blood and mucus impurities in the faeces - Cruvelier's symptom, the presence of erythrocytes in the wash water after enema - Babcock's

symptom. There are often positive symptoms of Mathieu-Sklyarov, Val, and in case of ileocecal invasion - Schiman-Dance symptom. Rectal examination reveals blood, mucus on the glove, and sometimes a pencil of invagination can be palpated. Plain radiography of the abdominal cavity shows a homogeneous shadow, contrast medium gives a filling defect with different

Sometimes, in the presence of incomplete strangulation, the symptom of a ‘thin stream’ occurs. Irigography reveals crescentic filling defects in the form of a ‘two-tooth’ or ‘three-tooth’.

Adhesive intestinal obstruction

Adhesive intestinal obstruction refers to mechanical intestinal obstruction caused by congenital or acquired abdominal adhesions.

Adhesive intestinal obstruction ranks first among all types of intestinal obstruction, occurring in 50-60% of cases. In recent years, this form of obstruction has been increasing due to the increasing number of abdominal surgeries, successful treatment of peritonitis of various etiologies, trauma and inflammatory processes of the abdominal cavity, and repeated surgical interventions.

A separate group of congenital adhesions includes **Lane's cords,** adhesions and Jackson's membranes. The cause of these adhesions is not known to this day. Most authors explain their occurrence by a change in the position of the abdominal organs and the upright position of the human body. They are very rare.

Obstructive forms of intestinal obstruction include all cases that occur as a result of adhesions with deformation of the intestinal loops, and strangulated forms include connective tissue and cord-like adhesions that pinch the intestinal wall or mesentery.

Acute adhesive intestinal obstruction is mostly of a mixed nature with a predominance of strangulation. A history of cramping abdominal pain, nausea, vomiting, retention of stool and gas, heart rate in the presence of a postoperative scar on the anterior abdominal wall or inflammatory disease of the abdominal cavity, trauma, should suggest the occurrence of acute adhesive intestinal obstruction. When the intestinal loop is kinked or compressed, there is sometimes pain in the abdomen, which appears, then subsides, then increases. The general condition of the patient in the intervals between pain attacks is satisfactory. In case of strangulation, it immediately deteriorates due to microcirculatory disorders, shock and intoxication. An objective examination reveals abdominal asymmetry, positive Schlange, Val, and Mathieu-Sklyarov symptoms. Plain radiography of the abdominal cavity shows a sharp pneumatisation of the intestine and Kloiber's bowl. The humoral syndrome is gradually increasing.

Laboratory and instrumental diagnostic methods

1. Complete blood count.
2. Hematocrit.
3. General urine analysis.
4. Biochemical blood test.
5. Coagulogram.
6. Overview radiography of the abdominal cavity.
7. Half-cup oral barium Schwartz test.
8. Irigography.
9. Colonoscopy.
10. Ultrasound examination of the abdomen.

11. Laparoscopy.

Laboratory findings: leucocytosis, neutrophilia with nuclear shift to the left. Developing:

hypokalaemia, hyponatraemia, hypochloraemia, hypoproteaemia, dysproteinemia. Samarin's humoral syndrome is characteristic of intestinal obstruction: hypoproteaemia, hypokalemia, hypochloraemia, hypovitaminosis and hypoxia.

A plain radiograph shows Clyber's bowls on a radiological examination. Contrast enterography (Schwartz test, probe enterography) shows a delay in the passage of the contrast agent at the site of obstruction. If colonic obstruction is suspected, irrigography should be used. When the sigmoid colon is twisted, the barium mixture tightly fills the rectum and distal sigmoid colon to the point of twisting, where a narrowing in the form of a 'beak' or a 'sitting bird' shadow is formed. In addition, irrigography makes it possible to diagnose invasion and other causes of obstruction.

Ultrasound diagnostics can detect overstretched intestinal loops with a horizontal fluid level and the presence of flatulence.

Colonoscopy reveals some causes of colon obstruction (e.g., tumour, coprostasis, foreign body), allows recanalization of the tumour-obstructed part of the intestine, and removal of the foreign body (Fig. 23).

