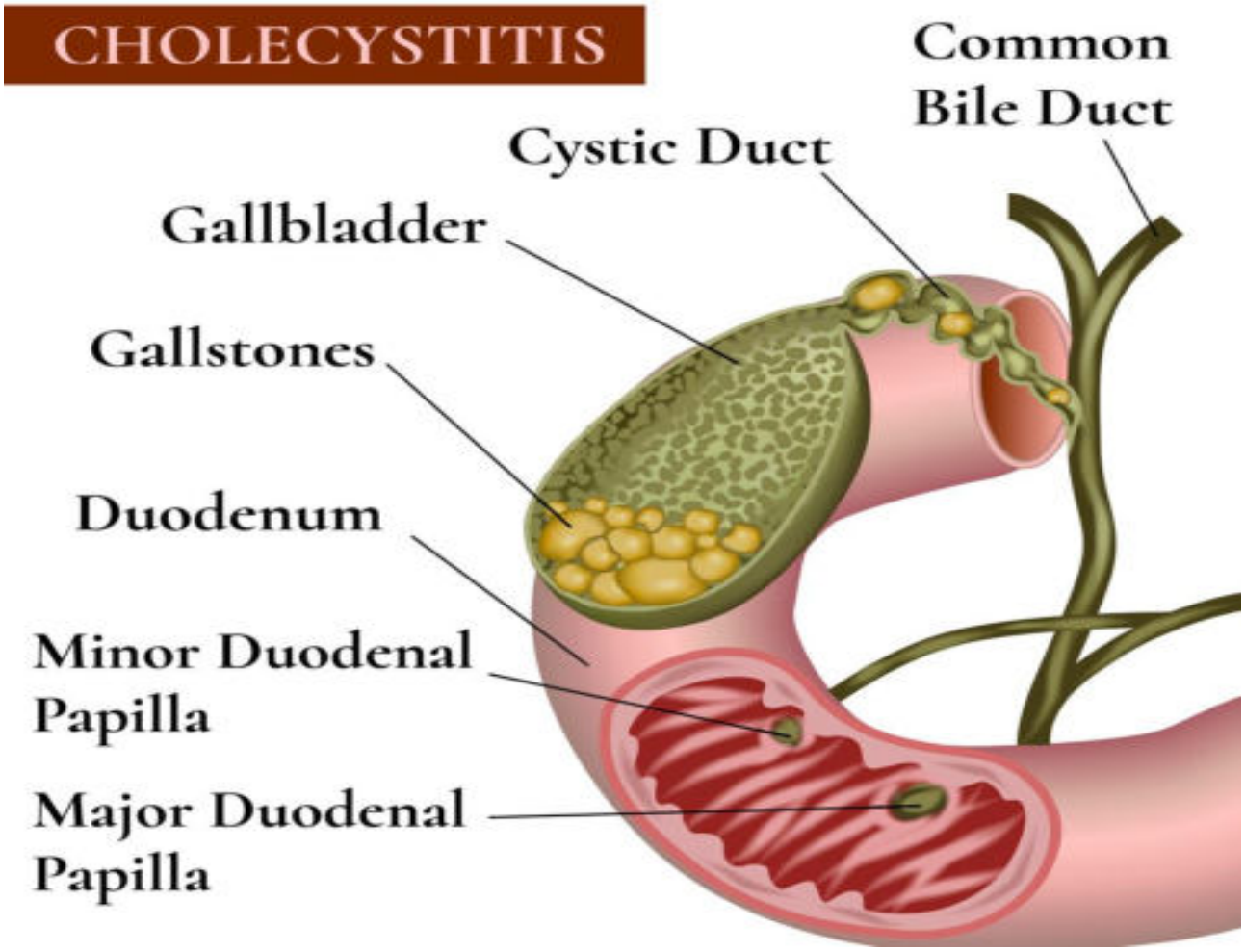
ROYAL METROPOLITAN UNIVERSITY

Department of Clinical Disciplines

ACUTE CHOLECYSTITIS

Educational and methodical manual



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The educational and methodical manual is devoted to acute cholecystitis. 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 definition, etiology / pathogenesis and ending with diagnosis (including differential) and treatment. 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 6 th semester of the Faculty of "Medical Science" of the RMU.

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1. Introduction

Relevance. Acute cholecystitis is one of the most common surgical diseases, ranking second in frequency after acute appendicitis. The problem of acute cholecystitis over the past 3 decades is relevant: both due to the widespread spread of the disease (25% of the total number of patients in surgical hospitals), and due to the continuing postoperative mortality from 2-3% to 7-10 % (in the elderly) [1].

Purpose of the lesson: based on the knowledge of the anatomy, histology and physiology of the biliary tract, to study the etiological factors, pathogenesis, modern methods of diagnosis and complex treatment of acute cholecystitis.

Tasks:

1. To consolidate the knowledge of topographic anatomy, histology and physiology of the digestive tract and, in particular, the biliary tract and gallbladder.
2. Acquire the skills to evaluate the results of clinical and special methods of examination of patients with acute cholecystitis.
3. Learn the basic statistics concerning the frequency of development and the main indicators of treatment of patients with acute cholecystitis.
4. Learn the main etiological factors and pathogenetic mechanisms of acute inflammation in the gallbladder.
5. Learn the basic principles of clinical and pathoanatomical classification of the disease.
6. To study the main clinical manifestations, syndromes of the disease.
7. Acquire skills in the diagnosis of acute cholecystitis, as well as learn the principles of differential diagnosis of the disease.
8. Learn the stages of cholecystectomy by median laparotomy using the video-laparoscopic technique of the operation from the mini-access.

Requirements for the initial level of knowledge. For full assimilation of the topic, it is necessary to repeat:

- from normal and topographic anatomy-features of the location, structure, blood supply and innervation of the gallbladder; options for possible atypical location of blood vessels and bile ducts;

- histology-features of the histological structure of the gallbladder;
- normal and pathological physiology-the function of the gallbladder and bile ducts, the physiological and pathological role of the gallbladder in the human body.

2. Definition

Inflammation of the gallbladder, accompanied by a local and systemic inflammatory reaction.

3. Etiology and pathogenesis.

Acute cholecystitis is the most common complication of CL. In approximately 90% of cases, acute cholecystitis develops against the background of CL, and in 10% - in the absence of gallstones and is therefore designated as acute stone-free cholecystitis (often develops in seriously ill elderly patients and is accompanied by a large number of complications and higher mortality).

The main cause of acute inflammation and necrobiotic processes in the bladder wall is an increase in intravesical pressure up to 200-300 mm of water. As a rule (90-95%), it occurs due to a violation of the outflow of bile from the gallbladder as a result of obturation with a stone, a lump of mucus or bile sludge, etc. In the pathogenesis of the disease (acute inflammation), lysolecitin (converted from bile lecithin by phospholipase A, released during injury to the gallbladder mucosa) and increased production of prostaglandins E and F1a are important. The occurrence of bile hypertension is a major factor in reducing the blood supply to the gallbladder mucosa. Reduction hemoperfusion walls (especially in the elderly and senile age in the presence of sclerotic changes) contributes to the violation of the mucus barrier, the penetration and growth of microorganisms (isolated from bile and gallbladder wall in 50-60% of cases; in 75% isolated anaerobes), which in turn increases the inflammatory exudation into the lumen of the organ. It is obvious that the process of exudation itself leads to a further increase in intravesical pressure, an even greater

violation of microcirculation, and increased mucosal damage. Thus, a pathophysiological vicious "vicious circle"is formed.

In 10-15% of patients, ischemia of the gallbladder wall, developing against the background of intravesical hypertension, leads to necrosis, perforation, local or diffuse peritonitis. More often, a perivesical (subhepatic, subdiaphragmatic) abscess is formed. With gas-forming flora-emphysematous gallbladder.

4. Classification

<table>
<tr><th>By etiology</th><th>By pathogenesis</th><th colspan="2">Clinical and morphological forms</th></tr>
<tr><td>Calculous</td><td>Obstructive</td><td>Catarrhal</td><td>Obstructive (obturation)</td></tr>
<tr><td>Stone-free</td><td>Enzymatic</td><td>Phlegmonous</td><td rowspan="3">Destructive</td></tr>
<tr><td rowspan="2">Parasitic</td><td rowspan="2">Vascular</td><td>Gangrenous</td></tr>
<tr><td>Perforated</td></tr>
</table>

Table 1.3.1. Classification of acute cholecystitis

5. Diagnosis

Clinical symptoms of acute cholecystitis have high sensitivity and high specificity and should be determined before instrumental and laboratory examination of the patient (level of evidence 1b).

On the basis of a physical examination, the diagnosis of AC cannot be reliably established or rejected. There are no pathognomonic symptoms of acute cholecystitis, although the combination of a number of clinical and laboratory signs has a high sensitivity and specificity (level of evidence 1b)

5.1.Clinical picture

Theclinical manifestations of the disease can be grouped as follows:

Local signs of inflammation of the gallbladder.

-Pain, tenderness, and muscle tension in the right upper quadrant and/or epigastric pain. Pain occurs in 72-93% of patients. Next in frequency are nausea and vomiting. Muscle protection occurs in half of the cases, palpable gallbladder and positive Blumberg symptom

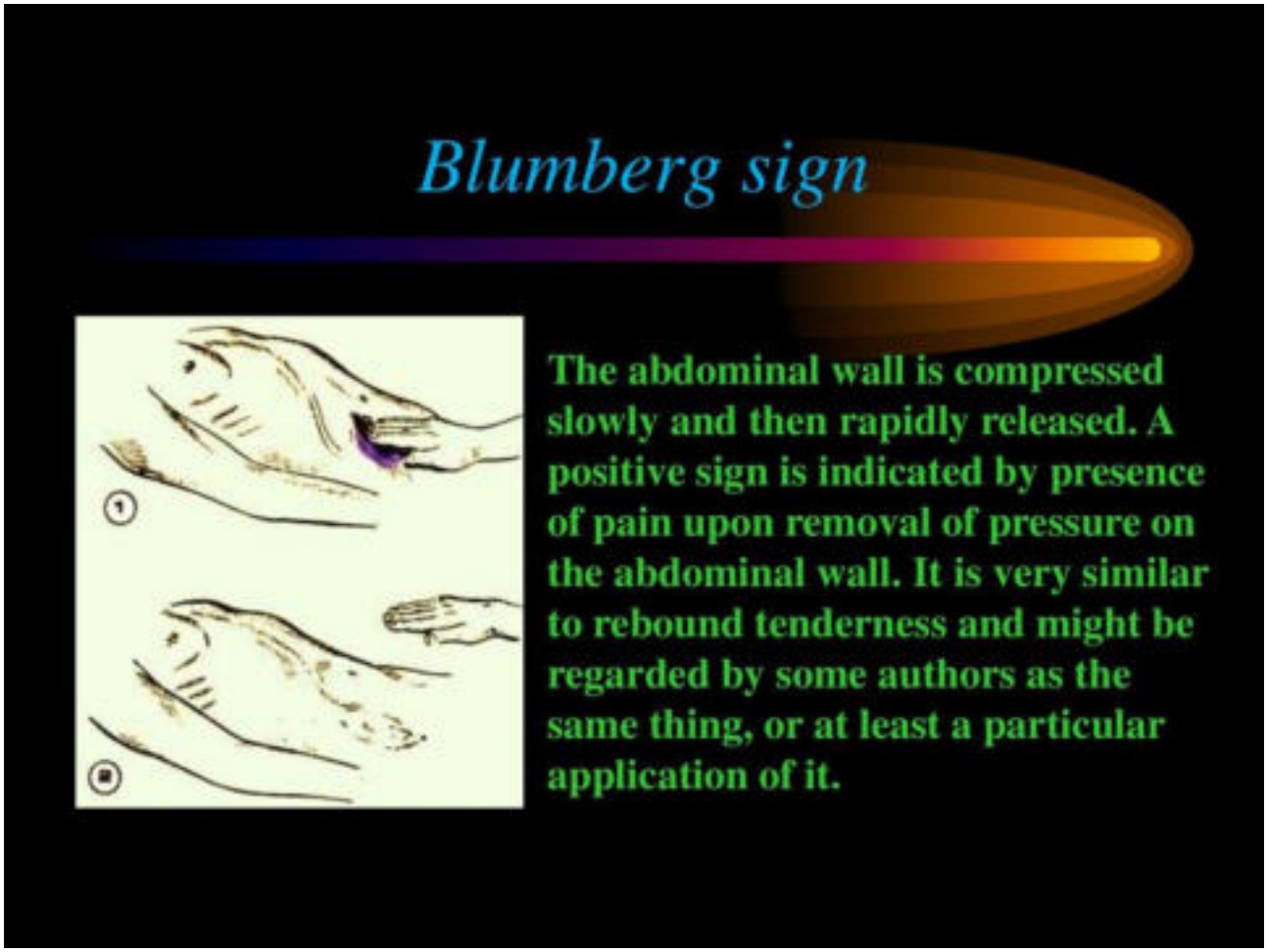

Fig. 5.1.1. Blumberg symptom

are even rarer.

