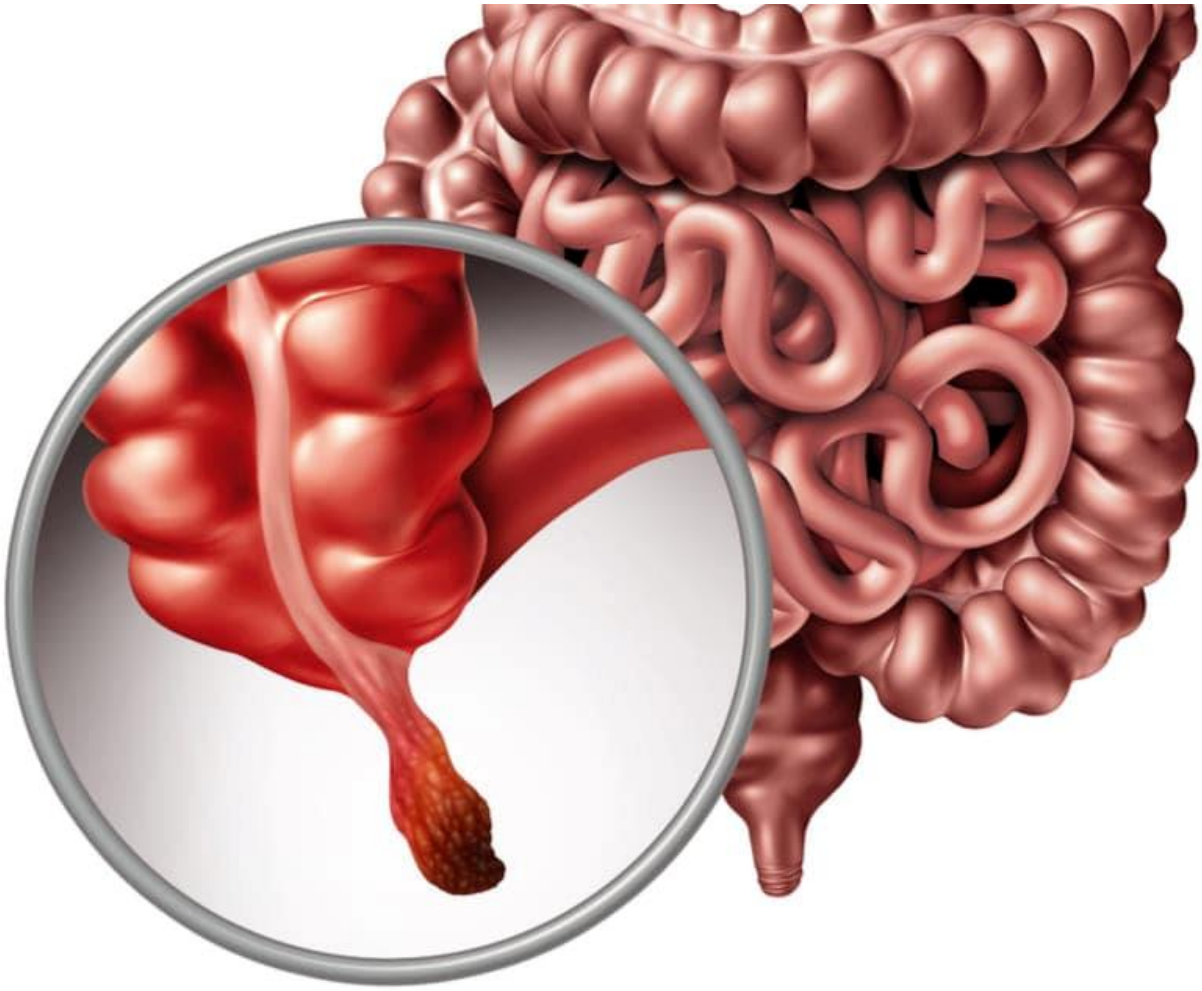
ROYAL METROPOLITAN UNIVERSITY

Department of Clinical Disciplines

ACUTE APPENDICITIS

Educational and methodological manual for students



BISHKEK 2022

UDC 616.346.2-002.1(575.2)

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Printed on the recommendation of the RMU Academic Council, Protocol № 1 dated 09.09.2022.

Compiled by:

Toktosunov U.T.,

Nazir Muhammad Imran,

Jaxymbaev N. B.

Saliev A.Zn.

The educational and methodical manual is devoted to acute appendicitis. Objectives and tasks are spelled out in a form understandable to students. The presentation of the material is intended to provide students with a unified picture, since this material is based on a universally recognized academic structure in the world, starting with etiology/pathogenesis and ending with treatment and postoperative complications. In order to check the level of students' knowledge, control questions, tests and tasks, and situational problems are given.

The educational and methodical manual is written in English at the highest level and is intended for international students of the 6th semester of the Faculty of "Medical Science" of the RMU

Reviewers:

Doctor of Medical Sciences, Professor of the Department of Clinical Disciplines RMU Kenzhaev M.G.

Doctor of Medical Sciences, acting Professor of the Department of Faculty Surgery named after Kakish Ryskulova of I.K. Akhunbaev KSMA Aitbaev S.A.

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1. Introduction

1.1. Relevance.

The medical and social significance of the problem of acute appendicitis is due to its high prevalence. Acute inflammation of the process is observed during life in 7-12% of the population of highly developed countries. The risk of the disease decreases with age [1].

1.2. The purpose of the lesson

The formation of the main professional competencies of a specialist of a medical doctor, provided for by the federal state educational standard of higher professional education in the specialty "medical care" within the didactic module "emergency abdominal surgery", the didactic unit "acute appendicitis" on the basis of:

- study of clinical, laboratory and instrumental diagnostics of acute appendicitis, including atypical location of the appendix.
- mastering the algorithm of tactics and basic principles of surgical treatment of acute appendicitis, as well as the principles of postoperative management.
- application of methods of physical, laboratory and instrumental examination of patients with various variants of the clinical course of acute appendicitis.

1.3. Tasks of the lesson

When mastering the materials of the lesson, the student should form the following theoretical and practical clinical and diagnostic competencies:

Theoretical competencies include:

-Etiology and pathogenesis of acute appendicitis.

-Classification of acute appendicitis.

-Clinical manifestations of acute appendicitis, depending on the location of the appendix.

-Basic methods of clinical, laboratory and instrumental diagnostics.

-The main stages of surgical treatment of appendicitis, the principles of postoperative management.

As a result of the development of practical competencies, the student must:

-Conduct a survey of patients with acute appendicitis, identify clinical features, depending on the location of the appendix.

-Perform an objective study of patients with the determination of specific symptoms characteristic of both appendicitis with a typical location of the process and atypical localization of the appendix.

-Interpret the main clinical indicators and data of X-ray examinations used for the diagnosis of acute appendicitis.

Requirements for the initial level of knowledge. To fully master the topic, you need to repeat the following material:

1. Normal and topographic anatomy — anatomical features of the ileocecal angle and VA, location, structure, blood supply, innervation.

2. Normal and pathological physiology — the function of VA in the processes of homeostasis of the body.

3. Histology-features of the histological structure of the cecum and VA.

Duration of the lesson: academic hours are allocated for the study of the topic.

2. Etiology, pathogenesis, pathophysiology.

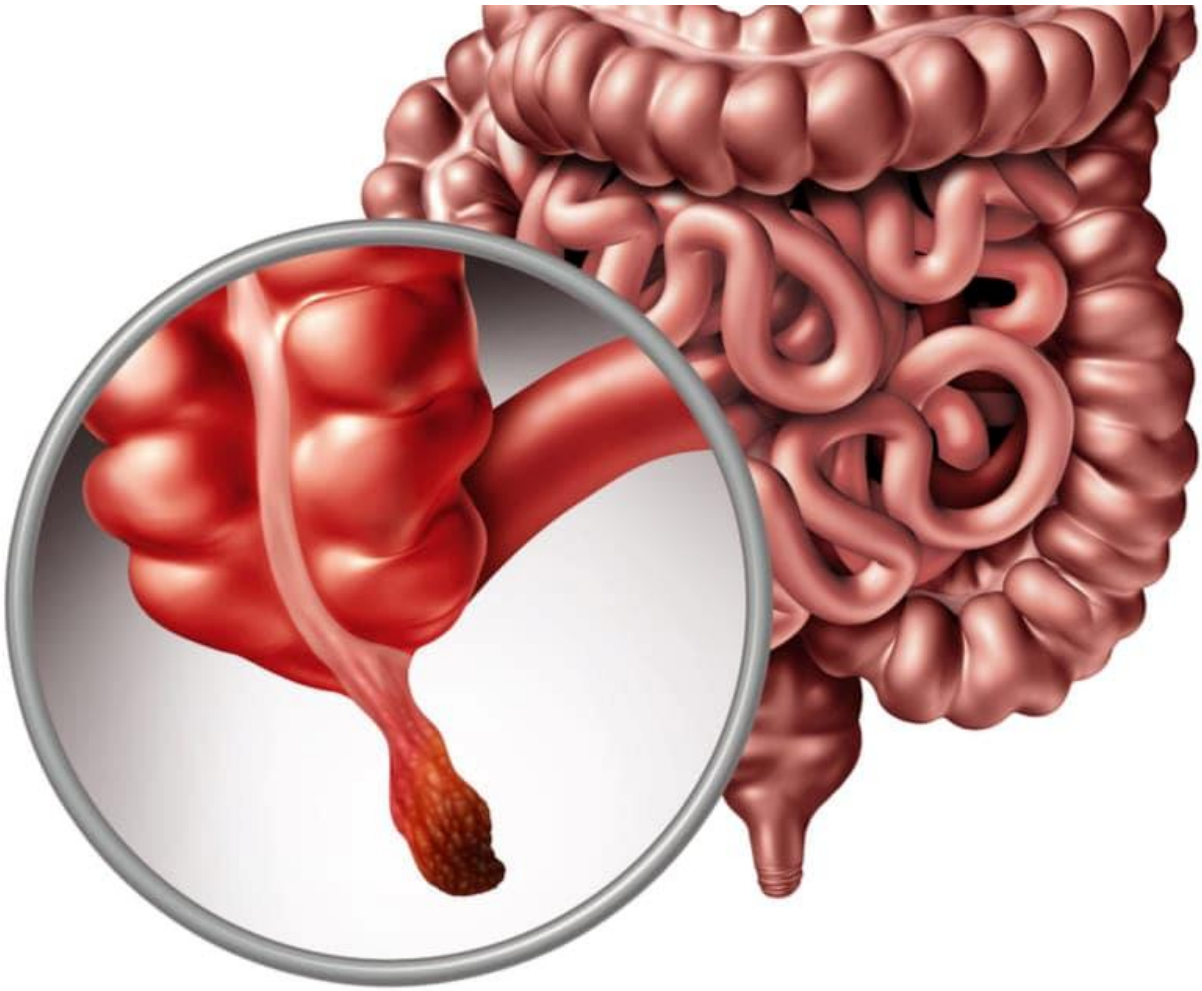

Fig. 2.1 Acute appendicitis

Acute appendicitis is the most common surgical disease of the abdominal cavity. The frequency of the disease is 1 case per 200-250 people annually. The share of inflammation of the appendix accounts for 75-85 % of all cases of acute surgical pathology of the abdominal cavity. Postoperative mortality in acute appendicitis reaches 0.1–0.3 % and is associated with an atypical location of the process and the development of complications. Despite the great achievements of modern surgery, the diagnosis of this pathology sometimes puts practitioners in difficult situations, especially in the atypical course of the disease.

Acute appendicitis does not have a specific pathogen. The cause of acute appendicitis can be all microorganisms of the cecum. Microorganisms in the lumen of the appendix are always present, but not all people have acute appendicitis. The

reaction of the macroorganism to the introduction of microorganisms has a decisive influence on the occurrence and course of the disease.

There are many theories of the occurrence of acute appendicitis: infectious, vasomotor disorders, neurotrophic disorders, stagnation theory, helminthic invasion, and others.

The inflammatory process in acute appendicitis always begins from the mucosal and submucosal layers and spreads to the serous one. With the development of inflammation in the vermiform process, exudate appears, the amount of which gradually increases. The exudate not only infiltrates the process tissues, but is also released into the free abdominal cavity. Exudate contains microorganisms and necrotoxins.

In parallel with the development of inflammation, the body tries to distinguish the resulting pathological focus. The vermiform process is approached by various organs and tissues that surround it from all sides and isolate it from the free abdominal cavity. Sometimes it works, sometimes it doesn't.

Until now, there are two opposing views on the occurrence and development of acute appendicitis (by stages and by forms). Proponents of the development of the disease by stages suggest that one form (catarrhal appendicitis) gradually passes into another, more severe (phlegmonous or perforated appendicitis). Followers of the development of the disease by forms believe that a particular patient immediately develops some one (mild or severe) form of acute appendicitis. Clinical practice provides a sufficient number of confirmations for both one and the other point of view.

Rarely, the inflammatory process in the appendix can undergo reverse development, and sometimes it can recur [2].

3. Classification

There are many different classifications of acute appendicitis, most of which are based on morphological changes in the appendix. Proposed classification, taking

into account the functional state of the ileocecal region of the gut - "sharp appendicovesicostomy". However, the most common, to date, are the classification of acute appendicitis, proposed by V. I. Kolesov (1972) and V. S. Savelyev (1985), which, in our opinion, is not necessary to revise.

Classification of acute appendicitis according to V. I. Kolesov, 1972.

There are the following forms of acute appendicitis:

1) Mild appendicitis (the so-called appendicular,or mucosal, colic);

2) Simple (superficial, or catarrhal, appendicitis);

3) Destructive appendicitis: a) phlegmonous, b) gangrenous, c)
perforated (perforated) gangrenous;

4) Complicated appendicitis: a) appendicular infiltrate (well-defined, progressive), b) appendicular abscess, c) diffuse purulent peritonitis, d) other complications of acute appendicitis (pileflebitis, sepsis, etc.).

Classification of acute appendicitis according to V. S. Savelyev, 1985.

Uncomplicated forms:

1) Catarrhal appendicitis;

2) Phlegmonous appendicitis;

3) Gangrenous appendicitis;

4) Perforated appendicitis;

5) Empyema of the vermiform process.

Complicated forms:

1) Appendicular infiltrate;

2) Diffuse peritonitis;

3) abscesses of the abdominal cavity: pelvic, subphrenic, mikesiction, the right iliac fossa;

4) Retroperitoneal phlegmon;

5) Pylephlebitis (septic thrombophlebitis of the mesenteric veins)

4. Clinical picture

Acute appendicitis is characterized by certain complaints and symptoms that depend on various reasons: time elapsed from the onset of the disease, location of the Appendix, the patient's age, presence of comorbidities and physiological state of the body, naturepathomorphological changes both in the process itself and in the abdominal cavity.