Laparoscopically, the condition of the intestine, the presence of exudate, peritonitis, its nature, and extent are determined. Under visual control, the adhesion can be cut.

Differential diagnosis

In the diagnosis of acute intestinal obstruction, it is important to clarify the type of obstruction (mechanical, dynamic), as the methods of treatment for these types of obstruction are different. In mechanical obstruction, intestinal distention is less pronounced than in dynamic obstruction, in most cases occurring in one part of the abdominal cavity. The pain in dynamic obstruction is constant, while in mechanical obstruction it is cramping. During an X-ray examination, it is found that in

functional obstruction, the diaphragm is located high, its movement is limited, and the stomach is dilated with a large amount of gas. In this pathology, there are few Kloiber's cups, they are located at the same level, and there is no movement of fluid from one loop to another. A small amount of fluid is detected in the bowls, and gas-distended intestinal loops are identified. Bilateral paranephric block is a valuable method of differential diagnosis. In case of dynamic intestinal obstruction, the patient's condition improves after it, and clinical symptoms disappear.

Differential diagnosis of acute intestinal obstruction is carried out with acute appendicitis, oral ulcer, acute cholecystitis, acute pancreatitis, torsion ovarian cyst, ectopic pregnancy, mesenteric vascular thromboembolism, renal colic, food toxicity.

Acute appendicitis and intestinal obstruction have the same symptoms: pain, nausea, vomiting, and retention of faeces and gas. However, in acute appendicitis, the pain occurs in the epigastric region and then moves to the right hypochondrium and is not as intense. Pain in intestinal obstruction has a diffuse, often cramping character with the presence of 'light intervals'. In acute appendicitis, muscle tension in the right ileum and positive Rovzing's symptoms are detected,Sitkowski, Bartomieux-Michelson, fever, neutrophilic leukocytosis, which is not typical for acute intestinal obstruction. In addition, there are no radiological signs of intestinal obstruction in acute appendicitis.

Perforated gastric and duodenal ulcers and acute intestinal obstruction also have common symptoms: severe abdominal pain, sudden onset, and retention of stool and gas. However, with a perforated ulcer, there is no bloating, vomiting is rare, and there is no increased peristalsis. In case of intestinalobstruction, the abdomen is soft, not painful for a long time, and a swollen intestinal loop is often palpated, whereas in case of perforated ulcer, the abdomen is board-like, sharply painful, and inaccessible to deep palpation. There is a sharply positive Shotkin-Blumberg symptom. On percussion in the case of a perforated ulcer, there is no hepatic dullness, which is preserved in intestinal obstruction. Auscultation in perforated ulcer does not show intestinal peristalsis, while in obstruction numerous intestinal noises are heard, which disappear in the terminal stage of the disease. X-ray examination of the abdominal cavity in perforated ulcer reveals free gas in the abdominal cavity, in intestinal obstruction - Kloiber's bowl.

Acute cholecystitis also has a number of the same symptoms as acute intestinal obstruction: sudden pain, nausea, vomiting, abdominal distension. At the same time, pain in acute cholecystitis is localized in the right hypochondrium, radiates to the right shoulder and shoulder blade.Muscle tension is determined by palpation in the right hypochondrium, the gallbladder can be palpated. High body temperature, neutrophilic leukocytosis, positive symptoms of Ortner, Murphy, Georgievsky-Mussy, and jaundice often occur with this disease. The listed signs are almost never present with acute intestinal obstruction. Data on intestinal obstruction are always confirmed by X-ray examination.

Acute pancreatitis and acute intestinal obstruction are characterized by the following general signs: the patient's severe condition, sudden onset of pain, intestinal paresis, abdominal distension, frequent vomiting, delayed bowel movements and gas. Whereas with acute pancreatitis, the pain is localized in the upper half of the abdomen and has a girdling character. Abdominal distension in acute pancreatitis occurs only in the upper parts, often palpated swollen lumbocolon. Vomiting with acute pancreatitis is frequent, with impurities of bile, with intestinal obstruction – frequent with fecal odor. The delay of stools and gases in acute pancreatitis is not long-term, there is no increase in constipation. Important diagnostic signs of acute pancreatitis are positive symptoms of Kerte, Mayo-Robson, a significant increase in the blood content and diastasis in the urine.