- Murphy's symptom

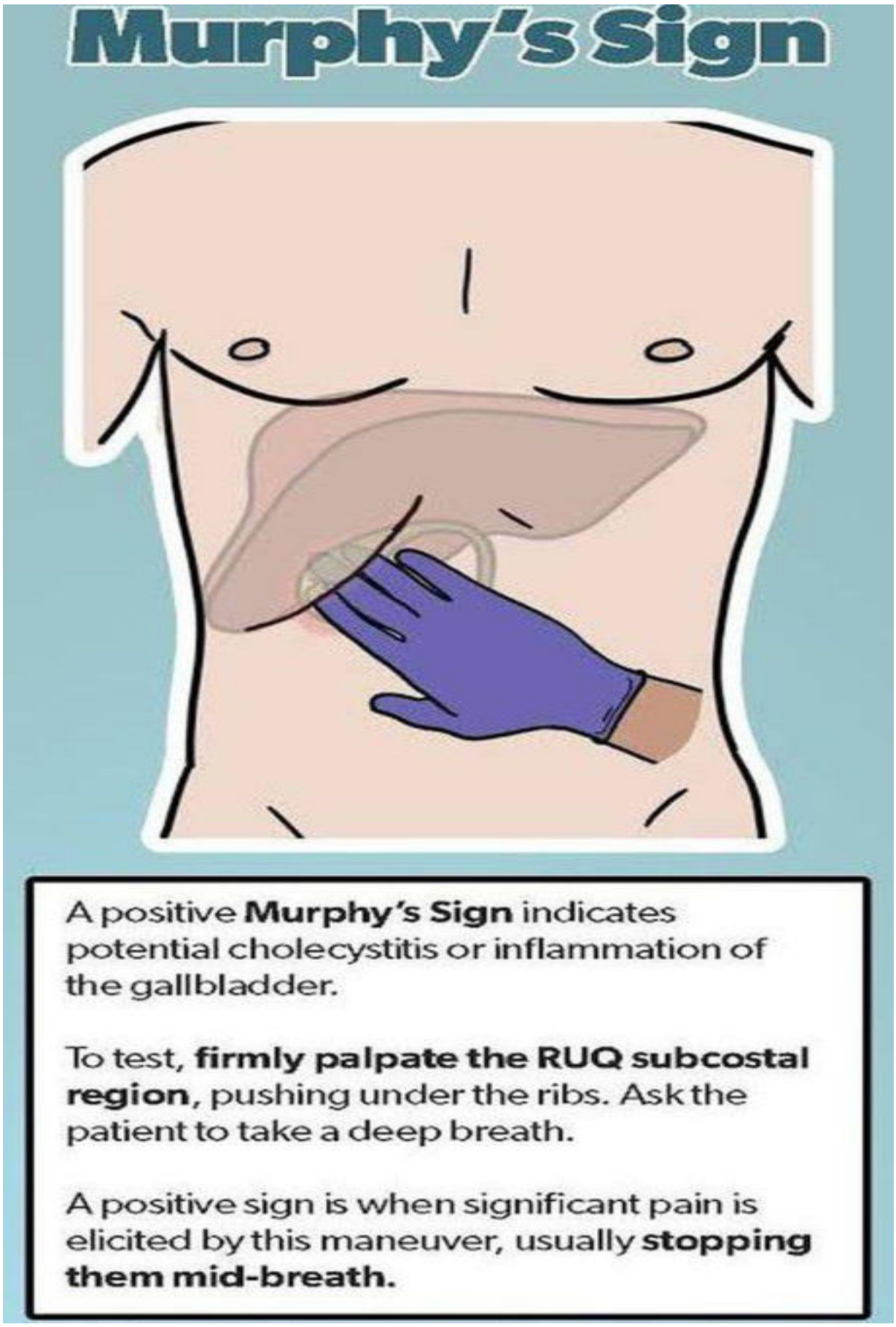

Fig. 5.1.2 Murphy's symptom

has a sensitivity of up to 65%, but most studies indicate that the diagnosis of acute cholecystitis can neither be reliably made nor reliably rejected on the basis of Murphy's symptom.

Systemic signs of inflammation in acute cholecystitis.

Fever, elevated C-reactive protein levels, and leukocytosis, combined with the ultrasound picture of acute cholecystitis, have sensitivity (up to 97%), specificity (76%), and a positive predictive value of 95% (level of evidence 1b) - should be used in the diagnosis decision-making process.

In patients of the older age group and / or in patients with diabetes mellitus, a blurred picture of the disease is possible, there are no signs of a systemic inflammatory reaction and slight soreness with deep palpation in the presence of destructive changes in the wall of the gallbladder.

No single laboratory analysis, as well as their combination, can reliably make or reject the diagnosis of acute cholecystitis (level of evidence 1a).

Laboratory examination in terms of the diagnosis of AC is of auxiliary importance and is intended mainly for making a decision on the severity of the patient's condition.

5.2. Visualization methods

Ultrasound diagnosis should be performed in allcases of suspected acute cholecystitis (level of recommendation A).

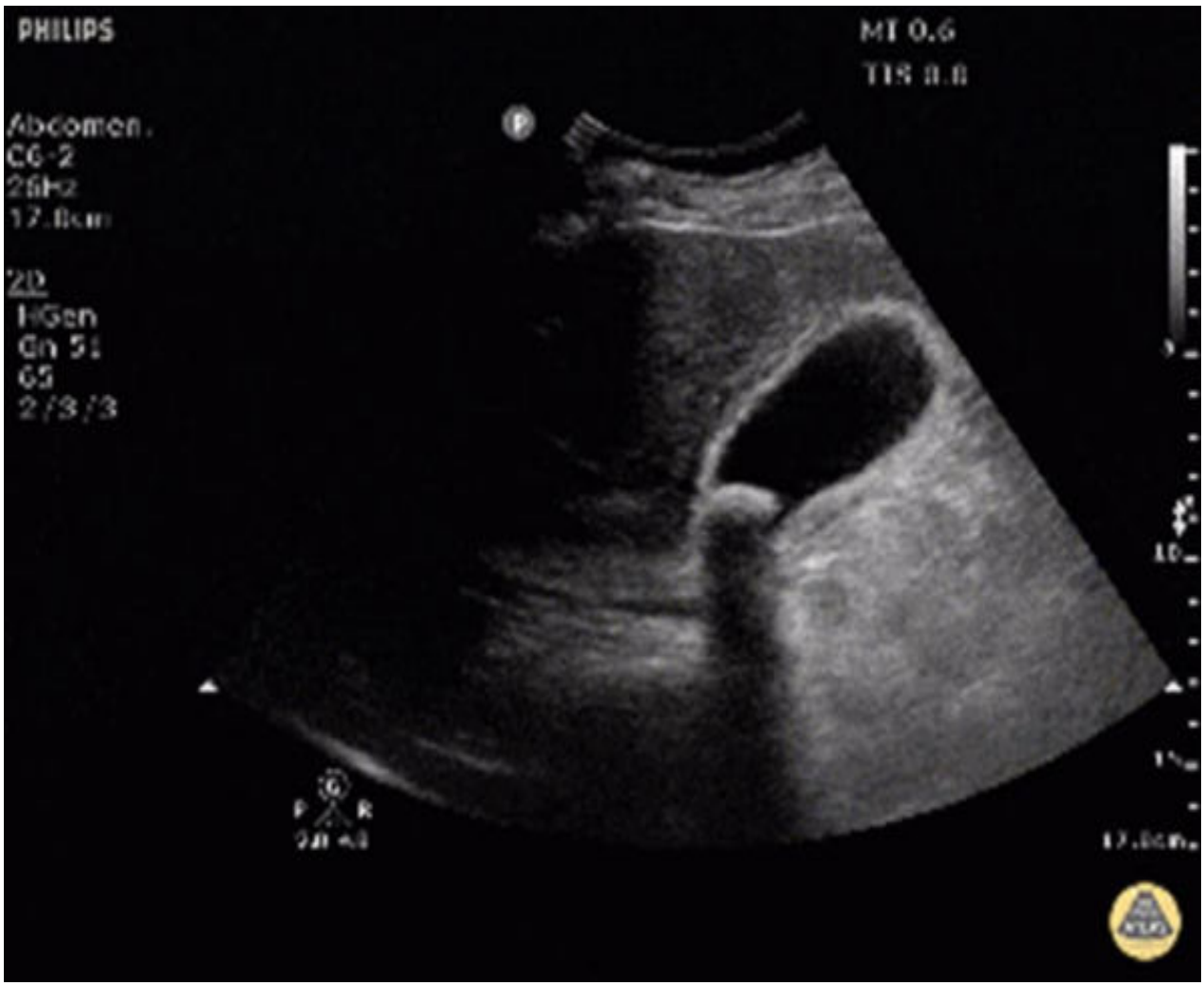

Fig. 5.2.1 Ultrasound diagnosis of acute calculous cholecystitis

Ultrasound diagnosis of acute calculous cholecystitis can be established in the presence of:

increases in longitudinal (>8 cm) or transverse (>4 cm) dimensions,

thickening of the wall more than 3 mm with signs of its edema and violation of the echostructure (layering and heterogeneity, " double contour»)

blocking concretion in the neck of the gallbladder

perivesical fluid accumulation.

High specificity and sensitivity is shown by the positive ultrasound symptom of Murphy, which consists in the increase or appearance of pain when the sensor is pressed on the anterior abdominal wall in the projection of the visualized bottom of the gallbladder with a deep breath of the patient.

It should be noted that none of these signs in itself has sufficient information for making a diagnosis, so when performing ultrasound, it is necessary to take into

account their presence in the complex. Thickening of the gallbladder wall can occur not only in acute cholecystitis, but also in liver diseases, heart and kidney failure, as well as in hypoproteinemia and a number of other diseases and conditions that do not require urgent surgical intervention.

Ultrasound allows us to differentiate acute obstructive (catarrhal) and acute destructive cholecystitis and distinguish gangrenous cholecystitis based on the presence of floating intraluminal membranes, foci of echogenic darkening in accordance with the presence of gas inside the wall or in the lumen of the ventricle and obvious violations of the integrity of the ventricle wall and peripubicabscess.(level of evidence 1C)

Dynamic ultrasound performed by a specially trained surgeon is particularly informative. (level of evidence 3b)

If choledocholithiasis is suspected in a patient with acute calculous cholecystitis, ultrasound can only serve as a screening study that reveals the presence of bile hypertension. To clarify the diagnosis, MRI-cholangiography,