The disease begins suddenly, against the background of complete well-being. The main complaints in patients with acute appendicitis are abdominal pain (in 100%), nausea, vomiting. Other complaints-dysuria, diarrhea are not constant.

At the beginning of the disease, the localization of pain is unstable and corresponds to the location of the inflamed process.

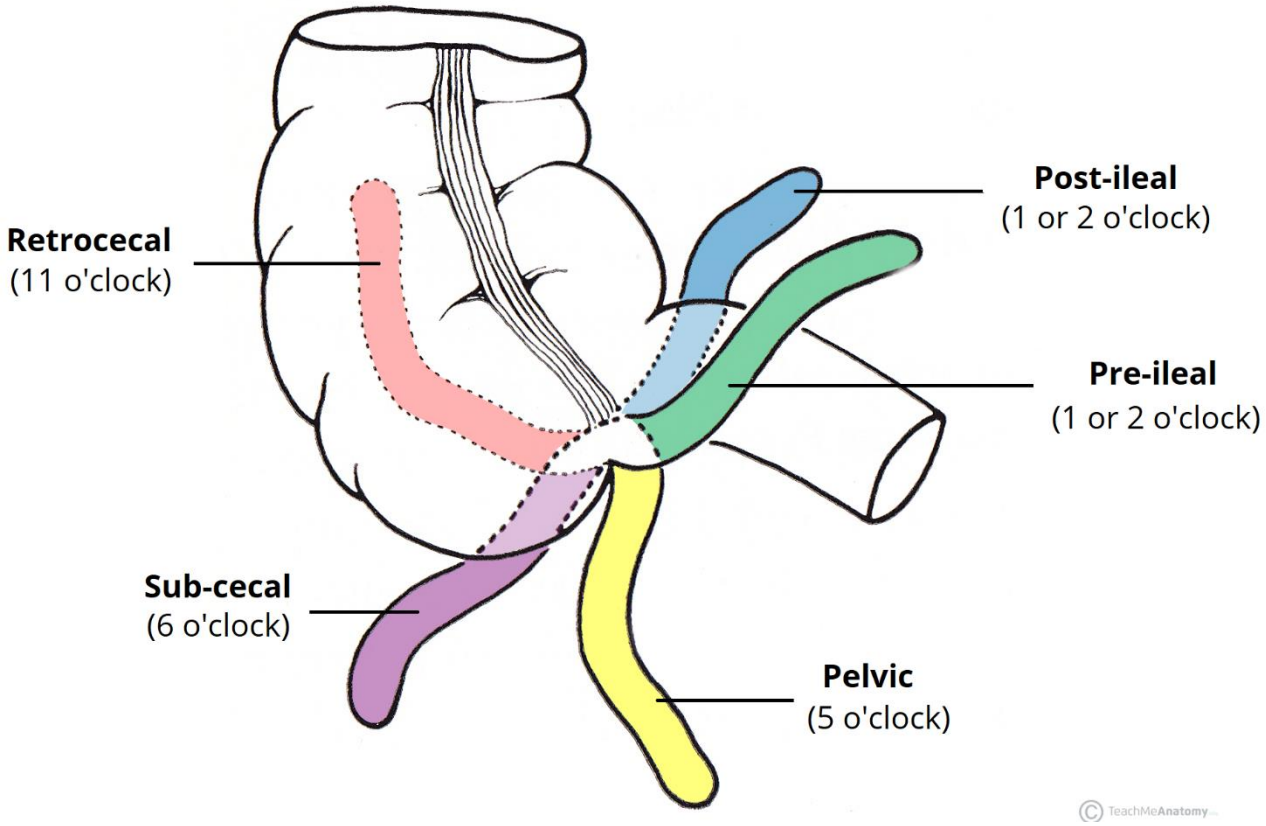

Fig. 4.1 Anatomical location of the vermiform process.

Usually, the pain is localized in the right iliac region, sometimes in the epigastric zone (Kocher's symptom) or in the parotid region (Kümmel's symptom),

followed by movement to the right iliac region. Most often, the pain begins suddenly, constant, of medium intensity, without irradiation. Sometimes the pain is cramping or throbbing in nature. In some cases, the clinical picture of acute appendicitis develops very rapidly and pain occurs immediately throughout the abdomen. Other complaints are optional. Kocher's symptom is the only reliable symptom of acute appendicitis, but it occurs in 25% of patients. There is no direct relationship between the intensity of pain and the degree of morphological changes in the process wall. With gangrenous appendicitis, the initial pronounced abdominal pain may subside until they are absent for 6-12 hours. Then the pain will resume due to the progression of peritonitis. A sudden sharp increase in pain is observed when the process is punctured. A clear localization of pain is lost and the area of its spread increases with the progression of peritonitis.

Nausea appears at the beginning of the disease and with the development of peritonitis, may be accompanied by a single vomiting. It is observed in about 40 % of patients and has a reflex character in the initial stages of the disease.

The general condition of patients at the beginning of the disease suffers little. Some complain of chills, body temperature from 37 degrees to 38 degrees Celsius, decreased appetite.

Diarrhea with tenesmus or dysuria can appear with the pelvic location of the process, when it is attached to the wall of the rectum or bladder, and serve as a pathognomonic sign of atypical forms of the disease.

The tongue at the beginning of the disease is moist, and with the development of peritonitis it becomes dry. The abdomen is involved in breathing, painful in the right iliac region. In the case of a long course of the disease and the presence of peritonitis, the most affected area of the abdomen lags behind in breathing, muscle tension and pain symptoms are determined (symptoms of peritoneal irritation): Rousing (increased pain in the right iliac fossa with compression of the sigmoid colon and retrograde move content ascending colon, the pain due to stretching of the cecum), Sadovsky (the appearance of pain in the right iliac area when the rolling of

the trunk from the back on the left side, the pain caused by the sagging of the inflamed appendix and mesentery), Bartomeu – Michelson (increased pain on palpation of the right iliac area when the patient on his left side, as in this case, the loop of the small intestine and omentum, previously covering the appendix, moving away to the left, and it becomes more accessible to palpation), Shchetkin-Blumberg (increased pain with a sharp withdrawal hands smooth after pre-pressing, while stretching the inflamed peritoneum causes pain, which is significantly enhanced by oscillatory movements of the abdominal wall after the sudden removal of hands), similar to the mechanism of occurrence of the Voskresensky symptom (a sharp increase in pain in the right iliac region when the doctor's fingertips slide over the patient's stretched shirt, from the epigastric region towards the right iliac), the Obraztsov symptom allows you to suspect acute appendicitis with a retrocecal location of the process (to check this symptom, the patient is asked to raise the straightened right leg in the supine position, the strained muscles of the lower back and the anterior abdominal wall will affect the receptors of the appendix, and, if he inflamed, there will be pain in the right iliac region).

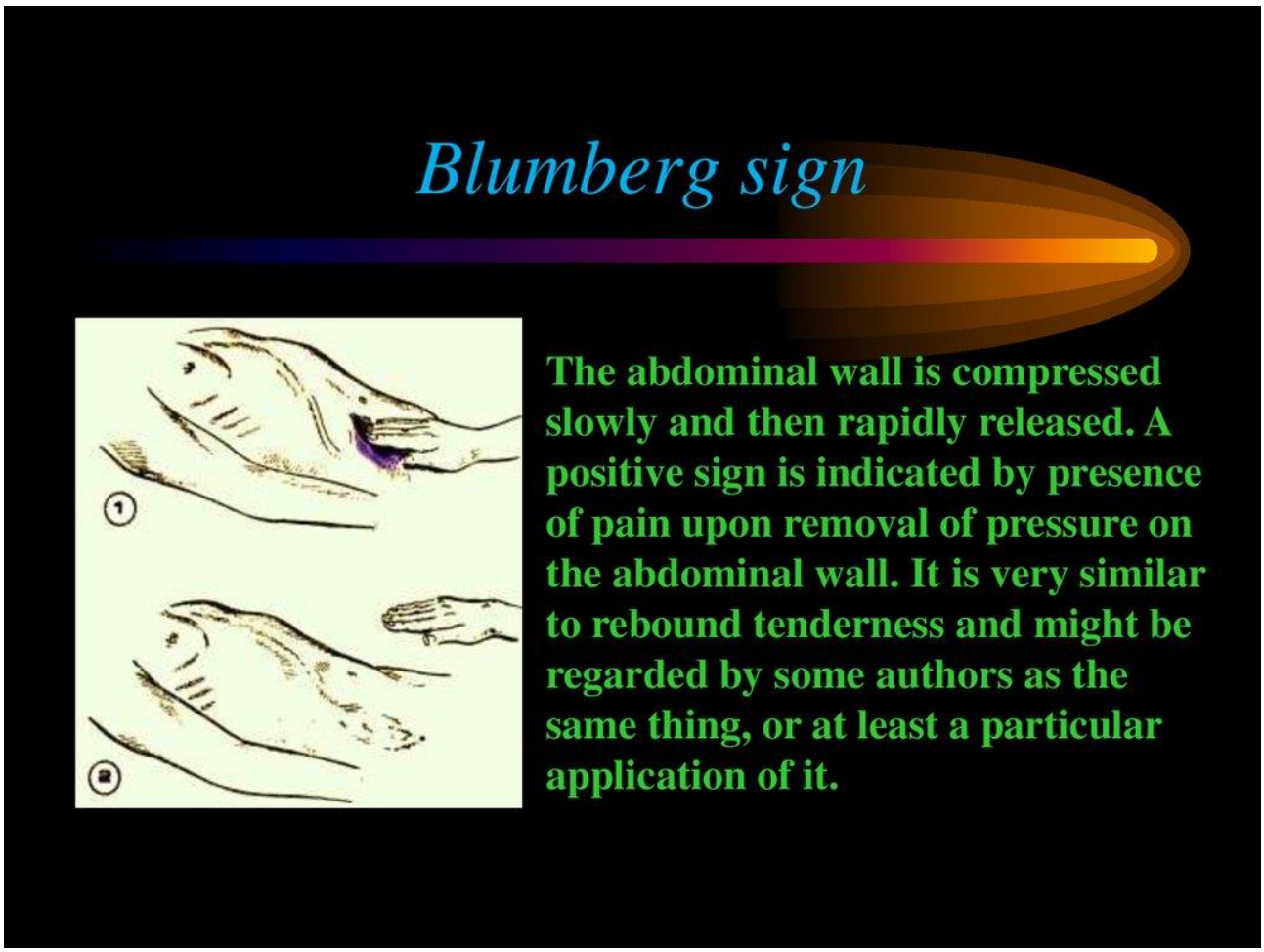

Fig.4.2. Blumberg sign

In the literature there is a description of another 10-15 symptoms that are not crucial in the diagnosis of the disease.

Start palpation should be away from the pathological process. Pain and soreness in the right iliac region are sometimes the only signs of acute appendicitis. Muscle protection appears only when the parietal peritoneum is irritated by inflammation.

When analyzing the clinical picture of acute appendicitis, it is necessary to keep in mind the typical and atypical (with retrocecal, pelvic location) manifestations, as well as similar symptoms of other diseases. Complications of acute appendicitis develop with untimely diagnosis (atypical "clinic", late treatment, an error in the definition).

5. Diagnostics.

The diagnosis of acute appendicitis is based on the survey data (complaints and anamnesis), the results of physical examination, laboratory and hardware data [3-5].
All patients with acute appendicitis should be examined rectally and, if possible, vaginally (women). They should be made to all patients and are intended to determine the sensitivity of the pelvic peritoneum (cry "Douglas») and the condition of other pelvic organs, women must consult a gynecologist.

You may need to consult a therapist, infectious disease specialist, urologist.
The laboratory minimum should include a general blood test, a general urine test, serum glucose, an ECG, a blood micro-shrinkage reaction, a blood type, and a rhesus factor. The blood test shows leukocytosis and a shift of the white blood cell formula to the left. In case of a doubtful diagnosis, the blood test is examined in dynamics. Leukocytosis is not a pathognomonic sign of acute appendicitis, since it is observed in various inflammatory diseases. It should be interpreted only together with the clinical manifestations of the disease. A more significant diagnostic value is the assessment of the leukocyte formula (the presence of a neutrophil shift to young forms, indicates a destructive process).

In the analysis of urine, there are usually no changes, deviations can only be when the inflammation passes from the process to the bladder.

The hardware examination involves performingthe implementation of the review radiography of the AO, ultrasound,