Disrupted ectopic pregnancy and acute intestinal obstruction have the following general signs: sudden severe abdominal pain, soft, mildly painful abdomen upon palpation, presence of free fluid in the abdominal cavity, normal body temperature. Pain in disturbed ectopic pregnancy is localized in the lower abdomen, and in intestinal obstruction - throughout the abdomen. In addition, with a disrupted ectopic pregnancy, patients complain of irregular menstrual cycles, dizziness, general weakness, fainting. Anemia is evident in the blood. In severe cases, a puncture of the posterior vault of the vagina is important for establishing a diagnosis.

Renal colic and acute intestinal obstruction also have a number of common signs: spasm-like abdominal pain that occurs suddenly, abdominal distension, delayed bowel movements and gases, restless behavior of the patient. While the pain in renal colic radiates to the groin, thigh, is accompanied by dysuric phenomena, which does not happen with intestinal obstruction. Renal colic is characterized by hematuria.

Radiologically, in case of renal colic, it is possible to detect contraints in the kidneys, ureters, in cases of intestinal obstruction - Kloiber cup.

In some cases, uremia can occur with abdominal pain, bloating, and retention of stools and gases. But with uremia, the smell of urea from the mouth is determined, significant changes are observed in the analysis of blood (high content of urea, creatinine) and urine, which are not characteristic of acute intestinal obstruction.

With ***food poisoning*** in the anamnesis, as a rule, there are indications of faults in food, consumption of poor-quality food. Pain is not the main symptom of this pathology. Abdominal pain is preceded by frequent liquid bowel movements, after which the pain disappears, the patient's condition temporarily improves. With acute intestinal obstruction, it has a cramp-like character, liquid stools can only be at the beginning of the disease, when the distal part of the intestine is freed. The body temperature in case of food toxic infection is often elevated, in the case of intestinal obstruction – within the normal range. In case of food poisoning, there is no X-ray picture characteristic of intestinal obstruction.

Lower lobe pneumonia can also be accompanied by abdominal pain, tension in the muscles of the anterior abdominal wall, and bloating. With pneumonia, redness of the face, shortness of breath, limited mobility of the chest on the side of the lesion are observed. By auscultation in the lungs, rales of various calibers, the noise of pleural friction are heard, with percussion - dulling of lung sounds. X-ray examination of the chest and abdomen confirms the presence of pneumonia and excludes intestinal obstruction.

With the abdominal form of ***myocardial infarction***, patients are diagnosed with abdominal pain, bloating, nausea, vomiting, delayed bowel movements and gas. Whereas with a myocardial infarction, the following symptoms are in the first place: tachycardia, decrease in blood pressure, muffled heart sounds, expansion of heart borders. Research and analysis of the ECG in these cases is one of the decisive diagnostic methods. At the same time, the anamnesis of the disease should be taken into account: pain in the area of the heart, feeling of fear, etc.

A disintegrating ***aneurysm of the abdominal aorta*** is also often accompanied by abdominal pain, nausea, vomiting, and absence of bowel sounds. But this pathology is accompanied by anemia. The anterior abdominal wall is retracted and participates in the act of breathing. By palpation along the midline of the abdomen and slightly to the right, an oblong neoplasm that pulsates under the fingers is determined. A systolic murmur is clearly heard above it.

Obstruction of the left half of the large intestine also causes swelling of the small and large intestines, but most often swelling is observed in the large intestine, especially the most pliable cecum expands.

Treatment tactics and choice of treatment method.

Tactics before the operation.

1. Gastric drainage, cleansing (siphon if necessary) enema, antispasmodics, paranephric blockade. All measures should take no more than two hours from the moment the patient enters the hospital.

2. In the case of resolution of intestinal obstruction after conservative therapy, the patient is subject to a full clinical examination in order to find out the cause of the obstruction.