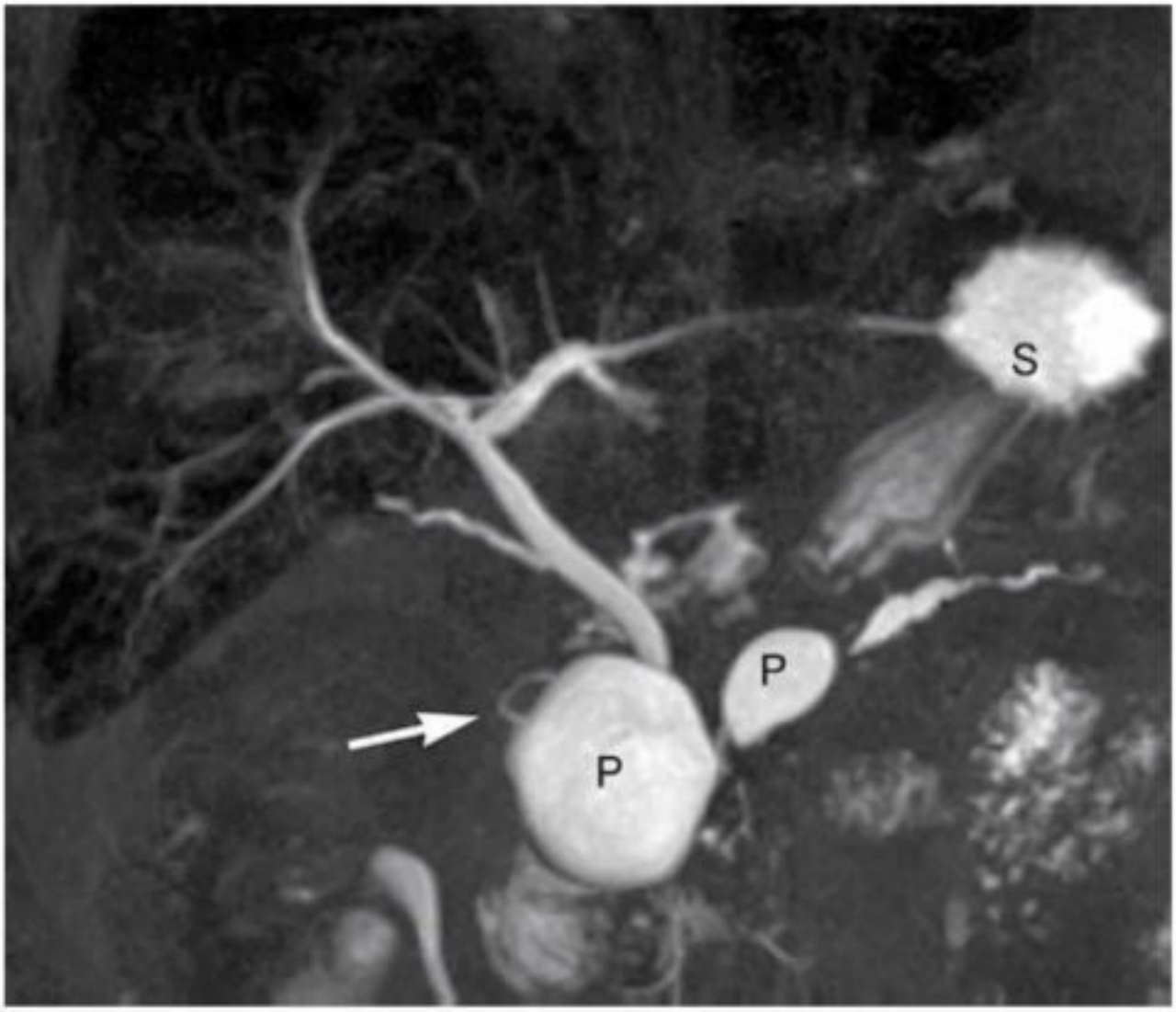

Fig. 5.2.2 MRI-cholangiography

retrograde cholangiopancreatography

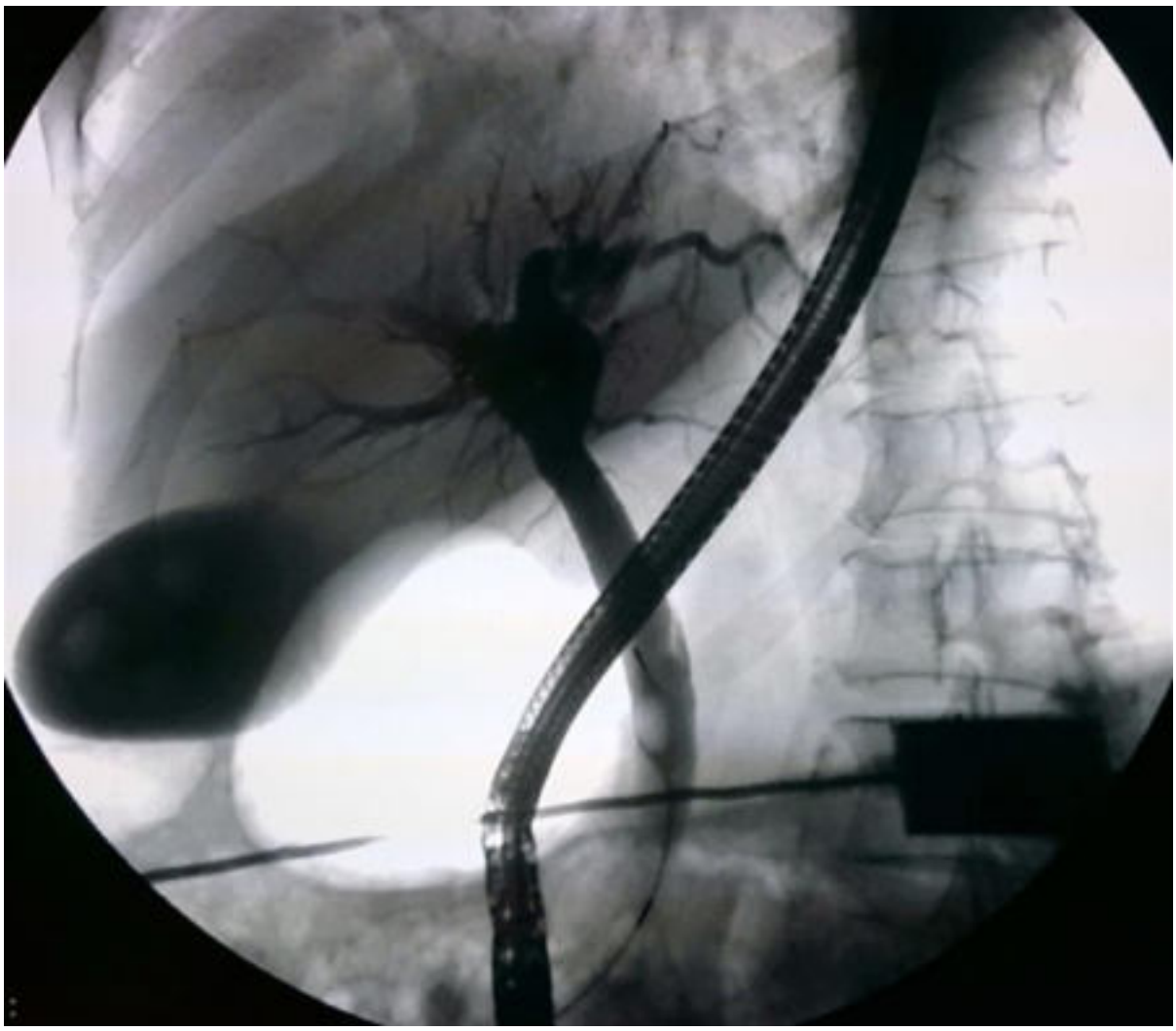

Fig. 5.2.3 Retrograde cholangiopancreatography

or intraoperative cholangiography (intraoperative ultrasound),

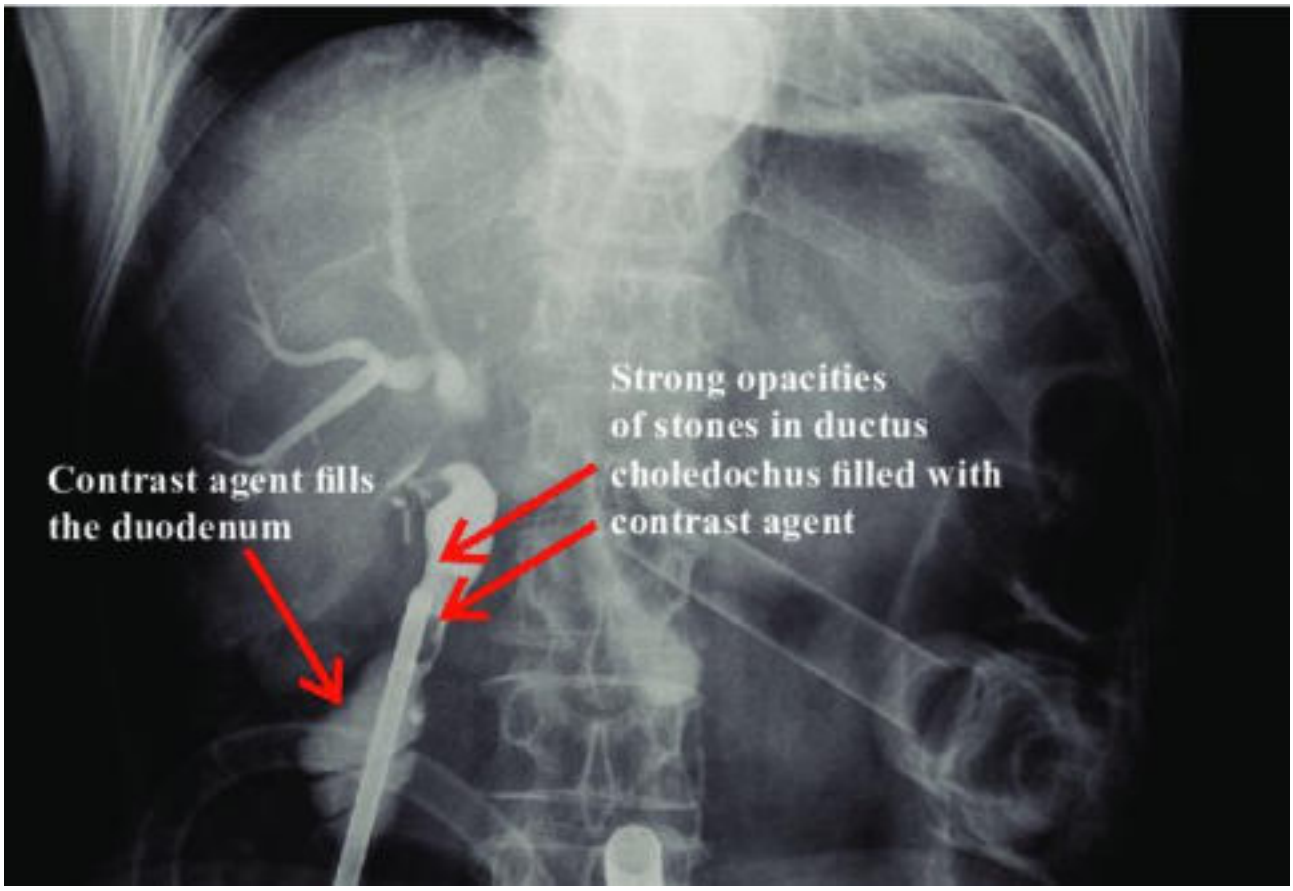

Fig. 5.2.4 Intraoperative cholangiography (intraoperative ultrasound

endosonography is necessary. The use of high-tech additional research methods is determined by their presence in the medical center.

It should be noted that of all the imaging methods, the maximum coincidence with the postoperative histological examination of the gallbladder is given by radioisotope scanning (level of evidence 1b), which should be carried out in the presence of equipment in doubtful cases.

Differential diagnosis

The differential diagnosis of suspected acute cholecystitis includes a number of extra-and intra-abdominal diseases:

right-sided lower lobe pneumonia

myocardial infarction

painful shingles

exacerbation of gastroduodenal ulcer disease, including perforative ulcer,

acute pancreatitis

hepatitis

acute intestinal obstruction

acute appendicitis

The diagnostic algorithm for suspected acute cholecystitis does not differ from that for acute pain syndrome in the upper abdomen.

In diagnostically difficult cases, having exhausted all non-invasive methods of investigation, the surgeon should resort to diagnostic video laparoscopy, and if it is impossible to implement it or uninformative-to laparotomy.

In the final formulation of the diagnosis, it is advisable to use the classification of the Tokyo Agreement on Acute Cholecystitis (Tokyo guidelines (2007, 2013)).

This classification correlates with the approaches to systematization of information about acute cholecystitis, which is used in domestic surgery.

Mild course (Grade I): - acute inflammation of the gallbladder in somatically healthy patients without concomitant diseases with moderate inflammatory changes in the gallbladder wall (acute simple cholecystitis (Korolev B. A., Pikovsky D. L., 1990)) or acute obstructive cholecystitis.

Moderate course (Grade II): - anamnesis of the disease more than 72 hours, palpable gallbladder or infiltrate in the right hypochondrium, leukocytosis more than 18x109 /l, verified destructive forms of acute cholecystitis with the development of peripesical complications or bile peritonitis. The presence of one of these signs allows you to assign the patient to this group. According to the terminology of Korolev B. A. and Pikovsky D. L. (1990) - complicated cholecystitis, or acute destructive cholecystitis.

Severe course (Grade III): acute cholecystitis accompanied by multiple organ failure, arterial hypotension requiring drug correction, impaired consciousness, development of adult respiratory distress syndrome, increased plasma creatinine levels, blood clotting disorders, thrombocytopenia (Threatened group, high-risk group).

6. Treatment

The goal of treatment: the most complete and rapid reduction of the level of general and local inflammatory response by removing the gallbladder or eliminating intravesical hypertension.

Indications for hospitalization. With the established diagnosis of "Acute cholecystitis", the patient is subject to emergency hospitalization in the surgical department.

6.1.Conservative treatment.

Conservative therapy can be considered mainly as a preoperative preparation, which is based on: refusal of food and water by mouth, intravenous fluid administration and antibacterial therapy, especially in the presence of signs of dehydration and fever (level of recommendation B).

For the relief of pain, it is possible to use NSAIDs, antispasmodics or opioid analgesics. It should be noted that the use of analgesics does not affect the informativeness of dynamic observation, including the detection of Murphy's ultrasound symptom.

7. Surgical treatment

Acute cholecystitis is subject to surgical treatment at an early stage-up to 72 hours from the onset of the disease. The operation is performed as the diagnostic process is completed and the patient is ready, depending on the severity of his condition. In hospitals that do not have the possibility of round-the-clock adequate pre-and intra-operative examination of the patient and the presence of an operating team of sufficient qualifications, performing "night" operations should be avoided.
Terms of surgical treatment. The optimal period of surgical treatment of acute cholecystitis is up to 72 hours from the onset of the disease.

Early surgery within the above time limits reduces the risk of postoperative complications and mortality, reduces the total time of treatment and rehabilitation (level of evidence 1a)

In the moderate course of acute cholecystitis, early cholecystectomy should be performed by an experienced surgeon in surgical hospitals with sufficient experience in biliary surgery.