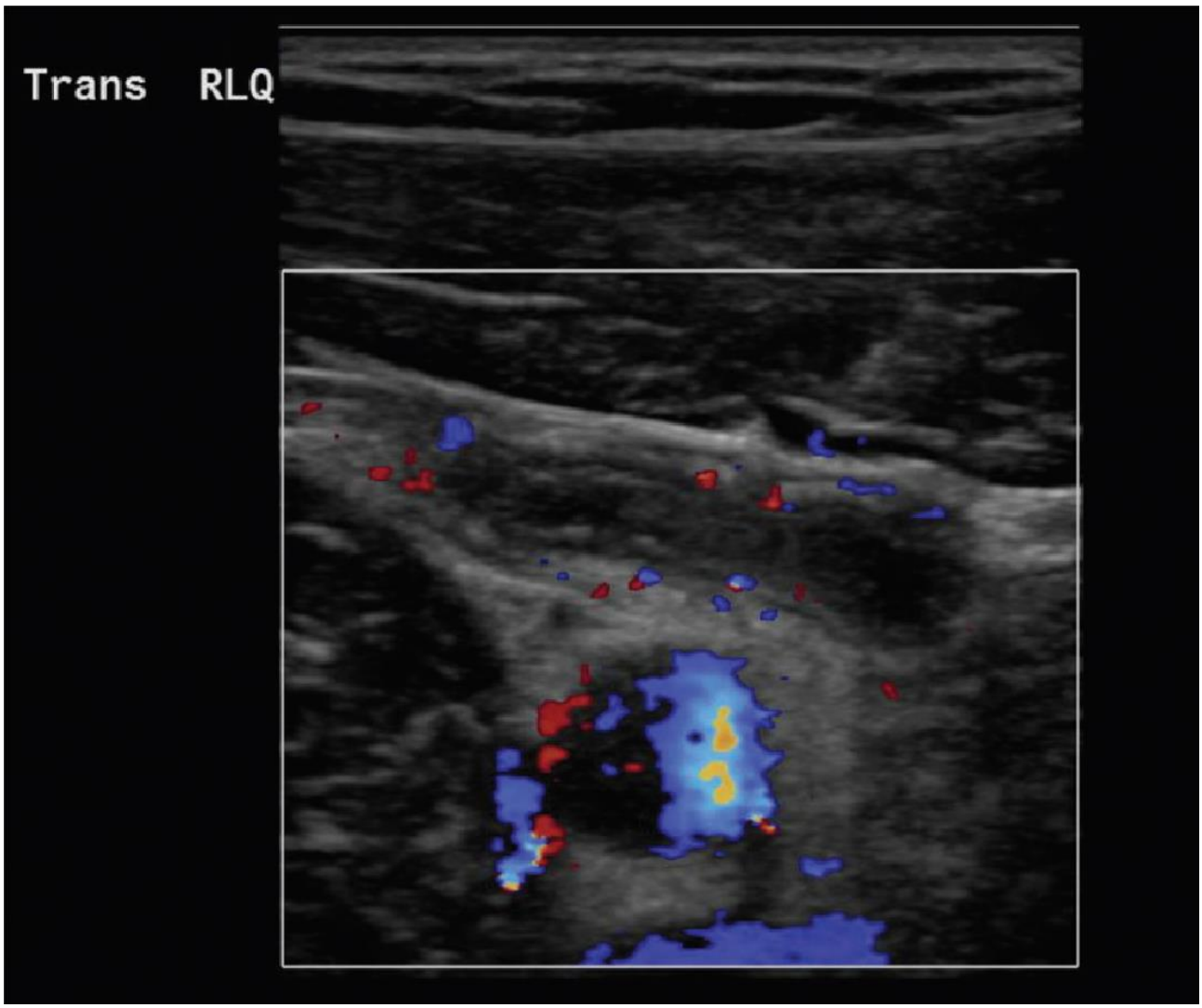

Fig. 5.1 Ultrasound

CT,

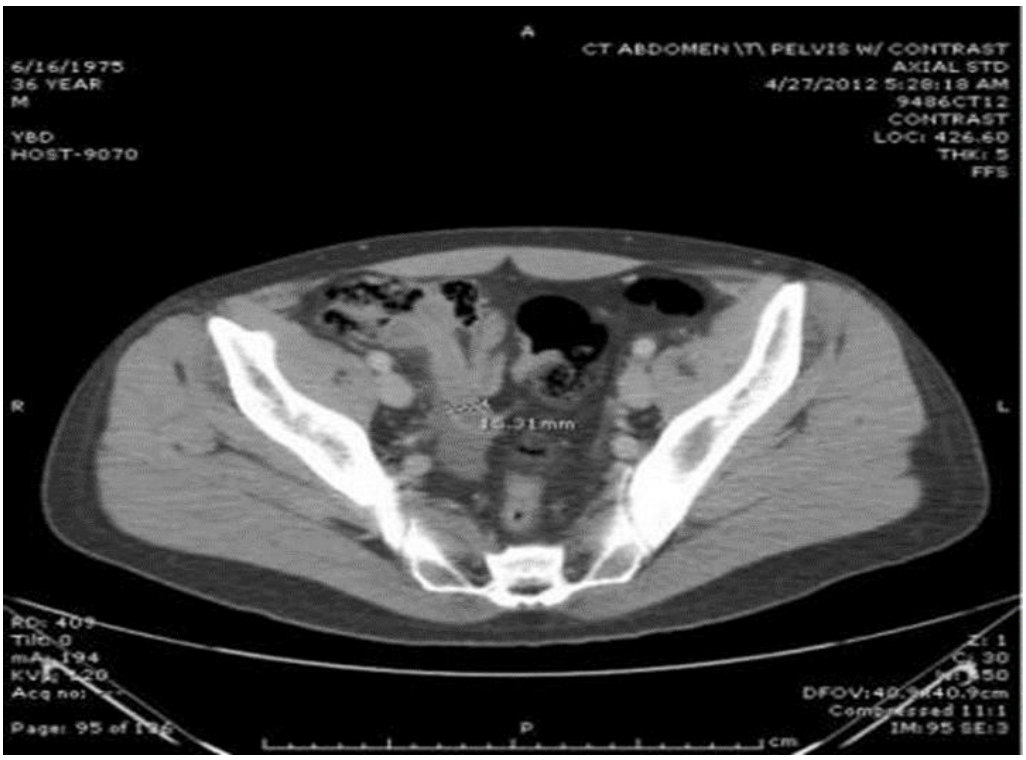

Fig. 5.2 CT

and laparoscopy.

Fig. 5.3 Diagnostic laparoscopy

There are no specific radiographic signs of acute appendicitis. Performing a review radiography of the abdominal organs is rather designed to exclude some other diseases that can simulate the picture of acute appendicitis: perforated gastroduodenal ulcer, right-sided lower lobe pneumonia (when captured on a chest image), acute

intestinal obstruction. In 80% of patients, AO survey radiography can reveal one or more indirect signs of acute appendicitis: the presence of fluid and gas levels in the lumen of the caecum and ileum, pneumatosis of the ileum and ascending colon, deformity of the medial contour of the caecum, indistinctness of the contour of m.ileopsoas. Less commonly detected facility (fecal stones) in the projection of the appendix. When the appendix is perforated, free gas can be detected in the upper floor of the abdominal cavity.

Ultrasound is especially informative in the retrocecal and retroperitoneal location of the process, as well as in the pronounced adhesive process in the abdominal vulgarity after previous operations. Without being an invasive method, ultrasound can be performed repeatedly and is harmless to the patient. This method is used in various doubtful cases for differential diagnosis and exclusion of other diseases simulating acute appendicitis.

On CT images, AO in acute appendicitis-inflammation of the appendix is visualized in 30-40% of cases. Thickening of the wall (more than 3 mm), inflammation of the appendix membranes, perinatal effusion around the cecum, or infiltration of adipose tissue, are pathognomonic signs of acute appendicitis. An inflamed appendix and inflamed surrounding adipose tissue are better visualized after intravenous contrast administration.

Laparoscopy allows you to see the appendix and other organs of the abdominal cavity and pelvis. If appendicitis is detected, you can immediately remove the appendix. The need for widespread use of diagnostic laparoscopy in emergency abdominal surgery is long overdue, due to the large number of diagnostic errors that lead to delayed surgery or unnecessary laparotomy. The frequency of diagnostic errors in acute appendicitis reaches 28-38 3%. About 15-25% of the removed vermiform processes are unchanged during histological examination. With the development of endovideosurgerydiagnostic laparoscopy was further developed in the form of laparoscopic appendectomy.

In most patients, the diagnosis of acute appendicitis does not cause much difficulty. However, in some patients, it is extremely difficult to recognize the nature of the disease, despite the use of a full diagnostic program. It is impossible to simplify the complex business of clinical diagnosis and when choosing the final solution, it is preferable to be based on the data of the clinic.

Difficulties in diagnosis may appear with the retrocecal location of the vermiform process. The appendix is attached to the back wall of the abdomen, covered with loops of the intestines, omentum, and, often, is located among the ligaments. Pain can be both in the right iliac and in the lumbar region on the right, radiate to the hip. Soreness in the right iliac region is insignificant even with deep palpation. Muscle tension and symptoms of peritoneal irritation are absent or mild. With retrocecal and retroperitoneal location of the process, the inflammatory process easily passes to the retroperitoneal tissue, which causes flexor contracture of the right hip and dysuria, as well as the development of retroperitoneal phlegmon.

When the vermiform process is localized in the pelvis, diarrhea and tenesmus, dysuria come to the fore in the clinical picture. Pain and soreness over the womb, tension of the abdominal muscles are expressed slightly. Rectal and vaginal examinations (determining the sensitivity of the pelvic peritoneum and the condition of other pelvic organs, especially in women),

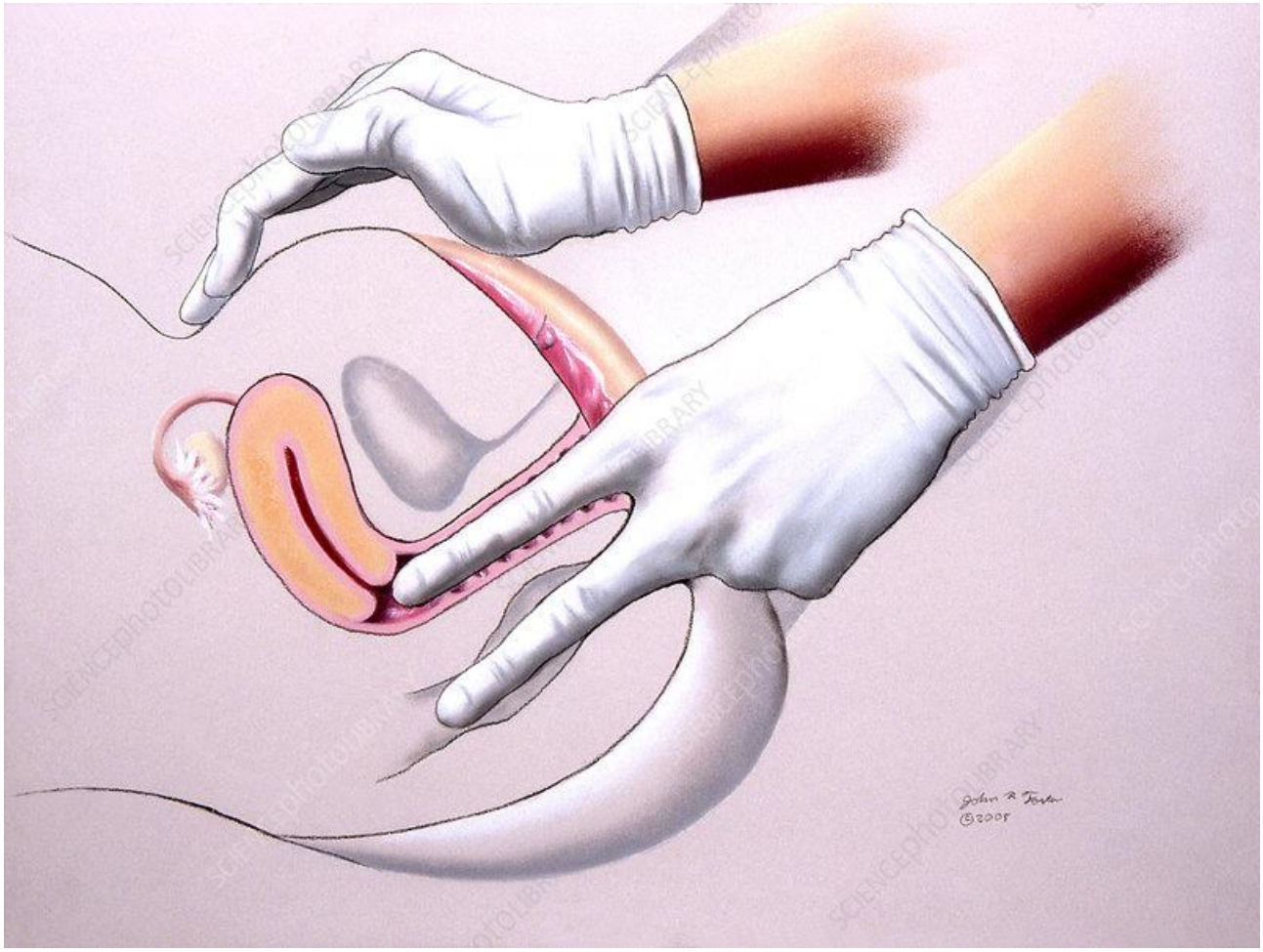

Fig. 5.4 Pelvic rectal examination

ultrasound and laparoscopy can help in accurate diagnosis.

We must not forget about the left-sided location of the vermiform process. In children, acute appendicitis develops rapidly, resembles gastroenteritis or dysentery. Among the symptoms, there are often cramping pains, repeated vomiting, diarrhea, hyperthermia up to 39 degrees. A special feature is the rapid development of destructive forms and widespread peritonitis due to the incomplete development of the omentum and the reduction of its delimiting capabilities.

In elderly and senile patients with acute appendicitis is often erased for due to the weakening of the immune system. The clinical picture may consist of mild abdominal pain and soreness, mild muscle tension and symptoms of peritoneal irritation. At the same time, the frequency of appendicular infiltrates in elderly patients is slightly higher than in the entire population of patients.

In pregnant women, acute appendicitis occurs typically if the gestation period is short. However, in the second half of the term, there may be features in the form of a shift of pain towards the right hypochondrium due to the displacement of the cecum there.

In the case of the location of the vermiform process behind the enlarged uterus, the symptoms of peritoneal irritation appear late. In addition, during pregnancy, there may be nausea, vomiting and abdominal pain caused by tonic contractions of the uterus or concomitant pyelonephritis. Women, knowing about the possibility of their existence, do not pay due attention to the next appearance of pain, the cause of which is acute appendicitis. Muscle tension is difficult to recognize, because the anterior abdominal wall is constantly stretched by an enlarged uterus.

Medical self-confidence and superficial solution of diagnostic problems are the reason for the increase in complications and mortality.

6. Differential diagnosis.

Acute appendicitis is the "monkey" of all diseases, so its clinical manifestations must be compared with the clinic of other diseases that exist separately or together! Most often, acute appendicitis has to be distinguished from a perforated ulcer of the stomach or duodenum, acute cholecystitis, acute pancreatitis, Crohn's disease, inflammation of the Meckel diverticulum, acute intestinal obstruction, acute adnexitis, interrupted ectopic pregnancy, renal colic, mesadenitis, pleurisy and pneumonia on the right, myocardial infarction, food toxicoinfection and a number of others.

7. Treatment of acute appendicitis

Acute appendicitis is a surgical disease and requires prompt care. There should be an early access of patients to medical care, and this requires adequate health

education of the population. Refusal of the operation is a threat not only to health, but also to life.

Surgical treatment is not indicated for two categories of patients:

- with mild appendicitis, the so-called "appendicular colic". In this case, in the presence of a normal body temperature, a normal content of white blood cells in the blood, it is indicated to monitor the patient for 4-6 hours with the necessary research methods (laboratory, X-ray, instrumental, etc.).
- with a well-delimited formed appendicular infiltrate that does not have a tendency to abscess.

7.1. Tactics and indications for the operation.

Suspected acute appendicitis requires urgent hospitalization in an emergency surgical department. The diagnosis of" acute appendicitis "requires urgent surgery within 2 hours from the moment of admission, regardless of the form of acute appendicitis, age and time from the moment of the disease. Doubts about the diagnosis of "acute appendicitis" oblige to observe the patient in the hospital for 6 hours and conduct a follow-up examination. All pregnant women with acute appendicitis should be operated on at any stage of pregnancy.

In difficult and questionable situations, a diagnostic video laparoscopy is performed, which may end with a laparoscopic appendectomy.