3. In case of lack of effect from conservative treatment, emergency surgery is indicated.

Surgical treatment.

Preoperative preparation includes the following procedures.

1. Drainage of the stomach with a permanent probe.

2. Administration of drugs to regulate the respiratory system, blood circulation and other life-supporting organs and systems.

3. Infusion therapy in the required volume under the control of CVP.

The rule of three catheters is mandatory: a catheter in the central vein, a probe in the stomach, a catheter in the bladder.

Premedication: omnopon, atropine sulfate, diphenhydramine.

Analgesia - the method of choice should be endotracheal anesthesia. Operative access - middle - middle laparotomy with its expansion after intraoperative revision and assessment of the situation.

Revision and examination of the internal organs of the abdominal cavity is systematic and thorough. Bowel loops should be moved carefully, using moistened napkins.

The main task of surgical treatment of intestinal obstruction is to eliminate the obstruction and establish the viability of the intestine. Decompression of the small intestine is carried out with the help of its nasogastric intubation, the large intestine - through the rectum.

Decompression is possible through the enterotomy hole in the diverting loop, through a gastrostomy and a cecostomy.

The viability of the intestine is determined visually by colour, peristalsis and pulsation of vessels, as well as with the help of dopplerography, EMG, spectroscopy. Table 2.

Table 2. Determination of the viability of a pinched intestinal loop

Sign	Viable intestine	Unviable intestine
Colour	Bluish, dark red	Black-green, dark blue
Appearance of the peritoneum	Smooth with isolated hemorrhages under the serosa	Without shine, matte, multiple hemorrhages under the serosa
The condition of the mesentery	Swollen with pulsation of blood vessels, no blood clots	Vascular thrombosis, no pulsation
Peristalsis	Rarely	Absent
Reaction to irritation with a warm saline solution	The colour is red, peristalsis, pulsation of blood vessels appears	The colour does not change, there is no pulsation of blood vessels and peristalsis

In case of nonviability of the intestine, resection of the changed part of the intestine is performed with the removal of the afferent loop 40 centimetres from the necrosis zone and the efferent loop 20 centimetres from the necrosis zone, followed by side-to-side or end-to-end anastomosis.

If the cause of obstruction is a cancerous tumour, different tactical options can be used in accordance with the intraoperative situation.

With tumours of the cecum, ascending colon and hepatic angle of the colon, the following options are possible:

1. When there are no signs of peritonitis, right-sided hemicolectomy is indicated.
2. In case of peritonitis, severe condition of the patient - ileostomy, lavage and drainage of the abdominal cavity.
3. In case of inoperable tumour and absence of peritonitis - ileotransversostomy. For tumours of the splenic angle and the descending part of the colon:
1. Without signs of peritonitis, left-sided hemicolectomy with colostomy is indicated.
2. Transversostomy should be limited to peritonitis and severe hemodynamic disorders.
3. If the tumour is inoperable and there is no peritonitis, a bypass anastomosis should be applied.

In case of tumours of the sigmoid colon, resection of the part of the intestine with the tumour according to the Hartmann method or the imposition of a double-barrel colostomy is indicated.

Elimination of strangulation intestinal obstruction.

In the case of nodulation and volvulus, if there is no necrosis of the intestine, the knot should be untied and the volvulus eliminated. In case of necrosis, it is necessary to perform resection of the intestine according to the classical rules. In case of peritonitis, the operation is completed with an intestinal stoma. In case of intussusception, disinvagination is performed, in case of necrosis - resection, in case of peritonitis - ileostomy. In the case of a sigmoid volvulus on the ground of the dolichosigma, after straightening the volvulus, a Hagen-Torn meso-sigmoplication should be performed.

In case of adhesion intestinal obstruction, the adhesions are crossed, the "double-barrels" are eliminated. In order to prevent adhesion disease of the peritoneum, the abdominal cavity is washed with a solution of fibrinolytics.

When the intestine is obstructed by a gallstone or roundworm, an enterotomy is performed on a healthy part of the intestine to remove the obstruction (stone or roundworm). Sometimes a ball of roundworms can be moved into the large intestine.