Early (the first 24 – 72 hours from the onset of the disease) laparoscopic cholecystectomy

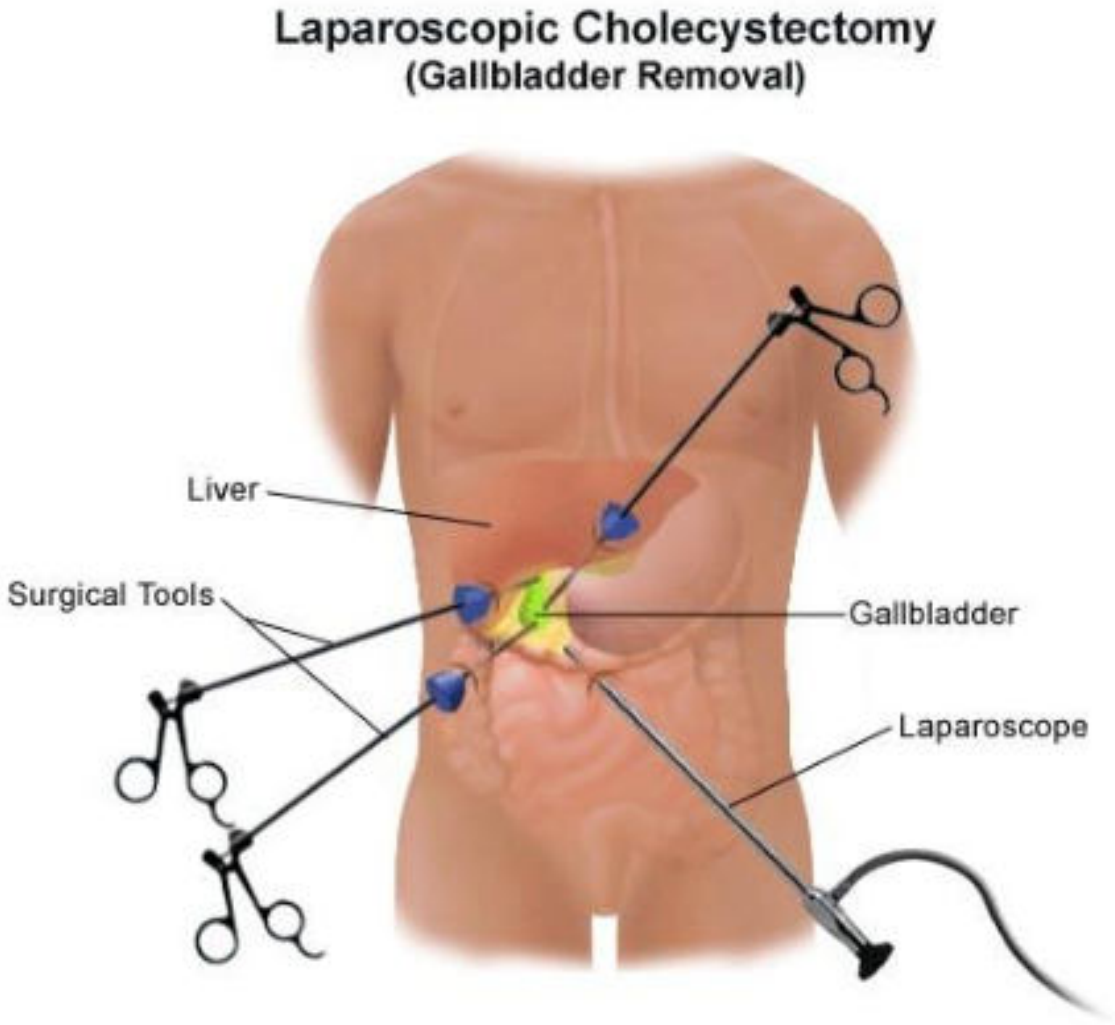

Fig. 7.1 Laparoscopic cholecystectomy

is most effective and safe (level of evidence 1a)

RCT data show a significantly lower number of complications and deaths in early operations compared to delayed ones.

Early operation cholecystectomy can be successfully performed using the standard technique of laparotomy access, minicholecystectomy

Fig. 7.2 Minicholecystectomy

or videolaparoscopic cholecystectomy

Fig. 7.3 Videolaparoscopic cholecystectomy

(level of evidence 1a) [6-10].

THE CHOICE OF THE METHOD OF OPERATION. Laparoscopic cholecystectomy in acute cholecystitis is preferable to open surgery (level of evidence 1b).

Mini-laparotomic cholecystectomy can be used as a conversion method in case of technical difficulties during laparoscopic surgery. (level of evidence 3b)

comparison of minilaparotomic and laparoscopic operations in AC according to RCT data shows essentially the same results in the number of complications and deaths.

The duration of the operation is slightly longer for LCE, but the postoperative period is shorter and more comfortable. A month after the operation, there is no difference in the level of recovery of vital functions (level of evidence 1b)

In case of technical difficulties, the surgeon should perform a timely conversion of laparoscopic or minilaparotomic access to open surgery before the development of complications, including damage to the extrahepatic bile ducts (level of evidence 1c).

In acute cholecystitis, an "active-waiting" tactic is used.

Tactics require compliance with three conditions:

1) Emergency surgery is performed only in the presence of spilled bile peritonitis;

2) Urgent surgical intervention is performed if the conservative treatment of acute cholecystitis is ineffective for 12-24 hours or if jaundice progresses;

3) The planned operation is performed when the attack is successfully stopped.

Conservative therapy, according to the accepted algorithms and standards, includes: bed rest, exclusion of food intake, local hypothermia, antispasmodic, antibacterial, detoxification, infusion therapy. It is mandatory to correct concomitant pathology, water-electrolyte disorders.

Since 1882, when Landenbuch performed the first cholecystectomy, the surgical method of treating GI remains the main one. Modern operations are characterized by reduced surgical aggressiveness (low invasiveness), which improves the quality of life of the patient and the course of the postoperative period.

Elderly and senile age should not be a risk factor that serves as a basis for refusing full-fledged planned surgical treatment.

The main factors of increased risk of surgery are:

concomitant pathology;

complications of the underlying disease – cystic duct obstruction, empyema, destruction;

inflammatory changes in the wall of the gallbladder and around it (infiltrate, abscess);

inflammatory changes in the bile ducts – choledocholithiasis, cholangitis and as a result – mechanical jaundice syndrome.

A history of surgical intervention on the abdominal organs is also a risk factor due to the adhesive process and violations of the topographic and anatomical relationships of organs and tissues.

In this regard, the use of minimally invasive puncture-drainage methods under the control of ultrasound in patients with a high operational and anesthetic risk is the most optimal and least traumatic method of surgical treatment, allowing the patient to

prepare as much as possible for subsequent radical surgery from MLA or laparoscopic method.

7.1.Open cholecystectomy

Previously, it was considered a classic method of surgical intervention in acute cholecystitis – open access (laparotomy).

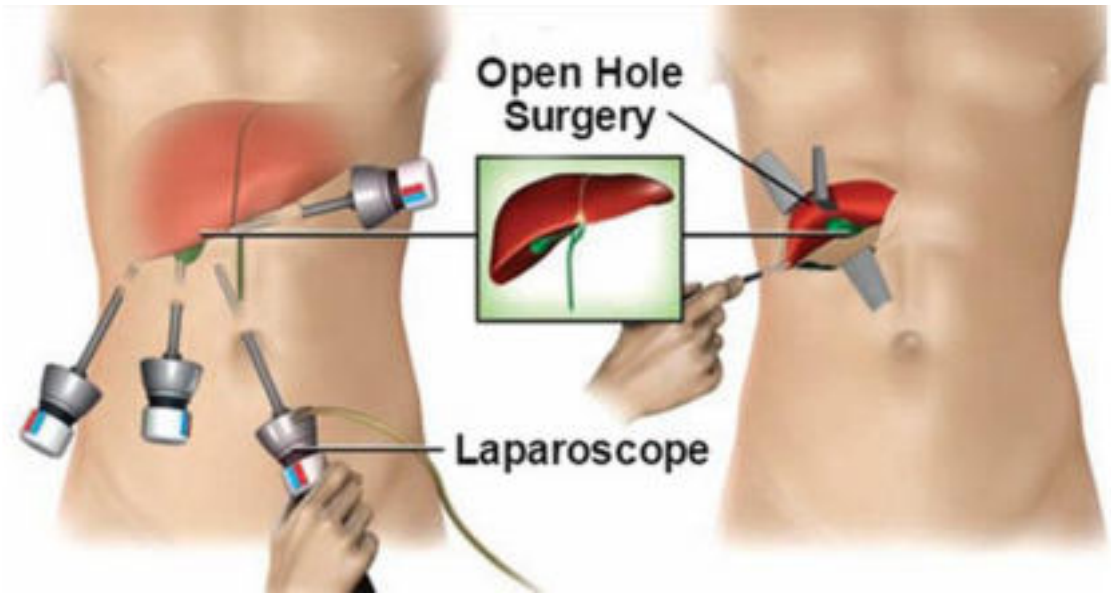

Fig. 7.1.1. Laparoscopy versus laparotomy

This was the so-called traditional approach.

Laparotomy inevitably leads to the need for a long stay of patients in the hospital with a period of hospitalization from 10 to 21 days with a high risk of intra- and postoperative complications. This is due to the large trauma of the tissues, hypodynamia in the postoperative period, as well as the risk of purulent-inflammatory complications.

Since the mid-90s of the last century, the laparoscopic method and mini-laparotomic access have been introduced. Laparoscopic cholecystectomy, against the background of acute cholecystitis, at the stage of development led to conversion with a similar risk of complications.

7.2. Mini-invasive punction-drainage technologies

The use of drainage operations (as the first stage) in preoperative preparation in severe patients with acute cholecystitis allows for preoperative decompression of the gastrointestinal tract, its sanitation, and to reduce the inflammatory process in the gallbladder wall and surrounding tissues. It is convenient to perform direct cholecystocholangiography to diagnose the patency of the common bile duct, to exclude choledocholithiasis before the second stage-cholecystectomy in the "cold period".

Next, we will reflect the main modern provisions of surgical tactics in acute cholecystitis.

Emergency surgery is indicated in the clinical picture of widespread peritonitis, and preoperative preparation should be short-term, the operation should be performed no later than 3 hours after the patient's admission to the hospital.

If the attack is stopped within 24 hours, patients are shown a planned cholecystectomy by laparoscopic method or from a mini-access to this episode of hospitalization.

If the AC attack is not stopped within 24 hours, patients are divided into three groups.

Group 1 – patients whose age is not more than 50 years, with no concomitant pathology, the duration of the disease is not more than 2 days. According to ultrasound data, they have no signs of peripubic infiltrate, biliary tract lesions. Patients of this group are indicated for urgent cholecystectomy – open, laparoscopic or mini-access.

Group 2 – patients with an increased operational and anesthetic risk. This group includes elderly and senile patients, patients with pronounced inflammatory changes in the wall of the gallbladder and adjacent tissues, with concomitant pathology that requires correction in the preoperative period.

Patients of the 2nd group are shown two-stage treatment with the use of minimally invasive technologies:

Stage I-cholecystostomy under ultrasound guidance;

Stage II-delayed operation - cholecystectomy from mini-access, laparoscopic or" open "method. Cholecystectomy is indicated in the "cold period" after the subsiding of inflammatory and infiltrative changes in the gallbladder and adjacent tissues.

Group 3-patients with extremely high operating pressure-

anaesthetic risk (senile age, severe concomitant pathology). Patients in this group are shown to form a "wide" cholecystostomy from a mini-laparotomy approach under epidural or local anesthesia with simultaneous removal of concretions during surgery or in the postoperative period using an endoscope or X-ray television control.

Two-stage treatment with the use of minimally invasive puncture-draining technologies:

a) Stage I - cholecystostomy under ultrasound guidance;

b) Stage II-delayed operation - cholecystectomy from mini-access, laparoscopic or" open " method.