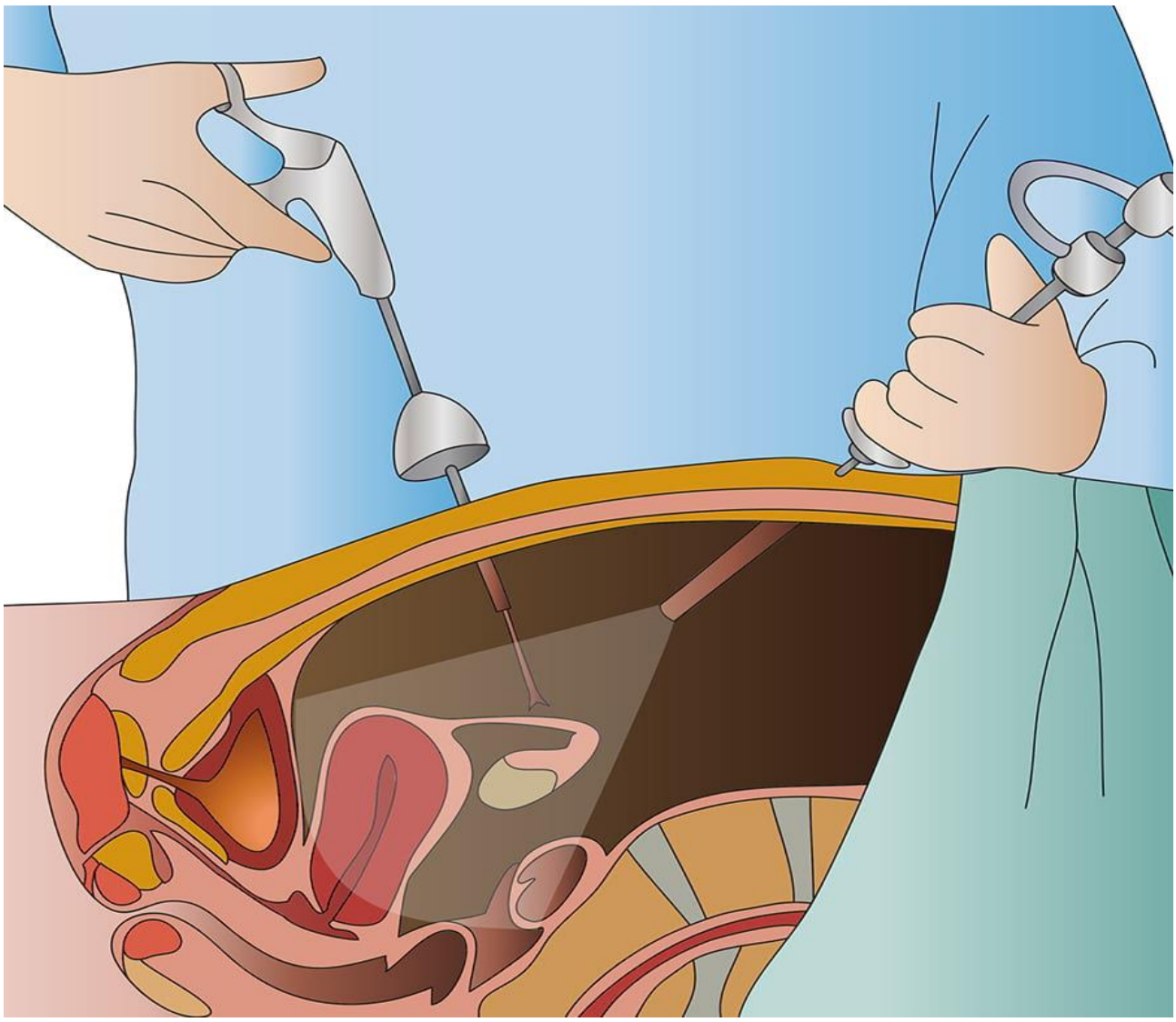

Fig. 7.1.1 Laparoscopic access

If it is impossible to perform a diagnostic video laparoscopy, it is better to operate with traditional accesses than to refuse it. A contraindication to surgery is an agonal condition. The impossibility of the operation must be confirmed by a consultation of doctors.

7.2. Preoperative preparation.

Preoperative preparation involves taking a hygienic bath, shaving, and inserting a probe into the stomach. Infusion therapy is required to correct fluid and electrolyte disorders in patients with peritonitis. Premedication sample: S. Promedoli 2%-1.0 + S. Dimedroli 1%-2.0 + S. Atropini 0.1%-1.0. Antibacterial therapy (preventive) begins simultaneously with premedication.

7.3. Pain relief.

There should always be an intravenous combined anesthesia with / without a ventilator, which allows you to adequately examine and sanitize the abdominal cavity. As an exception-local anesthesia according to A.V. Vishnevsky. The patient lies on the operating table on his back with his arms spread and the head end of the table raised. During the operation, the table can be turned to the left side.

7.4. Access modes.

To date, the access of choice for appendectomy is laparoscopic access [9-16], after which the possibility of performing laparoscopic appendectomy is evaluated.

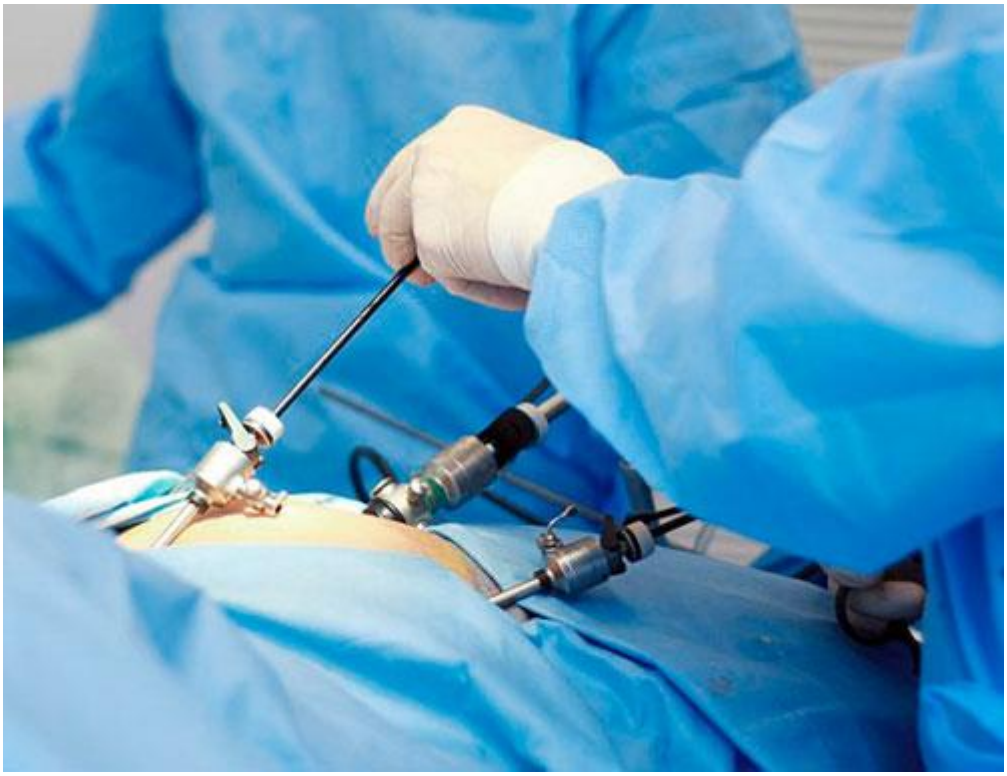

Fig. 7.4.1 Laparoscopic appendectomy

Pronounced destructive changes in the vermiform process, typhlitis, or a pronounced adhesive process that prevents the separation of the base of the process and its evaluation, forces the surgeon to switch to traditional approaches. The oblique variable approach according to Volkovich-McBurney and the paramedian approach according to Lennander are used for any degree of destruction of the vermiform

process without the phenomena of widespread peritonitis. Lower median laparotomy is necessary in case of detection of general inflammation of the peritoneum.

7.5. Revision and diagnostics during the operation.

After opening the abdominal cavity, the state of the parietal peritoneum, the presence of effusion (serous, serous-purulent, purulent), which is necessarily taken for sowing, and morphological changes in the vermiform process and its mesentery (hyperemia, tension, thickening, color changes, fibrinous overlays, necrosis, perforation, periprocess) are evaluated. In addition, changes in other organs (genitals, intestines) are evaluated.

Intraoperative diagnosis involves the presentation of catarrhal or one of the forms of destructive acute appendicitis. Simple (catarrhal) acute appendicitis is detected in 30% of operated patients, destructive – in 70%, complications of acute appendicitis-in 1%.

In simple or superficial appendicitis, exudate in the abdominal cavity is not always present. The serous membrane of the process with dilated vessels or hyperemic. On palpation, the consistency of the process is not changed or slightly stressed, sometimes fecal stones are felt in the lumen. On the section, all the layers of the process are clearly differentiated.

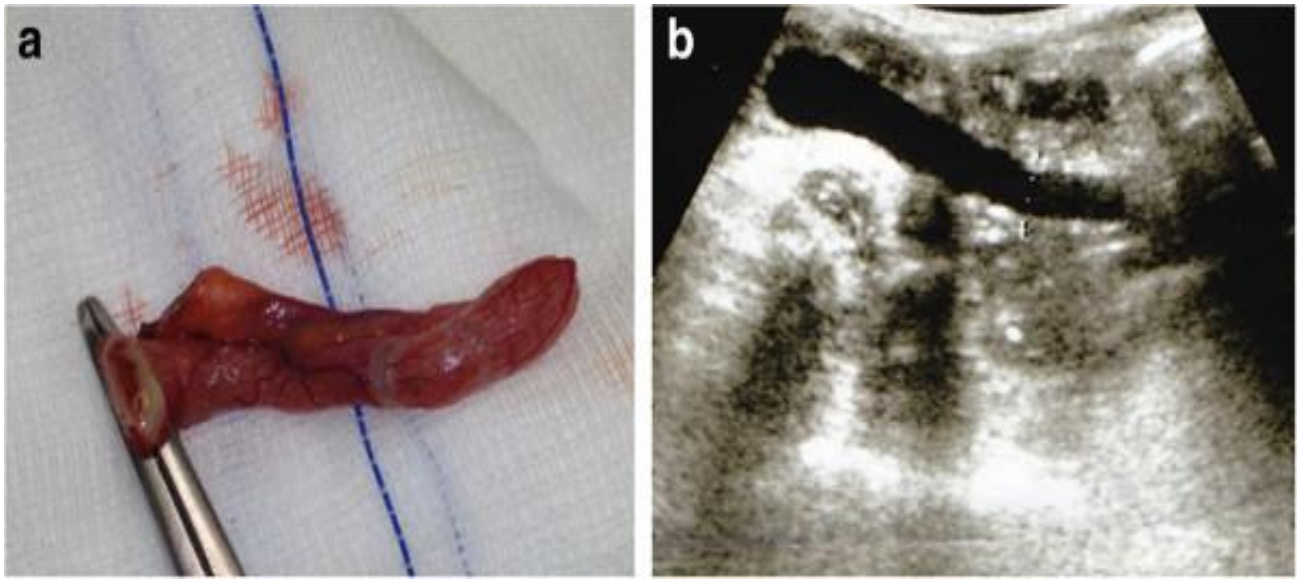

Fig. 7.5.1 Catarrhal appendicitis (macropreparation).

The mucosa is hyperemic, swollen, and may have many small hemorrhages. Changes in the mucosa are not expressed throughout, but occupy only a limited area. The microscopic picture reveals small defects of the mucosa, covered with fibrin and white blood cells. Sometimesthese defects are so small that they are detected only in a serial study of the drug. In the submucosal layer, leukocyte infiltration is noted. There is no purulent melting of the tissues.

In phlegmonous appendicitis, exudate of a serous, serous-purulent or purulent nature is often found in the abdominal cavity. The process itself is changed either throughout or in some part. It is thickened, enlarged. The serous membrane is sharply hyperemic and is completely or in places covered with fibrin. Sometimes the process is swollen and tense due to the accumulation of pus in its lumen (empyema of the process). Microscopic changes are characterized by leukocyte infiltration of all layers of the process.

Fig. 7.5.2. Phlegmonous appendicitis (micropreparation).

In the case of gangrenous appendicitis, exudate in the abdominal cavity is found in 60-70% of patients. With necrosis of only the mucous membrane, the process looks enlarged and hyperemic. If all the layers become dead, the process has a black-green color. Necrotic changes may not occupy the entire process, but only

part of it. Microscopically, wall necrosis, edema, hemorrhages, stasis, and leukocyte infiltration are detected.

Fig. 7.5.3 Gangrenous appendicitis (micropreparation).

In perforated appendicitis, the size of the defect varies from barely visible to the eye to a significant, almost equal to the diameter of the process. Microscopic examination of the process does not reveal any new changes in comparison with the picture of gangrenous and phlegmonous appendicitis described above.

Fig. 7.5.4. Gangrenous-perforated appendicitis (the perforating hole is indicated by an arrow).

It is necessary to evaluate macroscopic changes carefully and carefully. They may increase in the postoperative period. It is important to remember that the inflammation of the appendix begins with the mucous membrane. Pathoanatomical changes consist of a macroscopic and microscopic picture.

7.6. Types of operations, their volume.

Appendectomy

Fig. 7.6.1 Appendectomy

is the only operation performed in patients with acute appendicitis. It can be supplemented with sanitation and drainage of the abdominal cavity.

To date, the operation of choice is considered to be laparoscopic removal of the appendix. Laparoscopic appendectomy was first performed just over 30 years ago, and the experience accumulated to date shows the undoubted advantages of removing the process in this way. The main advantage of this method is minimal trauma, in which the recovery period has become shorter, the patient receives a minimum of discomfort and pain. Due to the fact that the tissues of the anterior abdominal wall are little damaged, the chances of complications from the postoperative wound are reduced in a person. Laparoscopy of appendicitis does not leave traces and scars, the puncture heals and the stitches eventually disappear without a trace.