At the end of the operation, with all types of intestinal obstruction, the abdominal cavity is thoroughly cleaned and drained. The operation ends with intestinal intubation. (Fig. 29)

Principles of management of the postoperative period.

After the operation, the patient should be transferred to the intensive care unit.

1. The diet depends on the nature and scope of the surgical intervention.

2. Physical mode. In the first days, the patient's position in bed with the head elevated (Fowler's position). Breathing exercises, chest percussion massage. Getting out of bed early. Stitches are removed on the 8-9th day.

3. Discharge on the 10-12th day after the operation with an uncomplicated course.

4. Detoxification, substitute infusion therapy (colloid, salt solutions, glucose).

5. Improvement of rheological properties of blood (rheopoliglyukin, refortan, stabizol).

6. Broad-spectrum antibiotics in combination with trichopol drugs (metronidazole).

7. Normalization of electrolyte metabolism and acid-alkaline balance (potassium, sodium, calcium salt solutions, sodium bicarbonate).

8. Normalization of respiratory systems, blood circulation, cardiac activity (cordiamine, sulfocamphocaine, corglycon, strophantin, curantyl, fenoptin).

9. Prevention of thromboembolic complications (fraxiparin).

10. Prevention of liver and kidney failure (ascorbic, glutamic, lipoic acids, methionine, essential, controlled hemodilution).

11. Mechanical, chemical and electrical stimulation of the gastrointestinal tract (enema with hypertonic solution, kalimin, proserin, electrical stimulation).

12. General strengthening, immunostimulating therapy (vitamins, methyluracil, thymus preparations, anabolic hormones).

13. Hormonal therapy according to indications.

hyperbaric oxygenation, extracorporeal methods of detoxification, enterosorption according to indications.

Complications in the postoperative period.

1. Necrosis of a strangulated loop of the intestine. Tactics: relaparotomy, bowel resection or enterostomy. Toilet and drainage of the abdominal cavity.
2. Bleeding. Tactics: relaparotomy, stopping bleeding, toilet and drainage of the abdominal cavity.
3. Failure of anastomotic sutures. Tactics: relaparotomy, enterostomy, toilet and drainage of the abdominal cavity.
4. Abscesses of the abdominal cavity. Tactics: opening and draining the abscess cavity.
5. Intestinal fistulas. Treatment is conservative. Toilet skin in the area of the fistula (zinc paste, gypsum-fat paste, Lasara paste, BF-6 glue, protective films). Early surgery is indicated for patients with high, complete fistulae due to rapid exhaustion caused by large losses of water, electrolytes, and protein. Resection of the loop with fistula and intubation of the intestines are performed.
6. Adhesion disease of the peritoneum. Tactics: In case of early adhesive intestinal obstruction

– relaparotomy, separation of ligaments, intestinal intubation. Without obstruction phenomena – diet therapy, therapeutic gymnastics, physiotherapeutic treatment (iontophoresis with proteolytic enzymes). Dispensary observation.

5. Plan and organizational structure of the lesson.

№	The main stages of the lesson. Their function, content.	Learning objectives in mastery	Control and training methods.	Methodological support materials	Time in minutes

		levels			
1	2	3	4	5	6
Preparatory stage					
1.	Organization of the lesson.				5 min.
2.	Setting educational goals and motivation of the topic.				10 min.
3.	Control of the initial level of knowledge, skills, abilities.				
	a) Anatomy and physiology of the small and large intestine	II	1. Individual oral survey.	1.Tables 2. Slides 3. Presentation, computer control	
	b) Etiology and pathogenesis of acute intestinal obstruction.	II	2.Written theoretical survey		60 min.
	c) Diagnostic program at acute intestinal obstruction	III		4. Level III tasks	
	d) Conservative therapy preparation for surgery	II	3.Solving unusual problems		
	e) Operative interventions for acute intestinal obstruction	II	4. Solutions to problems. 5.Prescribing treatment to the patient.	5. Equipment, radiographs, medical history.	
Main stage					
4.	Formation of professional skills and abilities				
	1. Master the methods of objective examination of patients with acute intestinal obstruction	III	Method of formation of practical training skills	Educational equipment, orientation maps.	
	2. Carry out the treatment of a patient with acute intestinal obstruction	III	Method of formation of skills.	Atypical tasks in the form:	