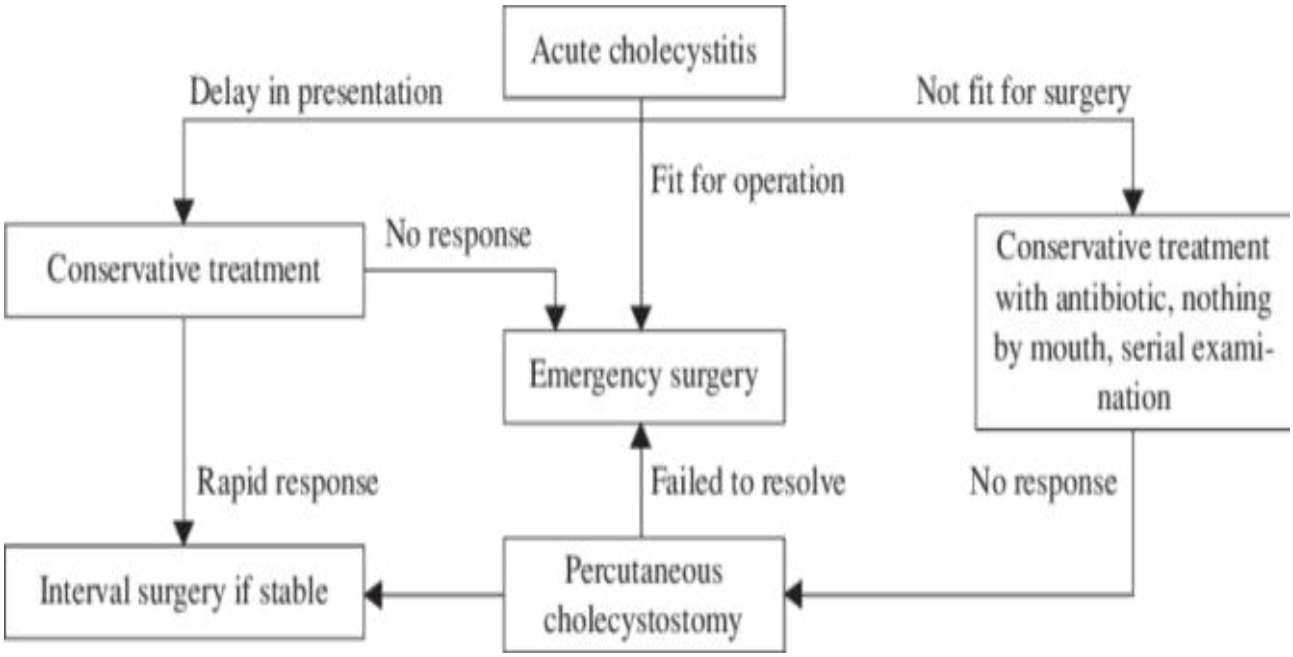

Table. 7.2.1. Algorithm of two-stage surgical treatment of acute cholecystitis

In case of percutaneous transhepatic drainage of the gallbladder performed under ultrasound guidance, the following techniques are used:

1. The two-stage Seldinger technique with the introduction of the drainage "pig tal" (pig tail) 7-8 Fr into the lumen of the gallbladder. In this case, a puncture of the

GB through the liver is performed under ultrasound guidance, then X-ray television control is applied.

2. A single-stage technique of PTMCE with a stiletto catheter, when the drainage (usually 9 Fr., for example, of the company "Balton") is the outer casing of the puncture needle. The technique is less traumatic than the two-stage Seldinger technique; it is performed under ultrasound control without the use of X-ray vision, does not require a trained assistant and is short in time.

3. Puncture, aspiration and washing of the gallbladder cavity with antiseptic solutions through the lumen of the needle, followed by the installation of a cholecystostomy through it. This is the least acceptable drainage option, since the manipulation technique involves a mismatch between the diameter of the drainage and the puncture channel. This can lead to blood and bile flow through the puncture channel into the free abdominal cavity. Fixation of the catheter in the draining position is achieved by an excess of the drainage tube in the gallbladder cavity and in the subdiaphragmal space, which, in addition to questionable fixation, also worsens the draining properties of the established cholecystostomy. The disadvantage of the technique is the microbial contamination of the puncture canal in its intrahepatic section during the reverse course of the needle.

4. The method of percutaneous drainage of cavities, with the proposed set of tools for its implementation. This technique is closest to stiletto-catheter drainage. The difference is that the drainage intubated with a special cannula is lowered into the cavity of the gallbladder along a flexible guide conductor. At the same time, the traumatic nature of the manipulation is reduced, and the removal of the needle through the lumen of the installed drainage eliminates the contamination of the puncture channel with the infected contents of the gallbladder.

Indications for percutaneous transhepatic cholecystostomy

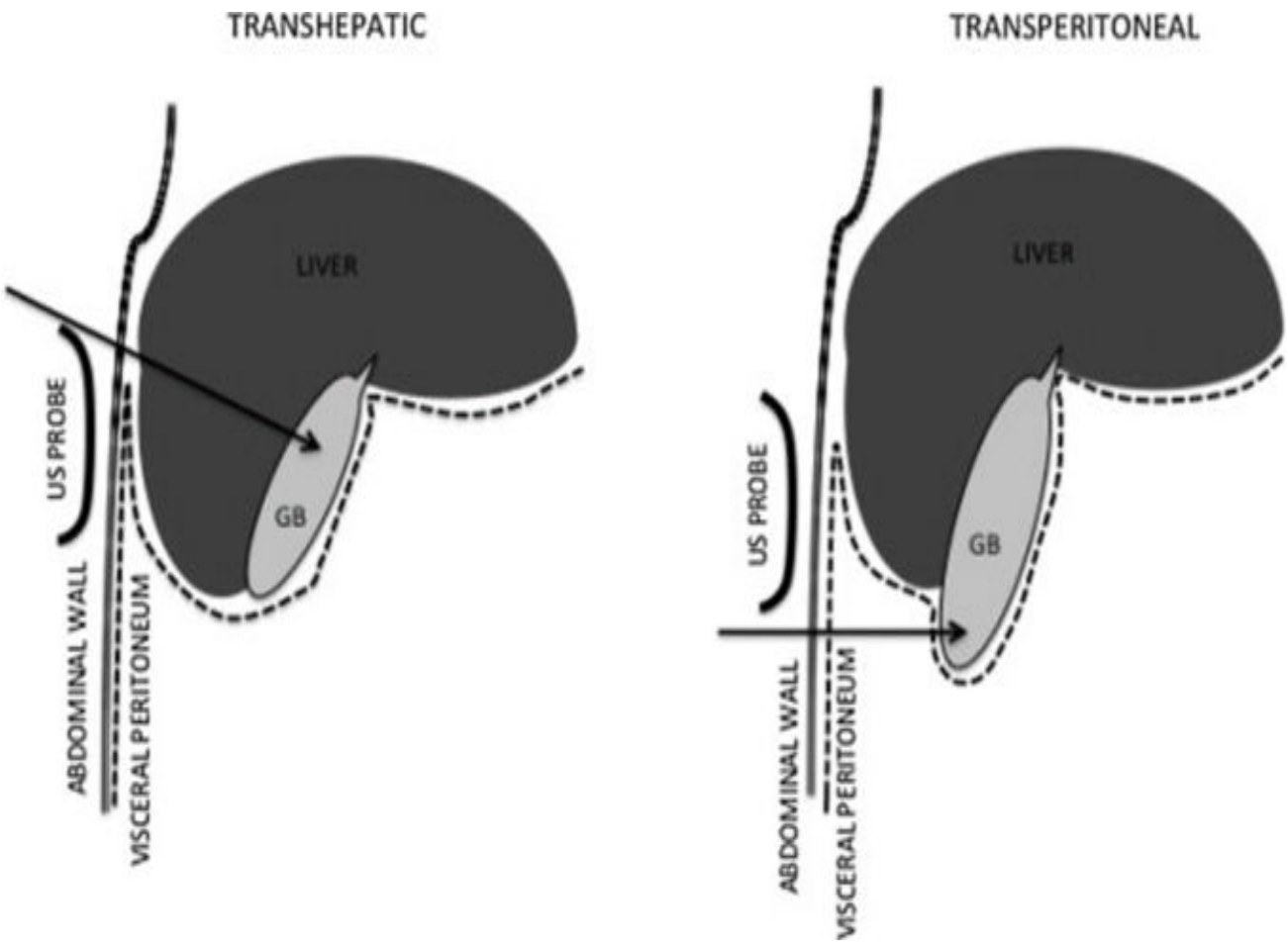

Fig. 7.2.1. Percutaneous transhepatic cholecystostomy

under ultrasound guidance in acute cholecystitis:

1. Acute destructive cholecystitis (calculous and stone-free).

2. Acute cholecystitis with the ineffectiveness of conservative therapy for 1-2 days in patients with high surgical and anesthetic risk.

3. Acute cholecystitis and choledocholithiasis, complicated by the syndrome of mechanical jaundice, with the ineffectiveness of conservative therapy and EPST.

4. Acute cholecystitis, complicated by mechanical jaundice, on the background of acute pancreatitis.

The essence of the method is that we have abandoned the use of puncture nozzles and sensors that support the trajectory of the needle.

The lack of fixation of the needle in the puncture nozzle allows the surgeon to adjust the trajectory of its movement during drainage. In turn, this makes it possible to correct the direction of movement of the puncture needle within a few millimeters.

PTDGB under ultrasound guidance in patients with diagnosed destructive cholecystitis is performed by X-ray contrast polyurethane drains with a fixing distal end of the "pig tale" type with a size of 9 Fr., which allows you to reliably fix the cholecystostoma in the gallbladder cavity.

Catheters and drainage systems are used both by Russian manufacturers, in particular, the company "MIT Ltd", and foreign-firms "Balton", SOOK, etc., which produce X-ray contrast catheters made of polyethylene of several modifications.

MIT drains are installed using a device for draining cavities. The device is a needle with a movable outer metal part and a clothed drainage.

The dimensions of the external moving part and the drainage are chosen in such a way that a free section of the needle with a length of 15-20 cm remains in the assembled form. There is a mandrel in the lumen of the needle. In addition, the device is equipped with two thrust plates with a limiting cable for moving the external cannula and drainage along the needle.

The 9 Fr. curved drainage is used to drain the gallbladder. The peculiarity of this drainage is that it is equipped with a control thread, the ends of which are removed from the pavilion at the cutaneous end of the catheter, which allows it to be additionally fixed in the cavity of the gastrointestinal tract.

Complications in the form of dislocation of cholecystostoma, leakage of bile through the channel into the free abdominal cavity when using drains of this design are practically not found.

For drainage of the gallbladder, the drainage of the company "Balton" 9 Fr is also used.

This system is represented by a puncture needle with a mandrel, on which to put a drainage in the form of an external casing. The distal part of the latter in the form of a ring of the "pig-tale" type is fixed in the cavity of the gallbladder due to its own rigidity. In the case of transhepatic puncture and drainage of the gallbladder not through the bed, but through a section of the free abdominal cavity, bile may flow through the puncture channel into the abdominal cavity with the formation of delimited fluid accumulations, abscesses or bile peritonitis. In addition, there is a high

risk of dislocation cholecystostomy. Positive aspects PTDGB manipulation under ULTRASOUND-guided drainage of the company "Balton" are more simplified methodology, which includes only three steps, and no need for an assistant.

Stages of drainage of the gallbladder under ultrasound guidance.

The drainage of the gallbladder by the DDC includes four stages.

1. Anesthesia of the skin and liver capsules (0.25-0.5% novocaine solution or 2% lidocaine solution). Under ultrasound guidance in the scanning plane after skin incision by the "free hand" method, we perform a puncture of the gallbladder.
2. With the help of the 2nd thrust plate, the forward movement of the external cannula and drainage along the needle is carried out until it is fully opened. At the same time, the position of the needle is fixed with the help of the 1st thrust plate.
3. Lowering of the distal end of the drainage into the lumen of the gallbladder. Under the control of an ultrasonic sensor, the drainage is installed at the required depth in the cavity, the distal part of the "pig-tail" type is fixed outside with special threads.
4. Fixing the drainage to the skin, ultrasound control, evacuation of the contents from the gallbladder.

7.3.Mini-access in the treatment of acute cholecystitis

Advantages of MLA surgery compared to laparoscopic surgery:

1. Possible revision of the biliary tract visually and palpation.
2. If necessary, it is possible to suture the bed of the gallbladder.
3. Faster conversion (conversion rate) a traditional laparotomy.
4. Objectively less risk of damage to the common bile duct.
5. The absence of a busy carboxyperitoneum.
6. The possibility of performing the operation under epidural anesthesia.
7. The possibility of surgical treatment of patients with high operational and anesthetic risks.
8. Low cost of instruments, the ability to quickly train surgeons.

Indications for the surgical aid from the MLA for AC:

1. The duration of the attack is not more than 2 days, while according to ultrasound there is moderate swelling and weakly pronounced pericubic infiltrate.