7.7. Laparascopic operation

Laparoscopy begins in a horizontal position. In the case of a decision on LA, create a Trendelenburg position on the left side,

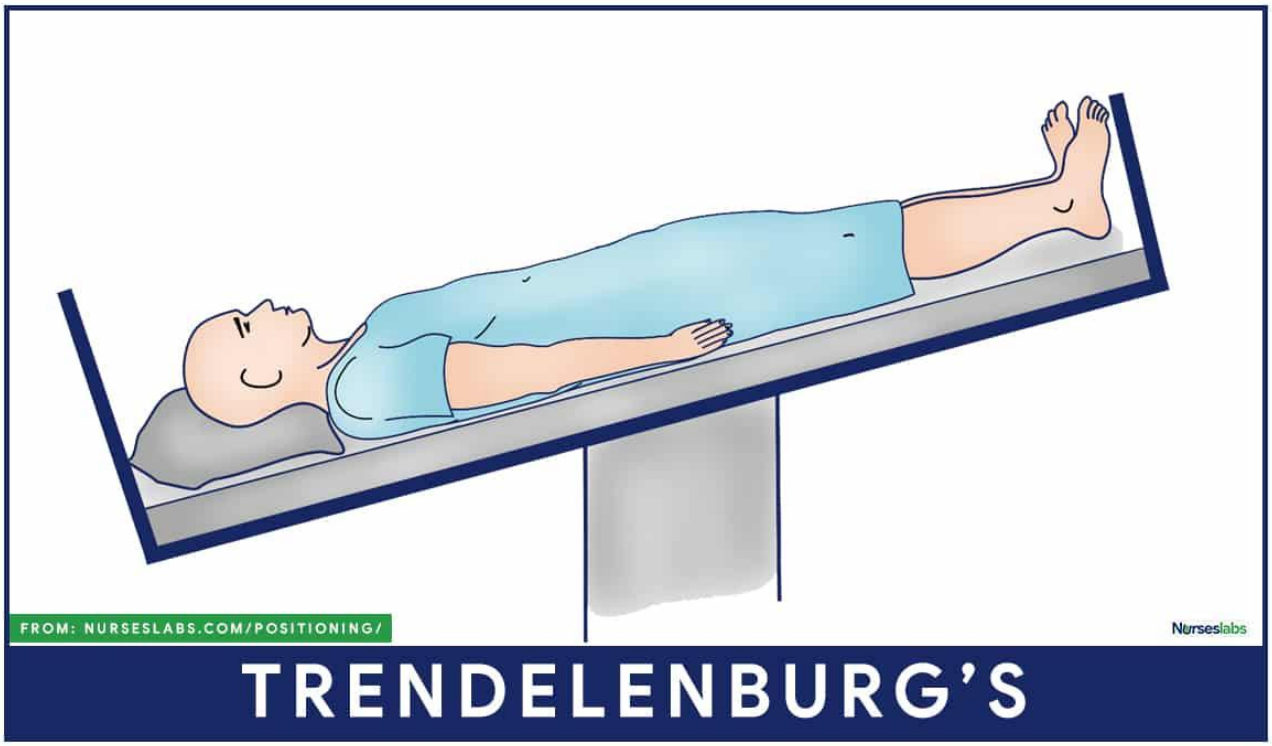

Fig. 7.7.1 Trendelenburg position

which allows you to divert the loops of the intestine and the large omentum from the right iliac fossa. The monitor is located to the right of the operating table. The operating team is located to the left of the operating table.

The operation is performed under general intravenous or endotracheal anesthesia. The latter is preferable, since it provides relaxation and is safer at the stages of electrosurgical exposure.

After the diagnostic stage of laparoscopy is completed, the final decision on the scope of the intervention is made. Normally, the vermiform process is easily moved by the tool, changes its shape, which indicates the absence of tension, its peritoneum is pale, the vascular pattern is not disturbed. As with open appendectomy, the method of treatment of the mesentery and the stump of the vermiform process is of fundamental importance. There are three ways to perform laparoscopic appendectomy – extracorporeal, combined, and intracorporeal.

Fig. 7.7.2 Extracorporeal laparoscopic appendectomy.

The extracorporeal method consists in laparoscopically clarifying the diagnosis, finding and grabbing the distal end of the appendix with a clamp, and then removing it together with the mesentery through an access in the right iliac region.

Next, perform a conventional appendectomy with the imposition of a pouch and Z-shaped sutures. The abdominal cavity is washed, drained and drained. The method is feasible with a mobile cecum, a small diameter of the appendix and no infiltrative changes in the mesentery. This option can be recommended at the stage of mastering the technique of laparoscopic appendectomy.

The combined method is used for a short infiltrated mesentery, which is coagulated inside the abdominal cavity.

The mobilized appendix is removed and treated traditionally.

The intracorporeal method is a generally accepted method of performing laparoscopic appendectomy, when all stages of the intervention are performed laparoscopically inside the abdominal cavity. Stages of the operation: 1. Traction. The distal end of the appendix is gripped by a clamp inserted through the access in the right mesogastric region and lift towards the anterior abdominal wall. The vermiform process is freed from adhesions and splices, and then positioned so that

the mesentery is in the frontal plane. 2. The mesentery is crossed in one of 4 ways. 1.

An electrosurgical monopolar clamp or dissector is inserted through the access in the left iliac region. In small portions of 2-3 mm, the mesentery tissue is captured and coagulated, moving towards the base of the appendix. Special care is needed near the dome of the cecum. Strictly observe the following sequence of actions: a small portion of the tissue is captured by a dissector, it is removed from the intestine and only then coagulated. Pay attention to the proximity of the bowel loops to the instrument. This method is the simplest, provides reliable hemostasis and takes a little time. It is necessary to completely isolate the base of the appendix along the entire circumference, preparing it for ligature application. 2. To treat the mesentery, you can use bipolar coagulation, which is safer, but requires a special tool and is somewhat longer in time. 3. Ligation of the mesentery: at the base of the appendix, a window is formed in the mesentery, a ligature is passed through it, both ends of which are extracted out through the trocar. The node formed extracorporally is lowered into the abdominal cavity. The mesentery is crossed with scissors. The application of individual titanium clips is quite expensive and unreliable, especially in infiltrated tissues. 4. The mesentery is crossed with a stitching device.

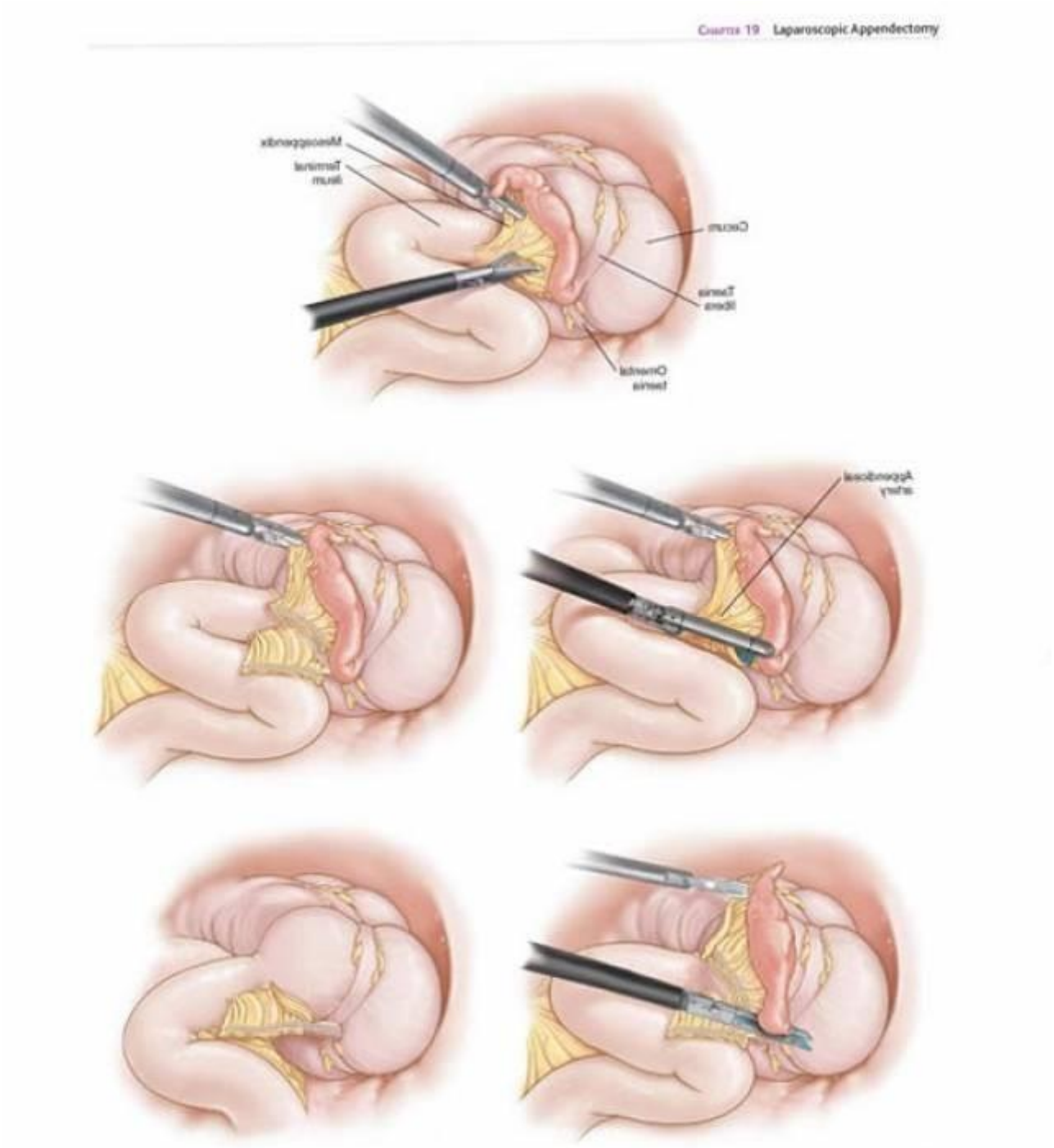

Fig. 7.7.3. Stages of laparoscopic appendectomy: A-Traction; B, C-Mesentery treatment; D-Appendix stump formation.

The formation of the appendix stump is performed in one of 3 ways.

1. The ligature method is most common in laparoscopy. It is recognized as safe by domestic and foreign surgeons. After crossing the mesentery, through an access in the right mesogastric region, an endopetl is inserted, thrown over the appendix and lowered to the base using a clamp. The loop is tightened, the ligature is cut off.

Usually, one or two ligatures are left on the stump of the vermiform process, superimposed on each other (one of them can be replaced with an 8-mm clip). On the distal stump of the appendix, a ligature, clip or surgical clip is also applied, for which the drug is immediately removed after cutting off. The size of the stump above the ligature is 2 – 3 mm. After cutting off the vermiform process, the mucosa of the stump is superficially coagulated with a spherical electrode inserted through an access in the left iliac region.

We remind you that coagulation near metal clips is not allowed. With sufficient experience, the duration of laparoscopic appendectomy does not exceed the time of open surgery, amounting to 20-30 minutes.

2. The hardware method. Through a 12-millimeter trocar, from an access in the right mesogastric region, an endosurgical suturing device is inserted, which is applied separately to the appendix and its mesentery, crossing sequentially. With a small thickness of the fabrics, both structures are stitched simultaneously.

Hardware appendectomy reduces the operation time and allows aseptic resection of the caecal dome, if necessary. The only drawback of the method is the high cost of the stitching device.

3. Immersion of the stump in the dome of the cecum by applying intracorporeal pouch and Z-shaped pouch sutures. The technique requires quite painstaking work and perfect mastery of the technique of endosurgical suture.

The extraction of the drug is the crucial moment of the operation. To avoid the spread of intra-abdominal infection, the drug is removed immediately after cutting off. It is necessary to prevent contact of the inflamed appendix with the tissues of the anterior abdominal wall, otherwise infection of the tissues is likely to lead to the development of purulent complications. To do this, use one of the following methods:
1. If the diameter of the appendix and mesentery is less than 10 mm, the drug can be easily removed through the trocar in the right mesogastric region.
2. With a larger diameter of the drug, a 10/20 mm transition sleeve is used.
3. The appendix is placed in a container before removal

The end of the operation. The intervention area is thoroughly washed with an antiseptic solution. The patient is returned to the starting position, and the wash water is aspirated. Drainage is installed in the abdominal cavity. The wounds are sutured.

If it is impossible to perform a laparoscopic appendectomy (severe concomitant diseases of the kidneys, liver, heart; long gestation periods; severe coagulopathy and blood clotting disorders), as well as the presence of local contraindications (dense inflammatory infiltrate in and around the process, massive adhesive process in the abdominal cavity, absceding periappendicular process), are indications for performing a traditional appendectomy.

7.8. Traditional appendectomy

There are two ways to remove a worm – like process-antegrade (remove the process, then treat its stump) and retrograde (cross the process and treat its stump, then remove the appendix).

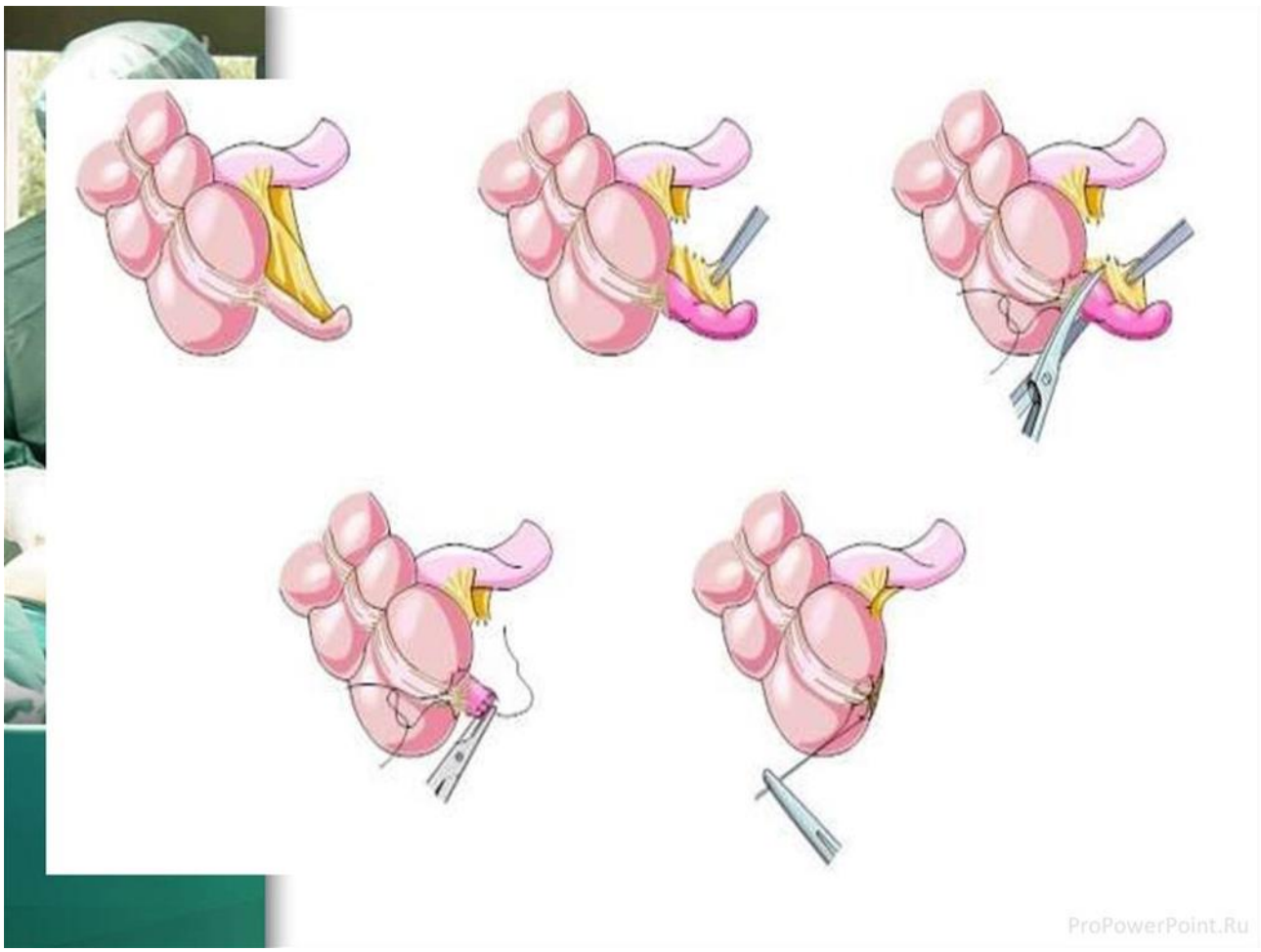

Fig. 7.8.1 Ligation and dissection of the mesentery of the vermiform process.