			A) professional training in solving typical and atypical problems.	patient, case histories, test situational tasks, business games, bandages	
	3. Take part in the x-ray examination of the patient (examination X-ray, irrigoscopy)		B) Interpretation of X-ray and fibrocolonoscopy data		
4. Take part in fibrocolonoscopy. 5. Bandaging the patient in the postoperative period		II III			
Final stage					
Control and correction of the level of professional skills and abilities		III	Control method: individual control of practical skills	Equipment	60 min.
Summarizing the results of the lesson.					3 min.
Homework, educational literature on the topic.			Oriented maps of independent work with literature		2 min.

6. Materials on methodological support of the lesson

6.1. Control materials for the preparatory stage of the lesson

Questions.

1. Classification of intestinal obstruction.
2. Spastic intestinal obstruction (SIO).
3. Paralytic intestinal obstruction.
4. Differential diagnostic signs of spastic and paralytic IO.
5. Obstructive IO.
6. Strangulated IO.
7. Differential diagnosis of obstruction and strangulated obstruction.
8. Surgeon's tactics depending on the form of mechanical obstruction.
9. Preoperative preparation of patients depending on the form of obstruction and age. Basics of metabolic processes correction.

10. Choosing the method of surgery for different types of intestinal obstruction.
11. Features of the postoperative period. Diagnosis and correction of metabolic disorders. Combating intoxication and intestinal paresis.
12. Diagnosis and prevention of postoperative complications.

Situational tasks

1. A patient with acute intestinal obstruction was found to have a complete obstruction of the rectum by a tumour. What are the surgeon's actions?
Answer: Impose a sigmostomy to eliminate intestinal obstruction. Later, if the tumour is operable, perform a radical operation.

2. During the operation, the patient was found to have a complete obturation of the cecum by a tumour. The tumour is inoperable. The patient's condition is serious. What is the surgeon's tactic?
Answer: Ileotransverse anastomosis.

3. In a patient with adhesive obstruction, necrosis of the small intestine was detected during surgery. What is the tactic?
Answer: Resect the area, retreating 40 cm proximally and 20 cm distally from the visible border of the necrosis with a side-to-side anastomosis.

6.2. Materials for the main stage of the class

1) On the 4th day after appendectomy (phlegmonous appendicitis), a 16-year-old patient developed acute abdominal pain (like colic), vomiting, abdominal distention, stool and gas retention. What is the most likely complication?
A. Mesenteric intestinal obstruction.
B. Perforation of the cecum.
C. Mesenteric vascular thrombosis.
D. Abscess of the Douglas space.
E. Bleeding from the appendicular artery.

2) An elderly woman, 66 years old, complains of colicky abdominal pain, nausea, vomiting, bloating, stool and gas retention. An examination X-ray of the abdominal cavity revealed Kloiber's bowls and intestinal pneumatosis. During the year, she lost 15 kg of weight. Urgent irrigoscopy. Barium filled the rectum and the lower 1/3 of the sigma, and does not pass further. What is the most likely diagnosis?
A. Cancer of the sigma.
B. Spastic colitis.
C. Sigmoid colitis.
D. Crohn's disease.
E. Intestinal invasion.

3) To decide the scope of surgical intervention for a malignant sigmoid tumour complicated by acute intestinal obstruction, additional examination methods are required. What are they?
A. Ultrasound of the liver.
B. Laparoscopy.
C. Pneumoperitoneum.
D. Gastrofibroscopy.
E. Selective angiography.