2. Severe concomitant pathology and the associated high operational and anesthetic risk.

3. Contraindications for endotracheal anesthesia and carboxyperitoneum.

4. The age of patients is more than 70 years.

5. History of laparotomic access surgery.

6. Adhesive process in the subhepatic space.

7. Conversion from LCE to MLA.

8. Mirizzi's syndrome.

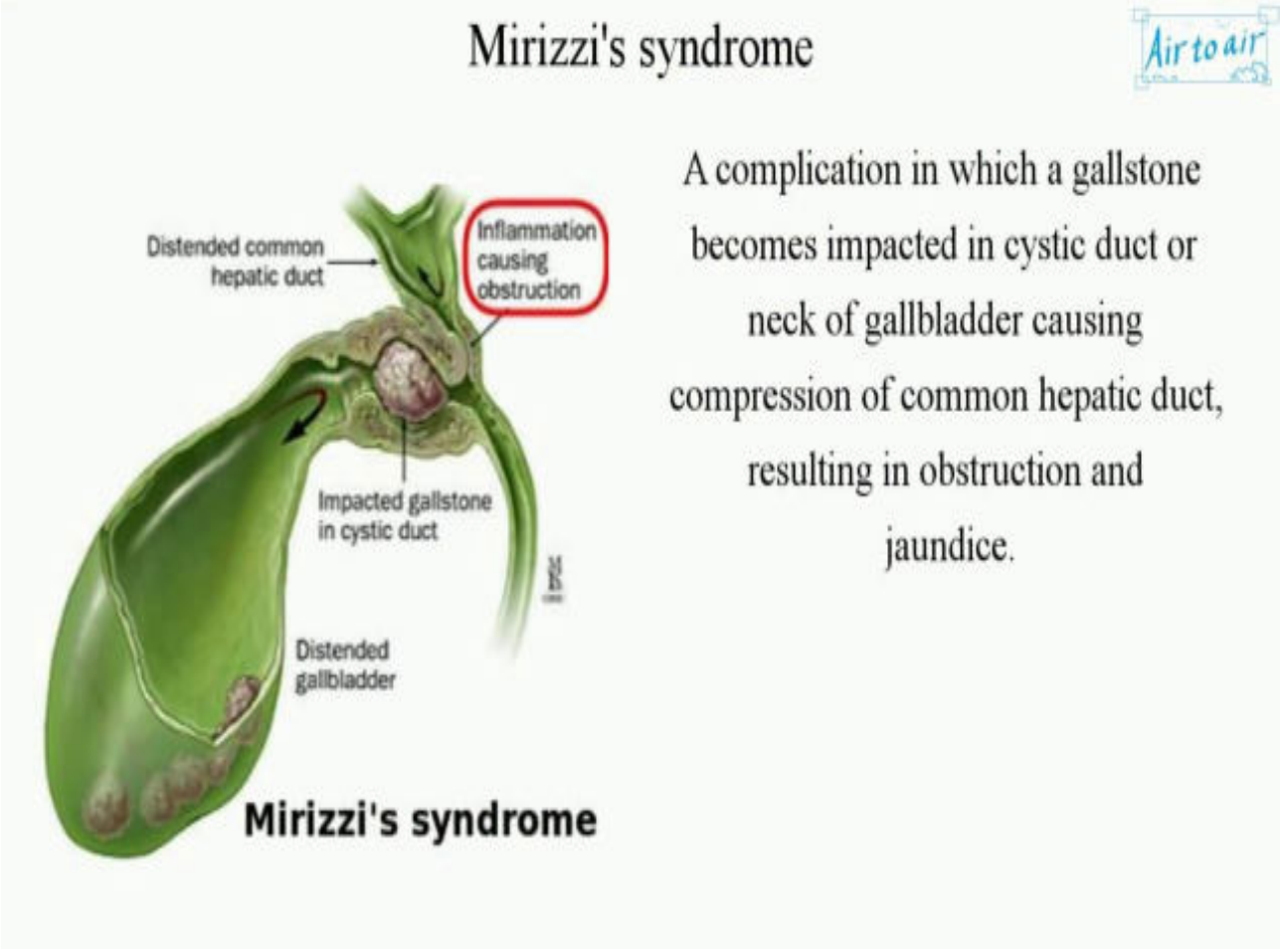

Fig. 7.3.1. Mirizzi's syndrome

9. The later stages of pregnancy.

Cholecystectomy from MLA should be performed after the acute purulent process in the gastrointestinal tract subsides, in the so-called "cold period". At the same time, the majority of patients are operated on the 10th-14th day after PTDGB.

Some patients are operated on for more than 14 days, which is associated with the need for correction and additional therapy of severe concomitant pathology. Patients are discharged on 2-3 days after the operation under the supervision of polyclinic doctors.

Contraindications for the surgical aid from MLA:

1. Extremely high operational and anesthetic risks in severe decompensated comorbidities.
2. The absence of the possibility of both endotracheal anesthesia and epidural anesthesia (according to the severity of the condition or concomitant pathology).
3. The need for revision of the abdominal organs.
4. Peritonitis.
5. Uncorrectable disorders of the blood clotting system.
6. Cirrhosis of the liver in the decompensation stage.
7. Cancer of the gallbladder.

MLA is used for tool box "Mini-assistant", including the ring illuminator, the expansion of the mirror and a special form tools.

A characteristic feature of all tools for operations of MLA is a form that allows you to keep the operating field and the zone of interest as open as possible to review, access, and manipulation.

Stages of the operation when MLA:

1. The skin incision in the right upper quadrant for 2-4 cm below the costal arch length 3-5 cm, with the formation of laparostomy.
2. Installation of the ring, illuminator, expansion mirrors with revision of the hepatic space, isolation of the gallbladder, elements of the hepatic-duodenal ligament.
3. Cholecystectomy, mainly from the neck, with separate ligation of the cystic artery and cystic duct. The bed of the gallbladder is coagulated in the spray mode, if necessary, it is sutured (rarely).
4. In the case of choledocholithiasis – choledocholitotomy, intraoperative cholangioscopy (according to the indications of cholangiography).

5. Control drainage to the gallbladder bed according to indications, layer-by-layer suturing of the wound.

Laparoscopic cholecystectomy

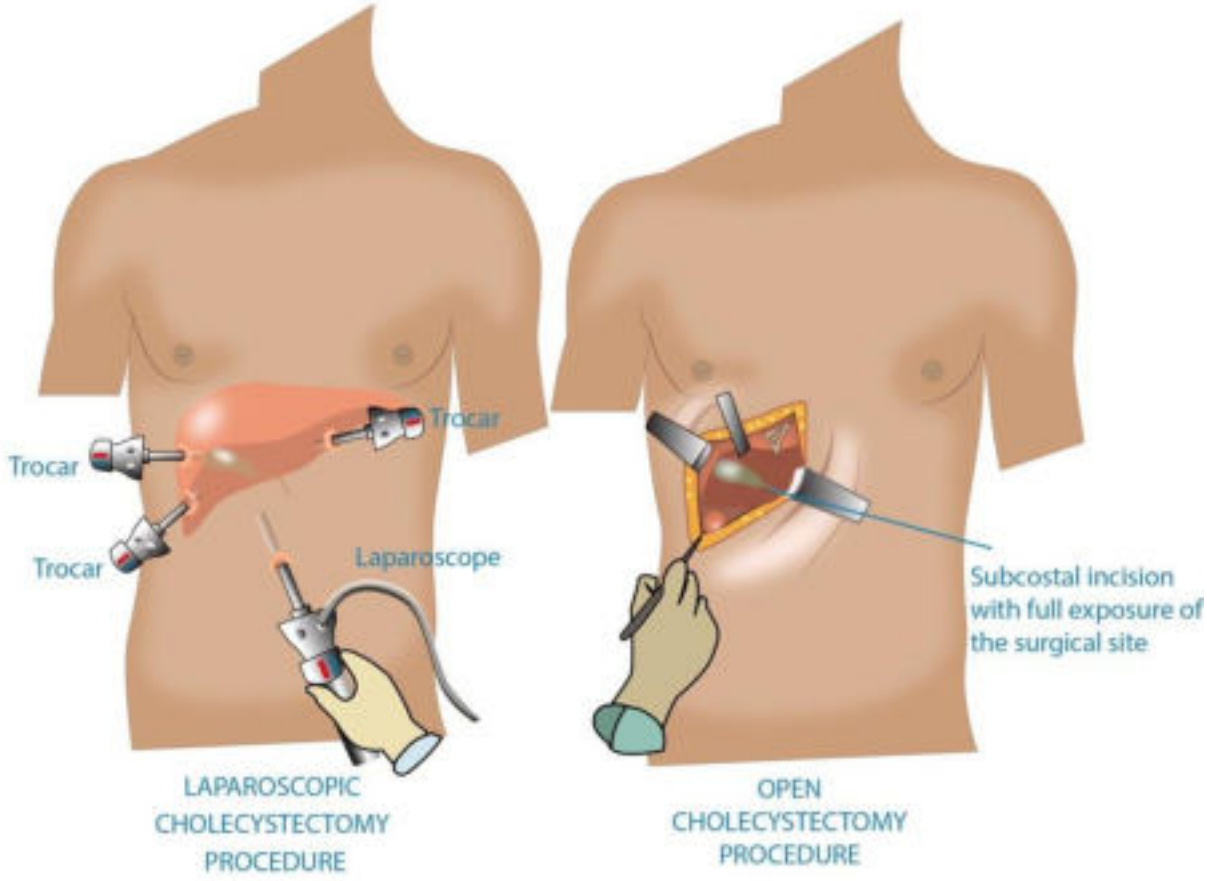

Fig. 7.3.2. Laparoscopic versus open cholecystectomy

Indications for LCE in AC:

1. The duration of the attack is no more than 2-3 days, while according to ultrasound data, there is no amniotic infiltrate and signs of destruction.
2. Absence of severe concomitant pathology.
3. Young and middle age of the patient.

Contraindications for LCE in AC.

Absolute values:

1. General contraindications to the operation.
2. The duration of the attack is no more than 2-3 days, according to ultrasound data, a dense inflammatory pericubic infiltrate, signs of destruction of the gastrointestinal tract.

3. Extremely high operational and anesthesiological risks against the background of severe concomitant pathology.

4. Contraindications for endotracheal anesthesia and carboxyperitoneum.

5. Mirizzi's syndrome.

6. The later stages of pregnancy.

7. Cancer of the gallbladder.

Relative values:

1. The age of patients is more than 70 years on the background of severe concomitant pathology.

2. Massive adhesive process in the abdominal cavity after a previous laparotomy.

3. High risk of conversion during the operation.

4. Choledocholithiasis, mechanical jaundice.

5. Acute pancreatitis.

6. Scleroatrophic gallbladder.

7. Cirrhosis of the liver.

8. Peptic ulcer disease.

A typical LCE is performed from 4 accesses.

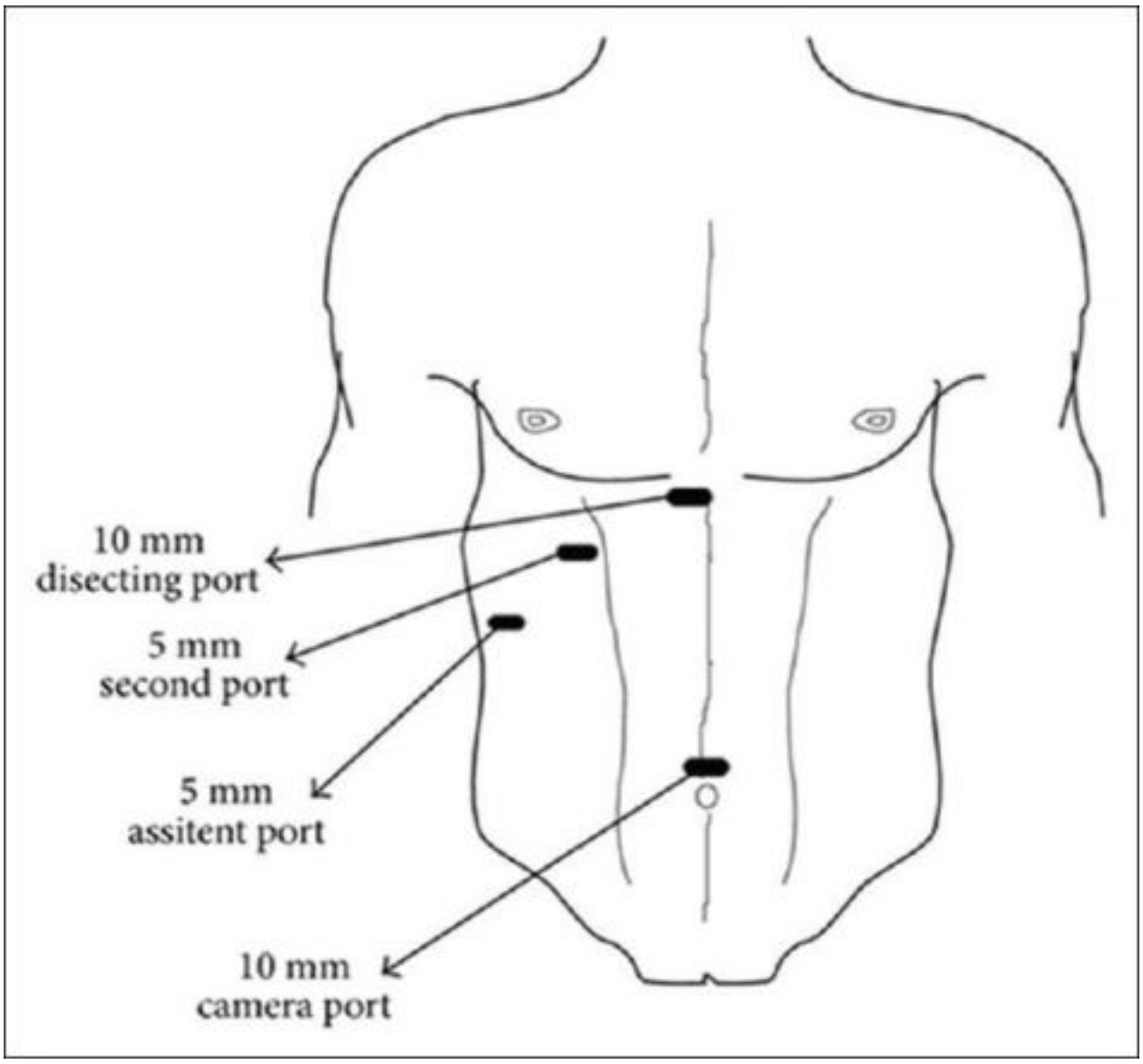

Fig. 7.3.3.The point of introduction of the trocar

Fig. 7.3.4. Trocars

Some features, such as hepatomegaly or intrahepatic location of the gallbladder, dense infiltrate, may require the introduction of a fifth trocar for the introduction of an additional instrument and the removal of the liver. A modification of the three-access LCE has been developed for technically simple cases. Tools and racks for LCE of domestic and foreign production are presented by various firms.