The mesentery of the process should always be stitched and bandaged.

There are two method of treatment of appendicular stump - immersion method, when the stump of the ligated with catgut, and then peritonitis purse-string and Z-shaped seams; and ligature method, without periodizacii stump, but with bandaging her monofilament. The closure of the hollow organ, completed by peritonization of the wall, is more reliable.

Retrograde removal of the vermiform process is performed in cases where it cannot be removed into the wound, which sometimes happens with the retrocecal position of the process or in the presence of its fusion with the surrounding organs and tissues. When the process is isolated from the splices, the abdominal cavity should be carefully fenced off with gauze napkins to avoid infection. To remove the vermiform process by retrograde means, the intestine is pulled as much as possible into the wound and its base is found, guided by the place of convergence of the

taeniae. The worm-like process is squeezed, bandaged and cut off at the base. The stump of the worm-like process is immersed with a pouch suture. Then the splices and mesentery of the vermiform process are crossed between the hemostatic clamps, followed by ligation and cutting off.

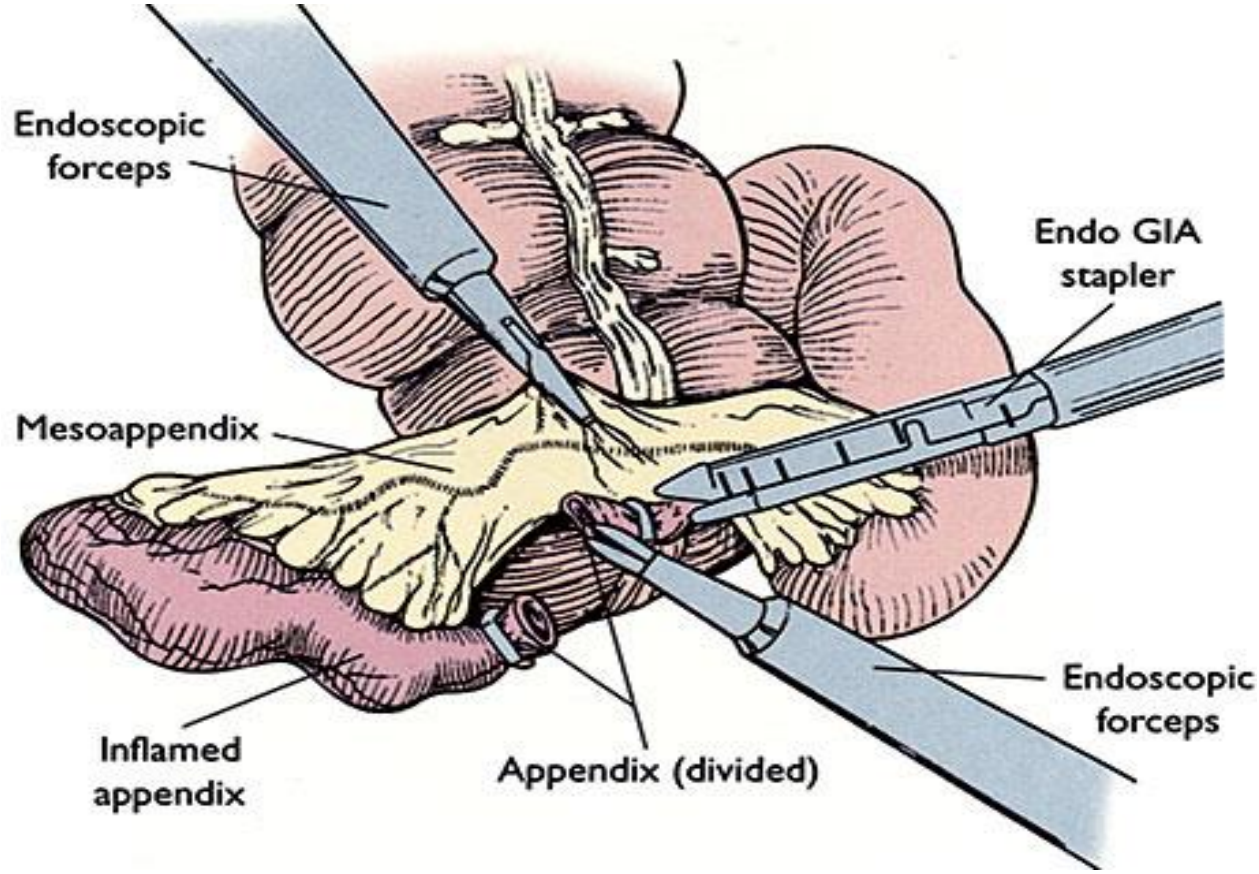

Fig. 7.8.2. Retrograde appendectomy.

Appendectomy in the retroperitoneal position of the process.

If there are no splices in the abdominal cavity and the process is not found, then you should think about its retroperitoneal position. The vermiform process is located behind the ascending colon and its tip can reach the lower pole of the kidney. When the retroperitoneal position of the vermiform process is exposed, the parietal peritoneum is dissected for 10-15 cm, retreating 1 cm outward from the blind and ascending colon. Find the base of the worm-like process, take it on the holder. The process is bandaged at the base, cut off, its stump is immersed with a pouch suture.

After removal of the process, the cecum is placed in place and the edges of the dissected peritoneum are sewn together with rare catgut sutures.

After an appendectomy, the abdominal cavity is drained using a tupfer or an electric pump. In most cases, the postoperative wound is sutured tightly without leaving drains in it. Drainage of the abdominal cavity is performed in the following cases:

In case of peritonitis.

It is not certain that the process has been completely removed

In case of uncertainty in hemostasis

The presence of a periappendicular abscess

Spread of inflammation to the retroperitoneal tissue

In case of uncertainty about the reliability of the immersion of the stump of the process

Drainage is carried out through a separate incision using a tube with several holes at the end. In the case of peritonitis, two drains are installed. One-in the area of the remote process and the small pelvis, the second-in the right lateral canal. In other cases, one drainage is installed in the area of the remote process and the small pelvis.

After a median laparotomy, the drainage tube can be removed through a posterior colpotomy.

8. Postoperative period.

There are two variants of the course of the postoperative period – smooth and severe or complicated. With a smooth postoperative period, it is recommended to get up 12 hours after the operation, drink and eat-after 18-24 hours, prescribe painkillers and antibiotics, remove the stitches for 3-7 days, prescribe 3-7 days, no examination is required.

In a severe postoperative period, the body is given the position of Fowler (Fowler) – semi-sitting, try to activate patients as early as possible, conduct a full daily examination and infusion therapy, to activate intestinal peristalsis and for the purpose of anesthesia, perform epidural prolonged anesthesia, prescribe antibacterial treatment, nasointestinal probe.

9. Lethality.

At the end of the 19th century and the beginning of the 20th, the overall mortality rate reached 40%. From the 50s of the last century to the present, the total mortality rate is 0.1%-0.3%. Lethality is caused by late hospitalization and untimely surgery. Lethality directly depends on the pathoanatomical changes in the appendix, i.e., on the form of acute appendicitis. Mortality is higher in elderly and senile patients than in young people. Relatively high mortality in children (difficulties in recognition and rapid destruction of the process). The main causes of death are general (spilled) peritonitis and purulent complications of the abdominal cavity with acute intestinal obstruction.

10. Complications of acute appendicitis

Until now, some patients are admitted to the hospital very late from the moment of the disease or refuse to undergo surgery. They either die from complications of acute appendicitis or recover.

Classification of complications of acute appendicitis

1. Specific, mainly in the abdominal cavity: 1). Complications of the disease itself, caused by a severe or advanced course of acute appendicitis. 2). Postoperative complications caused by errors in the technique of intervention or the consequences of complications of acute appendicitis.

2. Non-specific: 1). Common for diseases and operations on the abdominal organs. 2). Complications in any organs and systems

By the time of occurrence, early and late complications are distinguished, and by localization – in the abdominal cavity and in the abdominal wall.

Classification of specific complications of acute appendicitis:

1) Complications of the actual disease-acute appendicitis.

Appendicular infiltrate: with involution of the infiltrate after 4-6 weeks and with abscission

Common purulent peritonitis

Intra-abdominal abscesses (pelvic, inter-intestinal, subdiaphragmal)

Pileflebitis (septic thrombophlebitis of the portal vein and its tributaries)

Liver abscesses

Sepsis

2) **Postoperative complications.**

Complications from the surgical wound (infiltration, suppuration, hematoma, ligature fistulas).

Complications from the abdominal organs: purulent septic (common peritonitis, intra-abdominal abscesses), as well as intra-abdominal bleeding, acute intestinal obstruction, intestinal fistulas.

Complications from other organs and systems.

Complications of the actual disease-acute appendicitis.

Appendicular infiltrate is usually formed by 3-5 days from the onset of the disease. This conglomerate, consisting of inflammatory-altered loops of the intestines, the omentum, separating the inflamed vermiform process from the free abdominal cavity and the exudate accumulated around it, is formed according to various statistics from 0.3-4.6 to 12.5%. The clinical sign of infiltration is the detection of a painful inflammatory tumor in the right iliac region during palpation. The general condition of the patient by this time improves, the body temperature decreases, the pain decreases. The patient notes a dull pain in the right iliac region, which increases when walking. There are no signs of peritoneal irritation. With an atypical location of the process, the infiltrate can be palpated in accordance with the location of the process, with a low location, it can be palpated through the rectum or vagina. Ultrasound examination helps in the diagnosis. The appendicular infiltrate may resolve or abscess. In the first case, the temperature is normalized, there is a rapid decrease in the size of the infiltrate, soreness in the right iliac region disappears, blood parameters are normalized after conservative treatment, including bed rest, antibiotic therapy and FTT. The infiltrate resolves in 85% of cases, usually it occurs

within a period of 7-19 days to 1.5 months. All patients in whom conservative therapy has proved effective, appendectomy is recommended 2-2.5 months after discharge from the hospital.

If the infiltrate was not diagnosed before the operation and was found on the operating table, it is not advisable to remove the process – the operation ends with the introduction of a drainage or tampon into the abdominal cavity.

In other patients, the infiltrate decreases slowly, because the destruction of the vermiform process supports inflammation, and an abscess may form in the depth of the appendicular infiltrate.

With a slow decrease in the appendicular infiltrate, the subfebrile body temperature remains. Unexpectedly, after 7-14 days from the moment of the disease and / or the beginning of treatment, the temperature may rise to 38-39 degrees Celsius, which indicates the suppuration of the infiltrate. Suppuration is accompanied by some increase in pain, the appearance of chills. In the latter case, they talk about an appendicular abscess, which can contain from 50 to 500 ml of pus and which sometimes breaks into the free abdominal cavity and leads to the development of general purulent peritonitis. By localization distinguish between: 1) ileocecal (paraappendicular), 2) pelvic (Douglas space abscess), 3) subhepatic, 4) subdiaphragmal, 5) inter-intestinal. Appendicular abscess can occur due to the accumulation of infected exudate, pelvic abscesses are more often of this origin.

Pelvic appendicular infiltrate requires a systematic finger examination of the rectum and / or vagina. In dynamics, the soreness and overhanging of the anterior wall of the rectum or the posterior arch of the vagina, a decrease or increase in the size of the palpable painful infiltrate, the moment of the appearance of softening (fluctuation) are examined. Some patients have dysuria and tenesmus.

With the iliac, retrocecal and intermuscular location of the appendicular infiltrate during the daily examination of the abdomen, the question of the dynamics of changes in the inflammatory process in the abdominal cavity is also solved. It is advisable to supplement the physical examination with laboratory and ultrasound.

Subphrenic abscess localization due to the suction action of the diaphragm. Pain is determined in the lower parts of the chest and in the upper areas of the abdomen on the right or left. When pressing on the lower ribs, there is a sharp soreness, smoothness of the intercostals is revealed.

All of them are subject to surgical treatment – puncture and drainage under ultrasound navigation, if it is technically impossible to perform this operation-autopsy, sanitation and drainage according to the general rules of surgery.

Peritonitis, i.e. acute inflammation of the peritoneum of varying degrees of prevalence, occurs in almost every inflammation of the vermiform process. It is accompanied by severe abdominal pain of a constant nature, which increases with a change in the position of the body. If the patient does not undergo surgical intervention in a timely manner, and the body's defenses do not have time to distinguish the focus of inflammation , peritonitis progresses and goes from local to widespread, and then to general. There is repeated vomiting. The tongue becomes dry, overlaid with a white coating. The abdomen does not participate in the act of breathing, it swells, it is painful in all parts of the palpation, the tension of the abdominal wall muscles is determined, the positive symptom of Shchetkin-Blumberg, intestinal noises are not listened to. Leukocytosis increases with a shift of the leukocyte formula to the left, there are deviations in other parameters of the body's homeostasis.

The clinical picture of appendicular peritonitis does not differ from the manifestations of peritonitis of other origin. The symptoms of the disease increase rapidly, and patients quickly seek medical help. General purulent peritonitis is the main cause of mortality in acute appendicitis.

Sepsis ranks second among the direct causes of death in acute appendicitis, according to many authors. Its source is ulcers and phlegmons, as well as septic thrombosis of large vascular trunks, which complicated destructive appendicitis.

Pileflebitis-purulent thrombophlebitis of the portal vein, is a consequence of the spread of the process from the mesenteric veins of the process through the mesenteric

veins (from the appendicular vein through the v. Ileocolica and then v. Mesenterica superior). It occurs in 0.015-1.35% (according to Kuzin). The General condition of patients when pylephlebitis always heavy. Patients complain of abdominal pain, weakness, poor sleep, lack of appetite. Pain occurs in the right hypochondrium, the epigastric region, occasionally they radiate to the back, right shoulder. His face was pale, drawn, and sunken-eyed. The most constant symptom of pileflebitis is stunning chills, with an increase in body temperature to 40 degrees Celsius. Pulse is rapid, weak. Breathing is difficult. The abdomen is slightly painful, sometimes swollen. The liver is almost always enlarged, sensitive on palpation. The spleen may be enlarged. Leukocytosis is high. During the transition of the inflammatory process to the hepatic veins, jaundice, hepatomegaly occur, multiple liver abscesses are formed, hepatic-renal failure progresses, which usually end in the death of the patient in a few days, sometimes sepsis. Treatment: anticoagulants in combination with broad-spectrum antibiotics, preferably with direct injection into the portal vein system by catheterization of the umbilical vein or puncture of the spleen, puncture or drainage of liver ulcers under ultrasound navigation.

Postoperative complications.