4) After resection of 1 metre of the small intestine due to its necrosis during a reversal, a young man was given a side-to-side enteroenteroanastomosis. List the main elements of conservative therapy in the postoperative period:
A. Gastric drainage for decompression of the gastrointestinal tract, intestinal stimulation, antibiotic therapy, analgesia, infusion.
B. Breathing exercises.
C. Hemotransfusion, paranephric blockade.
D. Inhibitory and hepatoprotective therapy.
E. Administration of cardiovascular and anticoagulant drugs.
5) During a laparotomy for acute mesenteric intestinal obstruction in a patient, 55 years old, a 20 cm long dark coloured intestinal loop was found, a large amount of haemorrhagic fluid in the abdominal cavity. What should be the surgeon's tactics?
A. Perform a resection 40 cm distal and 15 cm proximal to the strangulation furrow; nasoenteric intubation, drainage of the abdominal cavity.
B. Inject a solution of novocaine with heparin into the mesentery, drain the abdominal cavity, and suture the surgical wound.
C. Bring the necrotised intestine to the abdominal wall, suture the wound.
D. Resect the necrotised bowel 60 cm proximal and 40 cm distal to the strigulation sulcus.
E. Resect the necrotised bowel 20 cm proximal and 30 cm distal to the strangulation sulcus, intubate the small bowel through the nose, and drain the abdominal cavity.
6) During surgery for high small bowel obstruction that had developed over 2 days, a woman, 62 years old, was found to have a gallstone in the small intestine at a distance of 20 cm from the Trace ligament, which was obstructing the intestinal lumen. A duodenal fistula was also found. What type of surgical intervention is optimal?
A. Enterotomy below the calculus, its removal, suturing of the intestine in the transverse direction.
B. Resection of the intestine with the stone, side-to-side anastomosis.
C. Enterotomy above the stone, removal of the stone, suturing of the intestine transversely.
D. Enterotomy above the calculus, removal of the calculus, suturing of the intestine transversely.
E. Enterotomy below the calculus, removal of the calculus, suturing of the intestine transversely, cholecystectomy, suturing of duodenal fistula.
7) On the 4th day after appendectomy for phlegmonous appendicitis, a 14-year-old child developed cramping abdominal pain, nausea, vomiting, abdominal distention, stool and gas retention. Loud intestinal peristalsis is heard from a distance. What complication has arisen?
A. Early mesenteric obstruction.
B. Bleeding from the appendicular artery.
C. Failure of the stump of the cecum.
D. Abscess of Douglas' space.
E. Gastric distention.
8) During the operation for acute mesenteric intestinal obstruction in a woman, 62 years old, (in the past she underwent appendectomy, cholecystectomy, tubectomy for ectopic pregnancy) it was found that the small intestine was deformed by the mesenteric process, the mesentery of the terminal small intestine was scarred. The

entire small intestine, the cecum, ascending, transverse colon, and ileum are severely distended, full of liquid contents and gases. The descending colon and sigma were asleep, without intestinal contents. What is the likely location of the pathological process that caused the intestinal obstruction?
A. Splenic bend of the colon.
B. Cecum.
C. Terminal section of the small intestine.
D. Transverse colon.
E. Hepatic bend of the colon.
9) During the operation for mesenteric intestinal obstruction lasting 1 day in a woman, 58 years old, a pronounced mesenteric process was found after uterine amputation for fibroid. The small intestine is deformed, in the form of a double trunk, distended by gases, overstretched by intestinal contents. Some loops of the intestine have deserosified areas. The distal part of the small intestine was sharply shrunken, proximally overstretched, distended, and cyanotic in colour. Due to compression of the intestine by scar tissue, some areas are dark purple in colour. The mesentery is scarred. Name the convincing signs of intestinal failure:
A. Absence of vascular pulsation.
B. Deserosion of the intestine of purple-blue colour.
C. Deformed intestine in the form of ‘two-barrelled’ with a cyanotic tint.
D. Overstretching of the adductor section.
E. Descent of the ileum.
10) A 67-year-old woman with third-degree obesity complained of severe pain in the area of hernial protrusion, repeated vomiting, stool and gas retention. She has been suffering from a postoperative ventral hernia for many years (she had a caesarean section). Over the past 5 years, the hernia has increased significantly, and 6 hours ago, it became strangulated. The patient's condition is severe, dyspnoea at rest, cyanotic skin. The pulse is 120 beats per minute, arrhythmic, of satisfactory filling and tension. The abdomen is distended, in the area of the old postoperative scar from the umbilicus to the womb, a hernial protrusion (25x20x20 cm) is moderately painful, dense-elastic consistency, which does not extend into the abdominal cavity. The coughing symptom is negative. The rest of the abdomen is soft, somewhat painful. After a short-term (30 minutes) preoperative preparation, a herniotomy was performed. ‘Hernial water’ was found in the hernial bladder. The total length of the obstructed bowel was about 1 m. After opening the strangulated ring, the intestine became viable. The correct tactics of the surgeon:
A. After opening the strangulated ring and eliminating the obstruction over the intestine, suture the skin wound.
B. Inject novocaine into the mesentery of the strangulated intestine, insert the intestine into the abdominal cavity, and perform Sapezhko plasty.
C. Resection of the intestine in the hernia bladder, side-to-side anastomosis, plasty with synthetic mesh.
D. To insert the intestine into the abdominal cavity, to perform conventional suturing of the abdominal wall wound after resection of the hernia sac.
E. Eliminate the entrapment, reinsert the intestine into the abdominal cavity, perform total intubation for decompression, and perform abdominal wall plasty.