LCE stages:

1. Creating a pneumoperitoneum.

2. The first trocar for the laparoscope is inserted paraumbilically along the white line of the abdomen below or above the navel.

3. Consistently examine the abdominal cavity.

4. The second instrumental trocar is inserted in the epigastric region as close as possible to the xiphoid process, the abdominal wall is dotted in an oblique direction at

an angle of 45°, so that the trocar stiletto appears in the field of view to the right of the round ligament of the liver.

5. The third and fourth auxiliary trocars are introduced, respectively, along the midclavicular line 4-5 cm below the costal arch and along the anterior axillary line at the level of the navel.

6. The fifth trocar in the left hypochondrium is inserted, if necessary, for additional removal of the liver by a retractor.

7. Examine the liver and gallbladder.

8. Traction. The goal of this stage is to lift the gallbladder, expose the liver gate and the area of the Calo triangle for subsequent preparation.

9. Dissection of the peritoneum. Mobilization begins with dissection of the peritoneum with an L-shaped electrode along the transition fold at the level of the middle third of the medial surface of the gallbladder. Next, the U-shaped incision is continued over the Hartmann pocket with a transition to the lateral wall of the organ.

10. The preparation of the triangle of calot. With the help of a dissector, tupfer or "heel" of an electrosurgical hook, the dissected peritoneum together with the underlying adipose tissue is displaced proximally towards the hepatoduodenal ligament. Expose the cystic duct and artery. Two rules, developed at the beginning of the twentieth century, should be strictly observed when allocating an organ.

First, no tubular formation leading to the gallbladder should be crossed until the anatomy of this area is fully clarified.

Second, you need to make sure that after performing the mobilization, only two tubular formations – the artery and the duct-approach the gallbladder.

11. Intersection of the cystic artery. The vessel is pre-clipped or coagulated with a dissector in 3-4 places throughout, then it is crossed near the wall of the gallbladder.

12. The intersection of the cystic duct. The cystic duct is isolated along the entire perimeter. The size of the clip (5 or 8 mm) is selected depending on the diameter of the duct. First, apply the distal clip as close as possible to the neck of the bladder. Then apply two proximal clips. At the time of clipping, the cystic duct and both branches of the clipper should be in the field of view. The cystic duct is crossed with

scissors without coagulation, leaving 2 clips on the proximal stump. Pay attention to the fact that the intersected structure has a single lumen.

Cholangiography

Fig. 7.3.5. Cholangiography

is the main method of intraoperative diagnosis of choledocholithiasis in LCE.

14. Isolation of the gallbladder from the liver bed. Small foci of bleeding are controlled by electrocoagulation. After that, the gallbladder is raised above the edge of the liver.

15. Extraction of the gallbladder from the abdominal cavity. A plastic container is inserted into the abdominal cavity through the umbilical port. The GB is cut off from the edge of the liver. The container is placed in the GB. The container is then closed and removed from the abdominal cavity.

16. Control audit of the abdominal organs and completion of the operation.

After removing the GB and suturing the aponeurosis, a pneumoperitoneum is applied.

A control revision and hemostasis of the bed, the liver gate, is performed, the

remaining fluid is aspirated, and lavage of the subhepatic and subdiaphragmatic spaces is performed.

Indications for drainage of the abdominal cavity are technical difficulties during the operation: bleeding of the GB bed, doubts about the reliability of hemostasis, intensive tissue coagulation, perforation of the gallbladder and the outflow of purulent bile, intrahepatic location of the gallbladder (prevention of fluid accumulation and abscess formation).

The removal of the trocars must be carried out under visual control.
Aponeurosis is sutured, skin sutures or paper clips are applied.

7.5.Robotic cholecystectomy

The robot-assisted surgical system "Da Vinci" (English: Da Vinci Surgical System) is a device for performing surgical operations. Manufacturer-Intuitive Surgical company. Installed in several hundred clinics around the world.

The system consists of two blocks. One is designed for the operator, and the second-a" four-armed " machine-performs the role of a surgeon. The doctor sits down at the remote control, controls the operated area, seeing it in a 3D image with multiple magnification. Special joysticks allow you to control the device.
Robotic surgery began to develop in the 1980s. One of the first automatic devices in surgery was the "Da Vinci".

A working prototype was developed in the late 1980s as part of a contract with the US Army.

Indications for robotic cholecystectomy do not differ from indications for laparoscopic surgery.

The Da Vinci robotic system, unlike a conventional laparoscope, has many flexible joints, which allow you to make movements following the movements of the operating doctor and provide almost unlimited freedom of movement in all directions.

The operating surgeon is at the control panel. The three-dimensional image, enlarged by 15 times, makes it possible to see even very small structures. The

advantage of robotic cholecystectomy compared to laparoscopic surgery: the duration of the operation is 8-12 minutes (no more than 20 minutes), while laparoscopic surgery is performed for about 30-45 minutes. Better stability and accuracy of movements allow you to avoid hand tremors. The incision runs below the underwear line, so the scar will not be noticeable.

Fig. 7.5.1.Operation of the Da Vinci system

Fig. 7.5.2. The surgeon at the console

In addition, with an incision in the lower abdomen, in the case of robotic surgery, patients experience less pain. After the robotic operation, the patient is activated on the same day and is discharged home the next day.

Robotic operations are rare, but can lead to forced laparotomy (conversion) due to poor visualization, pronounced inflammatory or adhesive process. Other intraoperative complications are also possible.

The indications for conversion are the same as for LCE.

The main drawback of the surgical robot is its high cost (from 1.5 to 2.5 million euros), as well as high operating costs (expensive disposable instruments and consumables).

7.6.Single-port access

An interesting and promising method of LCE is single-port laparoscopic cholecystectomy through a puncture in the umbilical region using the SILS technology (single-port surgery).

Since 2008, this unique technique of minimally invasive cholecystectomy has been used in the United States.

The essence of the method of single-port gallbladder surgery is to perform LCE through a special device-a port made of soft plastic, which is inserted through a single puncture in the parotid region.

The port diameter is 23-24 mm. Laparoscopic instruments and a 5 mm diameter laparoscope are passed through the soft operating port.

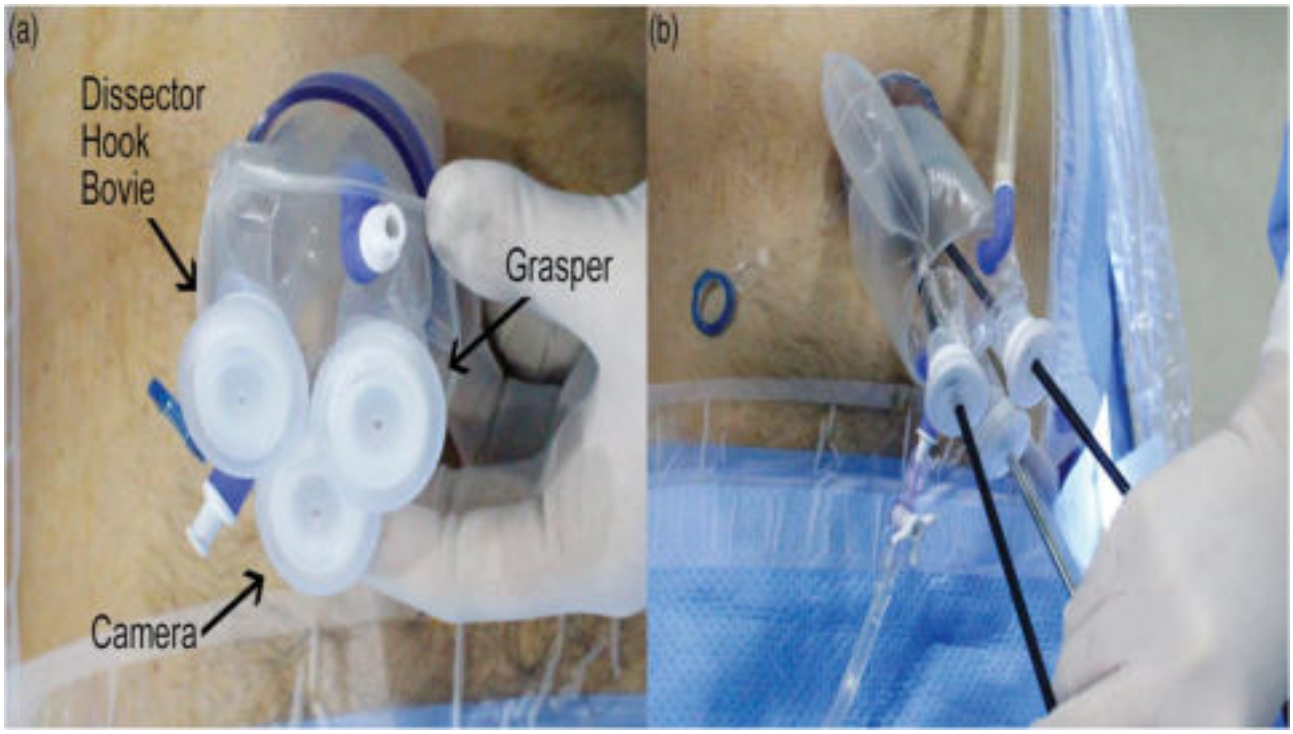

Fig. 7.6.1. Ports for SILS technology

At the end of the operation, the device is removed from the abdominal cavity along with the gallbladder. A cosmetic suture is applied to the wound in the umbilical region..

Advantages of the method through a single puncture in the pericupial region using SILS technology over conventional laparoscopic access:

- fewer punctures on the abdominal wall;
- reduction of pain after surgery;

- faster rehabilitation after surgery; - better cosmetic effect.

The maximum benefits of the SILS method are seen in patients with large and multiple gallstones, when the surgeon is forced to expand the access zone in the navel area with conventional LCE to extract the gallbladder with concretions.

7.7. Transluminal cholecystectomy (transvaginal laparoscopic cholecystectomy by N. O. T. E. S. technology)

Transluminal endosurgical interventions [27, 28] are called, where flexible instruments are inserted into the lumen of a hollow organ through the natural openings of the human body and through an incision in the wall of the internal organ and are brought directly to the operated object. To perform an intervention on the abdominal organs, working tools can be inserted through an incision in the wall of the stomach, vagina or rectum (transluminal cholecystectomy or transvaginal laparoscopic cholecystectomy).

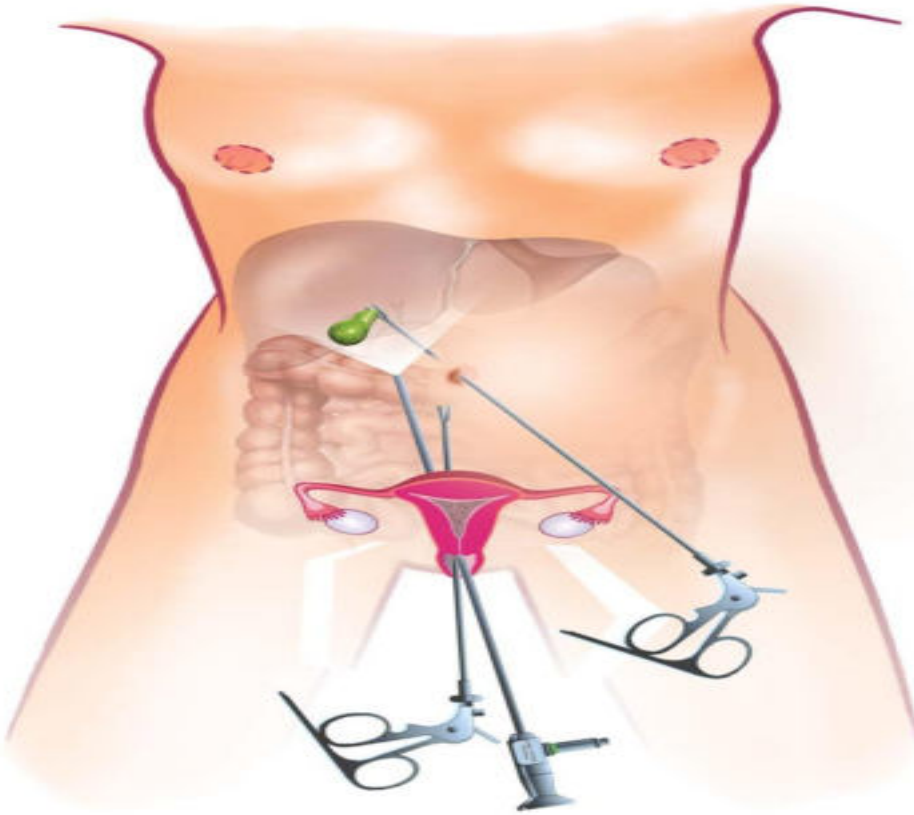

Fig. 7.7.1. NOTES

The concept of surgery through the body's natural physiological openings was first described by American gastroenterologist Anthony Kalloo of John Hopkins University in Baltimore (USA).