After appendectomy, complications most often develop in the wound and in the abdominal cavity. However, there may be complications from the respiratory system, cardiovascular and genitourinary systems. The causes of postoperative complications of acute appendicitis are: 1) Untimely treatment of patients for medical care. 2) Late diagnosis of acute appendicitis (due to the atypical course of the disease, incorrect interpretation of the available clinical data typical for inflammation of the appendix). 3). Tactical mistakes of doctors (lack of dynamic monitoring of patients with a dubious diagnosis of acute appendicitis, underestimation of the prevalence of the inflammatory process in the abdominal cavity, incorrect determination of indications for abdominal drainage). 4) Errors in the technique of surgery (tissue injury, unreliable ligation of blood vessels, incomplete removal of the appendix, poor

drainage of the abdominal cavity). 5) The progression of chronic or acute diseases of adjacent organs.

The most common complication is the formation of an inflammatory infiltrate and suppuration of the wound. These complications after appendectomy are often associated not only with direct infection from the zone of destruction of acute appendicitis, but also with rough surgery (excessive trauma of the wound associated with an inadequate skin incision or incorrectly selected access (Fig. 26)), the surgeon's inability to protect the surgical wound from infection with peritoneal contents, as well as poor postoperative care.

Early recognition of infiltrates and abscesses of the abdominal wall in the wound area is very important. Clinical signs that definitely indicate an unfavorable course of the wound process are the appearance or increase in pain on the 3rd-4th day after the operation and an increase in temperature. Soreness in the wound area and the determination of the infiltrate on palpation complete the diagnosis. Of undoubted importance in the diagnosis is the study of blood and ultrasound of the area of the postoperative wound. It is believed that if you start treatment at a time when the inflammatory process is in the stage of infiltration, you can timely and targeted treatment to achieve its reverse development. In inflammatory infiltrates, antibiotics and physiotherapy procedures (quartz, UHF, electrophoresis, etc.) are prescribed.

If the conservative treatment is not effective and there are signs of abscess formation, you should turn to the operative method of treatment. With subcutaneous suppuration, sutures are removed, the edges of the wound are widely spread, purulent-necrotic masses are removed and the cavity is drained with tampons moistened with antiseptics. In cases of localization of the abscess in the thickness of the abdominal wall, especially when the abscess is recognized 8-9 days after the operation, it is necessary to dissect the tissues in layers under local anesthesia or under anesthesia and open the purulent cavity. After the operation, the wounds heal, gradually filling with granulations. After cleaning the wounds from purulent-necrotic masses, ointment dressings are applied, then secondary stitches are applied.

Hematoma. Insufficient hemostasis can lead to the formation of a hematoma. Most often, hematomas are localized in the subcutaneous fat, less often-in the muscles. On the next day, the patient complains of a feeling of pressure or dull pain in the wound area. There is a noticeable swelling in the right iliac region, moderate uniform soreness, sometimes a swell is determined.

Treatment consists in partial removal of sutures and removal of hematoma (blood, blood clots). After that, the wound is not sutured, tampon, apply a pressure bandage and cold. If the hematoma is represented by uncoiled blood, then it can be evacuated by puncture with a thick needle (after anesthesia of the skin) under ultrasound navigation. Treatment should be started immediately after the recognition of the hematoma. Otherwise, the hematoma may fester or cause extensive scarring of the abdominal wall.

Divergence of the wound edges. The apparently smooth course of the postoperative period is sometimes complicated by the divergence of the edges of the wounds without visible signs of inflammation. The divergence of the edges of the wound occurs immediately after the removal of the stitches. The occurrence of this complication is associated with a decrease in regenerative processes, beriberi, and a general decrease in the body's protective reactions. Often there is a divergence of the edges of the wound when removing the sutures (with the usual management of the postoperative period) in the early stages-4-5 days after the operation. Complications from the abdominal cavity are classified as severe and life-threatening and include intra-abdominal abscesses (pelvic, subdiaphragmal, inter-intestinal, retroperitoneal), limited and diffuse peritonitis, peliflebitis, intestinal obstruction, intra-abdominal bleeding and intestinal fistulas. The vast majority of these complications after surgery are observed after destructive forms of acute appendicitis. Infiltrates and abscesses. Most often, infiltrates are formed in the right iliac region, near the caecum, after operations for destructive appendicitis in the presence of effusion, fibrinous-purulent overlays and involvement of nearby organs in the process. Contribute to the formation of infiltrates the remaining pieces of dead tissue, dropped out of process,

content, thick silk or cathalonia alloys as well as technical error of surgeons (violation of the technology of laying purse-string suture, when allowed puncture across the wall of the intestine, the use of Zобразного seam when Teplice is the nodal joints, rough handling tissues, decorazione of the bowel wall, inadequate hemostasis, the underestimation of the nature of the effusion, but in the end the unjustified refusal drainage). Sometimes infiltrates are formed for no apparent reason. In such cases, it is necessary to think about the high virulence of the infection, about the decrease in the body's defenses.

Postoperative infiltrates appear 5-6 days after the operation. Patients from the first days have a noticeably more severe course of the postoperative period: they are pale, the pain almost does not disappear, and after three days they become quite strong, the temperature rises to 38-39°, the pulse is frequent, the stool is delayed. By the 5th-6th day, a dense painful formation is determined in the abdominal cavity. The treatment strategy is the same as for appendicular infiltrates formed before surgery: antibiotics, rest, FTT.

Infiltrates and abscesses can be localized in other parts of the abdominal cavity: in the small pelvis, between the loops of the small intestine, under the diaphragm, under the liver, retroperitoneal. If you do not intervene in a timely manner during the infiltration, it abscesses, the suppurative process will progress and can break into the abdominal cavity-there is a lightning-fast general purulent peritonitis, ending in the death of the patient. A prolonged purulent process, accompanied by hectic temperature and severe intoxication, causes dystrophic changes in vital organs, disrupts metabolic processes, which dramatically reduces the body's protective reactions, and sepsis develops. Therefore, the breakthrough of the abscess and the occurrence of severe peritonitis is the last link in this tragic situation. Even the immediate recognition of the breakthrough of the abscess in the abdominal cavity and the operation undertaken are useless in such cases — the patient dies in the next few hours.

Less often, ulcers break out through the abdominal wall (in the area of the postoperative wound), into the small or large intestine, and then recovery can occur. But you can't count on such outcomes. It is necessary to intervene during the inflammatory process first with conservative, and then, when indications appear, with surgical methods of treatment.

Diagnosis and treatment of postoperative infiltrates and abscesses is carried out according to the general rules of surgery described above.

The most dangerous complication after appendectomy is peritonitis-inflammation of the peritoneum. Peritonitis after surgery for appendicitis occurs rarely and, as a rule, in patients with destructive forms of the disease. True postoperative peritonitis, which is not a consequence of purulent-destructive changes in the vermiform process, usually develops as a result of tactical and technical mistakes made by surgeons. In this case, the occurrence of postoperative peritonitis leads to the failure of the stump of the vermiform process; through piercing of the caecum when applying a pouch suture; undiagnosed and untreated capillary bleeding; gross violations of the principles of asepsis and antisepsis; leaving parts of the appendix or any other foreign body in the abdominal cavity.

Peritonitis after appendectomy is particularly worrisome. This danger, this anxiety is due to the fact that the symptoms of peritonitis appear in a patient who is in the postoperative period. The doctor to a certain extent has reason to associate the pain, anxiety of the patient and the deterioration of the condition with the peculiarities of the postoperative period, with the instability of the neuropsychiatric status of the patient.

The leading symptom of peritonitis in the postoperative period is pain, which gradually increases, instead of disappearing in 1-2 days after the operation. Pain – constant, strong, causing the patient to moan, behave restlessly. Nausea and repeated, non-relieving vomiting soon follow.

Postoperative peritonitis is often accompanied by hiccups, which indicates the spread of inflammation to the diaphragmatic peritoneum. The patient's condition

deteriorates, the pulse is frequent (does not correspond to the temperature), features, language becomes dry and is surrounded by a brownish tinge, chair arrested, gases do not depart, stomach tense at first and then becomes swollen. During auscultation, rare weak peristaltic noises are detected, then disappear altogether. Symptoms of peritoneal irritation are clearly expressed. The blood picture worsens, its biochemical parameters change dramatically. With ultrasound of the abdominal cavity, there is no peristalsis, the amount of free fluid increases. The daily amount of urine falls.

The above symptom complex dictates the need for immediate surgical intervention. The operation consists in opening the abdominal cavity, revision, elimination of the cause of peritonitis, sanitation and drainage of the abdominal cavity. With limited peritonitis in the right iliac region, the abdominal cavity can be opened by removing the sutures from the wound and spreading its edges. Spilled peritonitis requires a median laparotomy.

A rare but dangerous complication after appendectomy is intra-abdominal bleeding. This complication can be clearly attributed to defects in surgical equipment. Intra-abdominal bleeding often occurs from the artery of the vermiform process, due to the sliding of the ligature from the stump of its mesentery. This is facilitated by the infiltration of the mesentery and inflammatory changes in it. In cases where the mesentery is short, it must be bandaged in parts. Especially significant difficulties in stopping bleeding occur when it is necessary to retrograde remove the vermiform process. The process is mobilized in stages.

Often there is intra-abdominal bleeding from intersected or bluntly separated and unconnected splices. To prevent them, it is necessary to achieve an increase in blood pressure, if it decreased during the operation, make a thorough check of hemostasis, stop bleeding by grabbing the bleeding areas with hemostatic clamps, followed by stitching and dressing. Measures to prevent intra-abdominal bleeding from the stump of the appendix are reliable ligation of the stump, its immersion in the pouch and Z-shaped sutures.

Also noted intra-abdominal bleeding from deserized sections of the colon and small intestines. In all cases, deserized guts necessary peritonization of this site. This is a reliable measure to prevent such a complication. If it is impossible to apply serous-muscular sutures due to infiltration of the intestinal wall, it is necessary to peritonize the deserized area by suturing the flap of the omentum on the leg. Sometimes intra-abdominal bleeding occurs from a puncture of the abdominal wall made to introduce drainage, so after conducting it through the counterperture, it is necessary to make sure that there is no bleeding.

Among other factors contributing to the development of postoperative intra-abdominal bleeding, first of all, I would like to note technical difficulties: extensive adhesive process, incorrect choice of analgesia method, insufficient surgical access, which makes it difficult to perform manipulations and increases technical difficulties, and sometimes creates them. In technically complex appendectomies, intra-abdominal bleeding can occur from damaged vessels of the retroperitoneal tissue and the mesentery of the small intestine.

In the first hours, the bleeding is asymptomatic, and only with significant blood loss, there are signs of acute blood loss and very mild pain throughout the abdomen. If the bleeding is moderate, the general condition of the patient is satisfactory. Careful observation of the patient after the operation and a thoughtful explanation of each symptom of the problem will allow you to make a timely diagnosis of intra-abdominal bleeding. Abdominal pain, at first mild or moderate, gradually increases, and when infected with spilled blood, it becomes severe, accompanied by nausea, repeated vomiting, bloating, delayed stools and gases – there are symptoms of increasing spilled peritonitis. The only treatment is a relaparotomy, during which the revision is performed, the bleeding is stopped and the blood and its clots are removed.

Non-intensive intra-abdominal bleeding often stops spontaneously. Anemia can develop after a few days, and often in these cases, due to the addition of infection,

peritonitis develops. If infection does not occur, then the remaining blood in the abdominal cavity, gradually organizing, gives rise to the adhesive process.

To prevent the occurrence of bleeding after appendectomy, it is necessary to observe a number of principles, the main of which are careful anesthesia during surgery, ensuring free access, careful treatment of tissues and good hemostasis.

Light bleeding is usually observed from small vessels that are damaged during the separation of the splices, the release of the vermiform process, with its retrocecal and retroperitoneal location, the mobilization of the right flank of the colon, and in a number of other situations. These bleeds occur most covertly, hemodynamic and hematological parameters usually do not change significantly, so in the early stages of these bleeds, unfortunately, are very rarely diagnosed.

One of the most severe, but rather rare complications of appendectomy is postoperative intestinal obstruction, which is more often adhesive by the mechanism of development. During the development of this complication, the adhesions that fix the ileum to the pariental peritoneum at the entrance to the pelvis are of particular importance.

It is known that postoperative intestinal obstruction is observed mainly in destructive appendicitis.

The development of deforming splices in the area of the ileocecal angle is predisposed to severe trauma of the peritoneal leaves during surgery.

With an increase in the clinical picture of acute intestinal obstruction-surgical treatment, relaparotomy, elimination of the causes of obstruction, sanitation of the abdominal cavity.

After appendectomy for complicated appendicitis, 0.35-0.8% of patients may have intestinal fistulas. The occurrence of intestinal fistulas is closely related to the purulent-inflammatory process in the area of the ileocecal angle, in which the walls of the organs are infiltrated, easily wounded. Especially dangerous is the forcible separation of the appendicular infiltrate, as well as the removal of the process when an abscess has formed. The cause of intestinal fistulas can also be long-standing

gauze swabs and drainage tubes in the abdominal cavity, which can cause bedsores of the intestinal wall. Of great importance is the method of processing the stump of the vermiform process, its shelter in the conditions of infiltration of the wall of the cecum. When the stump of the process is immersed in the inflammatory infiltrated wall of the cecum by applying pouch sutures, there is a risk of intestinal obstruction, failure of the stump of the appendix and the formation of an intestinal fistula. Among the complications of appendectomy, the following appendicular-organ fistulas are distinguished: between the appendix and the fallopian tube; between the appendix and the gallbladder; between the appendix and the sigmoid colon; between the appendix and the bladder.

In order to prevent this complication, it is recommended to cover the stump of the process with separate nodular sutures using synthetic threads on an atraumatic needle and peritonize this area with a large omentum. In some patients, extraperitonation of the caecum and even the imposition of a cecostomy are justified to prevent the development of peritonitis or the formation of a fistula.

The most important measure in the treatment of intestinal fistula is the suction of the intestinal contents with the help of an active aspiration device until the formation of the fistula or its complete closure.

So, we come to the conclusion that complications in the treatment of appendicitis are mainly due to late diagnosis, late hospitalization of patients, inadequate surgical access, incorrect assessment of the prevalence of the pathological process, technical difficulties and errors during surgery, unreliable treatment of the stump of the appendix and its mesentery, and inadequate toilet and drainage of the abdominal cavity.

In the postoperative period, complications from other organs and systems are also possible.

These are primarily postoperative pneumonia and thrombosis, in which appropriate conservative treatment is indicated.

Complications from the cardiovascular system (PE, acute myocardial infarction), from the urinary system (acute urinary retention) can occur in elderly and senile patients in the presence of concomitant diseases.

The main method of preventing these complications is their prevention at all stages of treatment of patients. Treatment is best done in conjunction with a therapist and a cardiologist.