11) A 56-year-old woman presented with severe cramping abdominal pain, nausea, repeated vomiting, bloating, stool and gas retention. She became ill 6 hours ago unexpectedly. 3 years ago she underwent cholecystectomy, a year ago - uterine amputation for fibroids. The abdomen is distended, moderately painful in areas of old postoperative scars. Peristalsis is heard at a distance. Symptoms of peritoneal irritation are doubtful. Leukocytosis 15 G/l; ESR - 10 mm/h; urine diastasis - 256. Which of the following examination methods will help in identifying the correct diagnosis?
A. Plain radiography of the abdominal cavity.
B. Laparoscopy.
C. Rectoromanoscopy.
D. ERCP.
E. Pneumogastrography.
12) A patient, 58 years old, consulted a general practitioner with complaints of abdominal distension, constant constipation. The patient's condition has worsened over the past 2 months. He constantly takes laxatives, enemas. Appetite has disappeared. Rectoromanoscopy: the rectoscope is inserted 15 cm and rests against the circular constriction. A biopsy was performed. What is your preliminary diagnosis?
A. Cancer of the rectosigmoid colon.
B. Polyp of the upper ampulla of the rectum.
C. Cancer of the sigmoid colon.
D. Coprostasis.
E. Sigmoid colon volvulus.
13) Patient B. was admitted with complaints of constant pain in the left iliac region, frequent false defecation, mucus and blood discharge from the rectum. The sigmoid colon is palpated as a spasmodic cord. The rectal ampulla is empty. At a height of 8-9 cm from the external sphincter of the rectum, a tumour-like mass with an unchanged mucous membrane is detected. What is your diagnosis?
A. Invasion of the rectosigmoid section.
B. Cancer of the sigmoid colon.
C. Ulcerative colitis.
D. Cancer of the rectum.
E. Sigmoid colon volvulus.

6.3. Materials of methodological support for self-study of higher education applicants.

№	Main tasks (to learn)	Instructions (to name)
1.	Anatomical and physiological structure of the small and large intestine	- Parts of the small intestine - Parts of the colon
2.	Classification of acute intestinal obstruction	- Types of mechanical obstruction - Types of dynamic obstruction - Causes of obstruction

3.	Clinical signs of acute intestinal obstruction	- Mesenteric obstruction - Tumour obstruction - Paralytic obstruction - Spastic obstruction
4.	Methods of examination of patients with AIO	- Collection of anamneses. - Examination of the abdominal organs by fluoroscopy - Irrigoscopy. - Barium passage. - Fibrocolonoscopy - Finger examination of the rectum.
5.	Conservative therapy of AIO	- Infusion -Spasmolytic therapy -Enema therapy - Stimulation of peristalsis
6.	Surgical methods of treatment of AIO	- Dissection of joints -Removal of tumours with a colostomy (Hartmann operation) -Bypass anastomosis -Resection of the small intestine with anastomosis.

Literature:

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