The first results of a trans-ventricular appendectomy performed in a clinical setting were reported by gastroenterologists Nageshwar Reddy and Venkat Rao from the Asian Institute of Gastroenterology, Hyderabad (India) in 2004.

Transvaginal access is currently the most commonly used in human transluminal surgeries. This is due to the fact that access to the abdominal cavity through colpotomy has been widely used by gynecologists for a long time. Russian gynecologist Dmitry OskarovichOtt described the use of the posterior vaginal arch as a convenient access for performing intraabdominal diagnostic and therapeutic procedures.

In general surgery, the transvaginal approach is also not new, especially in laparoscopic surgery. The author of the first report on performing laparoscopic cholecystectomy using a laparoscope inserted through the vagina after a

hysterectomy was an Argentine gynecologist Daniel Alberto Tsin from the Mont Sinai Clinic (New York, USA).

The transvaginal pathway is the most convenient for popularizing surgery through natural openings from the experimental field to clinical practice. Within a few months, since the beginning of 2007, many research groups from different countries have published data on successfully performed transvaginal cholecystectomy operations using exclusively endoscopic techniques or using thin endoscopes, or using a combined technique when laparoscopic instruments are used for tissue dissection.

Advantages of laparoscopic cholecystectomyusing N. O. T. E. S. technology:

- no pain after surgery;
- maximum motor activity;
- hospitalization for only one day; - excellent cosmetic effect.

The only restriction in the postoperative period is sexual rest for one month.

It should be noted that transvaginal cholecystectomy does not affect the female genitals (uterus, appendages, etc.) and does not affect their work.

For men and women who have undergone many operations on the pelvic organs, the technique of laparoscopic treatment of cholelithiasis using transvaginal access using the N. O. T. E. S. technology is technically impossible.

8. Control questions

1.Modern definition of acute cholecystitis.

2. Foreign and domestic scientists who have made the most significant contribution to the development of the doctrine of diseases of the biliary tract and gallbladder.

3. The main etiological factors of acute cholecystitis.

4. Basic theories of the pathogenesis of acute cholecystitis.

5. Morphological changes occurring in the wall of the gallbladder during the development of various forms of acute cholecystitis. Modern pathologic-anatomical classification of the disease.

6. Clinical classification of acute cholecystitis and its complications.

7. The main syndromes in the clinical picture of acute cholecystitis.

8. The main specific symptoms of acute cholecystitis.

9. Features of the clinic and diagnosis of various forms of acute cholecystitis.

10. Indications for emergency, urgent and delayed operations in acute cholecystitis.

11. The main program of conservative therapy for acute cholecystitis.

12. The main stages of cholecystectomy are revealed by ultrasound and holaparoscopic methods.

13. What causes the adverse outcomes of treatment of acute cholecystitis? Basic principles of their prevention.

9. Tests

1. The main cause of acute calculous cholecystitis:

a) blockage of the cystic duct;

b) a stumbling block;

c) compression of blood vessels by a specific element in the wall of the gallbladder;

d) exacerbation of the inflammatory process in the bladder wall;

e) violation of the diet.

2. The Ortner-Grekov symptom is:

a) sharp pain when pressing on the xiphoid process;

b) pain when bending along the right costal arch of the edge of the palm;

c) increased pain sensitivity during palpation to the right of the spinous processes of the cervical vertebrae;

d) a certificate of palpation in the case of a bruised navel;

e) lower back pain.

3. Courvoisier's symptom is:

a) a large gallbladder as a result of blockageof the duct bladder;

b) painful gallbladder with signs of peritonitis;

c) sharp pain during palpation of the gallbladder;

d) overgrown painless gallbladder on the background of mechanical jaundice;

e) sharp pain when the right forearm is being pounded.

4. The most common cause of glandular peritonitis:

a) damage to the gallbladder;

c) cookies with filling;

c) sweating bile through Joaquin Rokitansky-Aschoff;

d) perforation of the gallbladder;

e) the failure of the cult of the 12-duodenum.

5. The average amount of bile rashes in an adult per day is:

a) 2000-2500 ml;

c) 700-1100 ml;

c) 200-300 ml;

d) 500-600 ml;

e)300-400 ml.

6. The Calo triangle is formed by:

a) cookies with bases;

b) cystic artery, hepatic duct, cystic duct of thegallbladder;

c) the cystic duct, the common bile duct and duodenum 12;

d) the cystic artery, cystic duct and the common bile duct.

7. Pathognomonic sign of acute blockage of the common bile duct:

a) sharp pain in the right hypochondrium;

b) a sharp increase in total blood bilirubin;

c) a sharp increase in direct bilirubin;

d) Georgyevsky symptom;

e) all of the above.

8. In the case of effective drug treatment for acute calculous cholecystitis, choledocholithiasis, acute pancreatitis, it is necessary to:

a) operate ahead of schedule;

b) operate in the cold period (2-3 weeks));

c) continue conservative treatment;

d) study in detail;

e) make suggestions.

9. For destructive cholecystitis and pancreatitis, it is indicated:

a) cholecystectomy;

b) drainage along the Pikovsky;

c) drainage of the stuffing box;

d) cholecystojejunostomy;

e) cholecystogastrostomy.

10. What are the decisive circumstances when deciding on the need for elective surgical treatment for cholecystitis?

a) severe dyspeptic syndrome;

b) long-term history;

c) concomitant liver changes;

d) the presence of episodes of recurrent pancreatitis;

e) the presence of concretions in the gallbladder.

11. A 70-year-old patient was operated on as planned for calculous cholecystitis. Intraoperative cholangiography revealed no pathology. On the 3rd day after the operation, the appearance of jaundice, pain in the area of the operation was noted. Diagnosis:

a) suppuration of the postoperative wound;

b) acute postoperative pancreatitis;

c) intraoperative trauma of the bile ducts;

d)cicatricial stricture of the common bile duct;

e) intra-abdominal bleeding.

12. A 70-year-old patient suffers from frequent attacks of calculous cholecystitis with a pronounced pain syndrome. Anamnesis: two myocardial infarctions, stage III B hypertension. Two months ago, he suffered a cerebral circulation disorder. Currently, he is admitted to the acute cholecystitis clinic. Which method of treatment should be preferred?

a) to refuse surgical treatment, to carry out conservative therapy;

b) cholecystectomy under intubation anesthesia;

c) cholecystectomy under peridural anesthesia;

d) surgical cholecystostomy;

e) remote wave lithotripsy.

13. A 55-year-old patient who underwent a cholecystectomy 2 years ago was admitted with a clinical picture of mechanical jaundice. Retrograde pancreatocholangiography revealed choledocholithiasis. Which treatment method is preferred?

a) endoscopic papillosphincterotomy;

b) complex conservative therapy;

c)transduodenalpapillosphincterotomy;

d)choledochotomy with external drainage of the common bile duct;

e) extracorporeal lithotripsy.

14. Which study is the most informative for the diagnosis of calculous cholecystitis?

a) oral cholecystocholangiography;

b) laparoscopy;

c) overview x-ray of the abdominal cavity;

d) ultrasound;

e)endoscopic retrograde cholangiopancreatography.

15. A 56-year-old patient was admitted with a clinical picture of acute cholecystitis. Ill for 2 days. Ultrasound revealed multiple concretions in the gallbladder, inflammatory and infiltrative changes in the wall of the latter. No pathological changes in the biliary tract and pancreas were detected. What tactics should I choose?

a) urgent cholecystectomy;

b) conservative therapy;

c) microcholecystostomy under ultrasound control;

d) the imposition of surgical cholecystostomy;

e) remote wave lithotripsy.

Answers: 1-a; 2-b; 3-d; 4-c; 5-b; 6-b; 7-c; 8-b; 9-b; 10-e; 11-d; 12-d; 13-a; 14-d; 15-a

10. Situational tasks

TASK 1. Patient B., 88 years old. She was admitted to the hospital via the channel " 03 " with complaints of abdominal pain for 4 days, nausea, periodically vomiting. In the anamnesis of AC for 20 years, CHD, HD-II art., **ADCC** in 2004, AMI in 1999. Objectively: the condition is severe, passive. Breathing is hard. BR – 21 in min. BP-150/90 mm Hg. Pulse-90 per minute, arrhythmic. The tongue is dry, overlaid. The abdomen is soft in all parts, not swollen, with palpation moderately painful in the right hypochondrium. Symptoms of Ortner, Shchetkin, Pasternatsky are negative. The stool and urine output without any changes. Blood test: Hb-120 g / l, white blood cells-12x10 to the degree of 9, red blood cells-4, 0x10 to the degree of 12, platelets-250x10 to the degree of 9. Blood biochemistry: blood sugar-10 µmol/l, total blood bilirubin-28 µmol/l, total protein-60 g/l. Ultrasound data of the abdominal cavity: liver of normal size; gallbladder-120x45 mm, wall-12 mm, layered, in the lumen multiple concretions from 5 to 10 mm in diameter; concretion of 10 mm in the neck of the gallbladder, there is a symptom of" overhanging " of the mucosa. The common bile duct is 8 mm, visualized throughout. The hepatic-duodenal ligament is edematous, infiltrated. Pancreas – 32x23x26 mm, diffusely altered. Virunga duct – 2 mm. The kidneys are unremarkable. No free fluid was found in the abdominal cavity.

Questions:

1. Formulate a diagnosis.
2. Surgical tactics for 1 day.
3. Surgical tactics in 1-2 months.

Answers:

1. Clinical diagnosis: AC. Destructive acute calculous cholecystitis. Coronary artery disease. Angina pectoris of tension III FC. AMI in 1999-Post-infarction cardiosclerosis. HD - III art., high risk. State after ADCC in 2004 Type II diabetes mellitus.

2. During the first day, percutaneous transhepatic drainage of the gallbladder under ultrasound guidance is indicated, followed by detoxification, antispasmodic,

antibacterial therapy and discharge for outpatient treatment after 3-7 days with positive ultrasound dynamics.

3. Hospitalization in 1-2 months, after correction of concomitant pathology and control ultrasound examination of the gastrointestinal tract, for planned surgical treatment. Cholecystectomy is indicated through a mini-laparotomy approach under epidural anesthesia.

TASK 2. Patient G., 48 years old. He was admitted to the hospital via the channel "03" with complaints of abdominal pain for 1 day, nausea. Previously, I did not observe abdominal pain. The pain appeared after eating fatty foods. Objectively: the condition is closer to satisfactory, active. Vesicular respiration. BR – 16 v min. Blood pressure-120/80 mm Hg. Pulse-90 per minute, rhythmic. The tongue is dry, overlaid. The abdomen is soft in all parts, not swollen, with palpation sharply painful in the right hypochondrium. The symptom of Ortner is positive, Shchetkin, Pasternatsky are negative. The stool and urine output without any changes. Blood test: Hb-120 g / l, white blood cells-14x10 to the degree of 9, red blood cells-4, 2x10 to the degree of 12, platelets-260x10 to the degree of 9. Blood biochemistry: blood sugar-5.0 mmol/l, total blood bilirubin-20 mmol/l, total protein-70 g/l. The ultrasound of the abdomen: the liver is normal in size, the gallbladder – 130x50 mm, wall – 8 mm, webbing, no, in the lumen of multiple stones from 5 to 10 mm in diameter; 10 mm calculus in the neck of the gallbladder. The common bile duct is 5 mm, visualized throughout. Hepatic-duodenal ligament without pronounced infiltration. Pancreas – 32x23x26 mm, diffusely altered. Virunga duct 2 mm. The kidneys are unremarkable. No free fluid was found in the abdominal cavity.

Questions:

1. Formulate a diagnosis.
2. Surgical tactics for 1 day.
3. Method of surgical treatment.

Answers:

1. Clinical diagnosis: AC. Acute obstructive calculous cholecystitis.

2. Tactics. Within 2-4 hours, follow-up examination of the patient: chest X-ray, ECG, consultation with a therapist, blood type, Rh-factor, coagulogram. USDG of the veins of the lower extremities and EGD are also possible according to the indications. Operation-cholecystectomy in an emergency, with the consent of the patient.

3. The method of surgical treatment is laparoscopic (LCE).

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