11. Conclusion

Acute appendicitis is the most common acute disease of the abdominal organs. Surgeons engaged in providing emergency care are increasingly found with an erased clinical picture of acute appendicitis. The literature data explain this fact by the widespread and uncontrolled use of antibiotics. In case of doubt in the diagnosis, it is possible and necessary to verify the nature of the pathological process in the abdominal cavity with the help of laparoscopy. Immediately note that almost all the clinical symptoms of acute appendicitis reveal in fact only one pain sign of acute appendicitis, while other signs of inflammation of the appendix-edema, infiltrate, hyperemia-can be visualized only with the help of video laparoscopy.

If the complications that occur in acute appendicitis in the preoperative period are less dependent on the surgeon, then the complications that arise during the operation always, and after the operation often, depend on the correct tactics and technical equipment of the surgeon. Therefore, the surgeon who begins to perform an appendectomy should know the anatomy of the ileocecal angle and all the options for the location of the appendix; it is good to know the clinical manifestations of typically occurring acute appendicitis from atypical forms of the course of the disease; be able to distinguish diseases with similar symptoms of acute appendicitis from true acute appendicitis. A young doctor-surgeon, before resorting to 53 operations for acute appendicitis on his own, must repeatedly participate in the operation as an assistant surgeon, during which he will see all the variety of surgical

techniques that an experienced surgeon uses when performing complicated forms of acute appendicitis.

Only if all these conditions are met, surgeons will be able to avoid diagnostic, tactical and technical errors, which will undoubtedly lead to a reduction in the number of fatal complications.

12. Control questions

1. Give the most common classification of acute appendicitis.
2. What is an appendicular infiltrate? What are the terms of its formation?
3. Name the indications for surgical treatment of appendicular infiltrate.
4. What are the possible causes of intra-abdominal bleeding after appendectomy?
5. What approaches are used in the operation-appendectomy?
6. Specify the features and the most important clinical signs of acute appendicitis in children?
7. What are the possible complications of appendectomy, if it is performed in a patient with appendicular infiltrate.
8. What are the most likely causes of pelvic abscess development in acute appendicitis? How to open a pelvic abscess in women and men?
9. List the indications for tamponing the abdominal cavity during surgery for acute appendicitis. The timing of extraction of swabs after surgery.
10. List separately the early and late complications from the wound and abdominal cavity after appendectomy.
11. List 3-4 typical clinical signs of pileflebitis that developed after appendectomy. Specify the ways of spreading the infection in this complication.
12. What are the distinguishing features in the clinical course of interstitial abscesses?
13. List 3-4 reasons for the atypical course of acute appendicitis in pregnant women. The tactics of the surgeon in the early and late stages of pregnancy.
14. Indicate the most characteristic clinical and radiological signs of an abscess of the subdiaphragmal space.

15. What diseases of the abdominal organs are practically impossible to differentiate before surgery with acute appendicitis (using physical methods of research)?

16. What are the features of the clinical picture of acute appendicitis in the elderly?

17. What are the main studies that are used for the differential diagnosis of acute appendicitis and renal colic?

The standard answers:

1. Simple (catarrhal) appendicitis; destructive appendicitis: phlegmonous, gangrenous, perforated.

2. A conglomerate of organs and tissues soldered together around an inflamed vermiform process. An appendicular infiltrate is formed on 3-5 days after the onset of symptoms of the disease.

3. In adult patients only with abscess formation of infiltration. In young children with any form of infiltration.

4. Slipping of the ligature applied to the stump of the mesentery of the vermiform process; leaving the stump of the mesentery too short; separation of the abdominal adhesions during the operation, accompanied by vascular damage.

5. Accesses of Volkovich-Diakonov, Lenander, cross-section according to Sprenger-Kolesov, lower middle laparotomy.

6. Characterized by an acute onset and rapid progression of the disease, a tendency to generalize the process (general phenomena prevail over local ones). Clinical signs: frequent vomiting, high temperature, non-localized abdominal pain, lack of rigidity of the abdominal wall muscles, symptoms of "pulling the leg", "pushing the arm".

7. Bleeding; intestinal perforation; peritonitis.

8. Destructive form of appendicitis; pelvic location of the appendix; insufficient sanitation of the abdominal cavity and poor hemostasis during surgery. Opening of the abscess: in women-through the posterior arch of the vagina; in men-through the anterior wall of the rectum.

9. For the purpose of delineation - in case of periappendicular abscess; in case of parenchymal bleeding (doubts about the reliability of hemostasis); in the presence of

necrotic tissues or incomplete removal of the source of infection (to limit the process). Removal of tampons is performed on 5-6 days.

10. Early complications: wound suppuration, eventration, ileocecal infiltration, Douglas space abscess, interstitial abscesses, peritonitis, intestinal fistulas, early postoperative intestinal obstruction, intra-abdominal bleeding, pileflebitis, liver abscess, subdiaphragmal abscess. Late complications: ligature fistulas, adhesive intestinal obstruction, postoperative hernias.

11. Chills, jaundice of the skin, enlarged and painful liver, intestinal paresis. Pathways of infection: thrombosed process veins-mesenteric veins – portal vein.

12. Clinical signs: pronounced flatulence and intestinal paresis; diffuse abdominal pain; very pronounced intoxication.

13. Displacement of the cecum by the pregnant uterus changes the localization of pain; displacement of the omentum prevents the delineation of the inflammatory process; nausea, vomiting, leukocytosis often accompany pregnancy, which makes it difficult to diagnose; difficulties in determining the tension of the abdominal muscles. Surgical tactics: if it is impossible to exclude acute appendicitis, an emergency operation is performed regardless of the duration of pregnancy.

14. Clinical signs: pain in the hypochondrium with radiation to the shoulder, smoothness of the intercostal spaces, an increase in the upper border of hepatic dullness, pain when pressing on the area of the costal arch. Radiological signs: the presence of a gas bubble with a horizontal liquid level under the dome of the diaphragm; high standing and lack of respiratory excursions of the diaphragm from the side of the lesion; reactive pleurisy.

15. Terminal ileitis (Crohn's disease); Meckel's diverticulum inflammation; acute mesadenitis (in children).

16. Due to the reduced reactivity of the body or concomitant diseases, appendicitis is erased. In this case, atherosclerosis of the vessels of the ileocecal angle can be the cause of thrombosis and the rapid development of primary gangrenous appendicitis. Abdominal pain is expressed slightly, muscle tension of the anterior abdominal wall

and symptoms of peritoneal irritation are weakly expressed or absent even in destructive forms. With atherosclerotic cardiosclerosis and blockages of the cardiac conduction system, even with severe intoxication, bradycardia can be used instead of tachycardia. In the presence of an artificial heart driver, tachycardia may also be absent. A similar picture is observed in the study of blood parameters – even with pronounced destructive changes, leukocytosis may be expressed slightly or not at all.

17. Ultrasound of AO and RPF, overview and excretory urography, clinical analysis of urine, CT of AO and RPF, laparoscopy.

13. Tests

1. Acute appendicitis is not characterized by a symptom:

a) Rovzing

b) Voskresensky

c) Murphy

d) Obraztsov

e) Bartomye-Michelson

2. Clinically acute appendicitis can be mistaken for:

a) salpingitis

b) for acute cholecystitis

c) for Meckel's diverticulitis

d) for ectopic pregnancy

e) for any of these types of pathology

3. Perforated appendicitis is characterized by:

a) Razdolsky's symptom

b) an increase in the clinical picture of peritonitis

c) sudden increase in abdominal pain

d) tension of the muscles of the anterior abdominal wall

e) all of the above

4. Contraindications to emergency appendectomy are:

a) appendicular infiltrate

b) myocardial infarction

c) the second half of pregnancy

d) hemorrhagic diathesis

e) diffuse peritonitis

5. Leaving tampons in the abdominal cavity after appendectomy is indicated:

a) with unstoppable capillary bleeding

b) with gangrenous-perforative appendicitis

c) when a local peritonitis

d) with diffuse peritonitis

e) under all these conditions

6. In acute phlegmonous appendicitis, there is no symptom:

a) Shchetkin-Blumberg

b) Bartomier-Michelson

c) Kocher-Volkovich

d) Georgyevsky-Mussi

e) Krymov

7. An abscess of the Douglas space after appendectomy is characterized by all signs, except:

a) hectic temperature

b) pelvic pain and tenesmus

c) restrictions on the mobility of the diaphragm

d) overhanging of the walls of the vagina or the anterior wall of the rectum

e) pain during rectal examination

8. The most rational method of treating the appendix stump in adults is:

a) dressing with a silk ligature with immersion of the stump

b) ligation with dacron ligature with immersion of the stump

c) immersion of an unbound stump

d) ligation with a catgut ligature without immersion of the stump

e) ligation with catgut ligature with immersion of the stump

9. Meckel's diverticulum is localized:

a) on the jejunum

b) on the ileum

c) on the ascending part of the colon

d) on the caecum

e) on the sigmoid colon

10. In the typical picture of acute appendicitis, surgical access is:

a) lower median laparotomy

b) the Volkovich-Diakonov section

c) pararectal

d) transrectal

e) transverse incision

11. Specific to acute appendicitis is a symptom.

Response options:

a)Kocher-Volkovich

b)Rousing

c)Sitkovsky

d)all three symptoms

e) none of them

12. Peritoneal symptoms in acute appendicitis include;

Response options:

a)Voskresensky (shirt symptom)

b) Shchetkin-Blumberg

c)Razdolsky

d)all the above symptoms

e) none of them

13. Acute appendicitis should be differentiated from all the listed diseases, except:

Response options:

a) glomerulonephritis

b) acute pancreatitis

c)acute adnexitis.

d) acute gastroenteritis

e)right-sided renal colic

14. It is not true for acute appendicitis that;

Answer options:

a)the rigidity of the abdominal wall may be absent with the retrocecal location of the process

b) there may be no rigidity in the pelvic position

c)vomiting always precedes pain

d)pain may begin in the navel area

e) pain often begins with the epigastric region

15.Primary gangrenous appendicitis is most often found in;

Response options:

a) children

b)severe patients

c) men

d) women

e)elderly patients

16. In acute appendicitis in the elderly, it is advisable to use: Response options:

a) endotracheal anesthesia

b)intravenous anesthesia

c) local anesthesia

d)priuralny anesthesia

e)spinal anesthesia

17. For the diagnosis of acute appendicitis, do not use: Answer options:

a) palpation of the abdominal wall

b) clinical blood test

c)finger rectal examination

d)barium enema

e)vaginal examination

18. The optimal length of the skin incision in appendectomy in an adult is: Response options:

a) 2-2. 5 cm

b)3-4 cm

c)5-6 cm

d)6-8 cm

e)10-12 cm

19. In case of spilled purulent peritonitis of appendicular origin, the following response options are used:

a)median laparotomy

b)appendectomy

c)lavage of the abdominal cavity

d)abdominal drainage

e)all of the above

20.Typical complications of acute appendicitis are all but: Response options:

a) appendicular infiltrate

b)periappendicular abscess

c)local peritonitis

d) spilled peritonitis

e)inflammation of the Meckel diverticulum

Answers to tests:

1-c; 2-e; 3-e; 4 - a; 5-a; 6-d; 7-c; 8-e; 9-b; 10-b; 11-c: 12-d; 13-a; 14-c; 15-e; 16-c; 17-d; 18-e; 19-e; 20-e.

14. Situational tasks

Task 1.

A patient with suspected acute appendicitis has radiated pain to the lumbar region. When lifting the extended leg in the supine position-increased pain in the right iliac region.

What about the symptom and what kind of form you can think of appendicitis?

Answer:

About Obraztsov's symptom and retrocecal appendicitis.

Task 2.

The patient, 46 years old, was admitted with complaints of dull pain in the right iliac region, subfebrile temperature. He got sick 5 days ago, when there were acute pains in the epigastrium, subfebrile fever, nausea, there was a single vomiting. He took painkillers, anti-inflammatory drugs. The next day, the pain decreased, moved to the right iliac region. he went to the doctor on the fifth day of the disease due to the persistence of pain. The condition is satisfactory. The temperature is 37.2 degrees. Pulse rate 88 beats/min. In the right iliac region, a formation of 11.0x8.0 cm, of a dense elastic consistency, motionless, with clear borders, moderately painful, is palpated. The Shchetkin-Blumberg symptom is negative. Blood leukocytes 12, 0x10 to the degree of 9/l.

What disease can you think of? What is the therapeutic tactic?

Answer:

The diagnosis of appendicular infiltrate. Conservative treatment (antibacterial, anti-inflammatory therapy, FTT), dynamic ultrasound observation. If the dynamics are positive, surgical treatment is planned (appendectomy) in 2-3 months.

Task 3.

A 30-year-old patient was operated on for acute appendicitis 24 hours after the onset of the disease with traditional access in the right iliac region. The operation revealed gangrenous perforated appendicitis. In the right iliac fossa and in the small pelvis, about 50 ml of purulent effusion. How should the operation proceed?

Answer: Perform an appendectomy, drain the abdominal cavity, perform drainage of the right iliac fossa through a separate puncture of the anterior abdominal wall, primarily delayed sutures on the n / o wound.

Task 4.

In a 27-year-old patient with appendicular infiltrate, with subfebrile temperature and positive dynamics in the course of conservative medical treatment, pain in the right iliac region increased and chills appeared. Ultrasound revealed signs of infiltrate abscess formation. Your diagnosis? What is the surgeon's next tactic?

Answer: Diagnosis: Abscess of the appendicular infiltrate. It is necessary to drain the abscess under ultrasound navigation.

Task 5.

On the second day after appendectomy, the patient appeared: tachycardia, pallor of the skin, bluntness in the sloping places of the abdomen. The Shchetkin-Blumberg symptom is doubtful. During ultrasound, free fluid is determined on the right flank and in the small pelvis of the abdominal cavity. The reasons for this condition and the actions of the surgeon?

Answer: Diagnosis: The patient has intra-abdominal bleeding. Emergency laparotomy.

Task 6.

A 65-year-old patient was operated on for acute appendicitis 72 hours after the onset of the disease. During the operation, the surgeon found a dense inflammatory conglomerate in the right iliac fossa, consisting of the cecum, omentum and loops of the small intestine. The vermiform process does not differentiate. Your diagnosis and further tactics of the surgeon?

Answer: The diagnosis of appendicular infiltrate. Appendectomy is not performed, the wound is sutured with drainage and tampons separating the inflammatory focus from the free abdominal cavity.

Task 7.

The patient on the 3rd day after appendectomy surgery for gangrenous appendicitis developed intoxication syndrome, accompanied by hectic temperature, repeated chills. When examining the abdomen, there is flatulence, soreness of its right half without peritoneal symptoms. On the 6th day, the patient developed jaundice, hepatomegaly, and the phenomena of renal failure were noted. Your intended diagnosis, tactics?

Answer: The diagnosis of pylephlebitis. Treatment: Detoxification and anti-inflammatory therapy, anticoagulants in combination with broad-spectrum antibiotics, preferably with direct injection into the portal vein system by catheterization of the umbilical vein.

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