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ЖЕЛЧНОКАМЕННАЯ БОЛЕЗНЬ И ЕЕ ОСЛОЖНЕНИЯ

Учебно-методическое пособие
для студентов 5 и 6 курсов
факультета по подготовке специалистов для зарубежных стран
медицинских вузов

GALLSTONE DISEASE AND ITS COMPLICATIONS

The educational methodical work
for 5th and 6th year students
of the Faculty of preparation of experts for foreign countries
of medical higher educational institutions

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CONTENTS

Introduction	4
Surgical anatomy and physiology	4
Methods of diagnosis	6
Cholelithiasis	7
Aetiology	7
Classification	8
Complications (clinical effects) of gallstones	8
Complications of gallstone disease	9
Chronic calculous cholecystitis	9
Clinical features of different forms of GSD	10
Diagnostic investigations	11
Treatment of different forms of GSD	11
Acute cholecystitis	12
Surgical approach in acute cholecystitis	13
Surgical treatment	14
Choledocholithiasis	14
Other complications of gallstone disease	15
Jaundice	17
Surgical approach to the jaundice	17
Cholangitis	17
Biliary fistula	18
Gallstone ileus	18
Sclerosed (shrunken) gall bladder	18
Standards for diagnosis and treatment of acute cholecystitis	19
Postcholecystectomy syndrome	20
Literature	22

INTRODUCTION

In Europe, North America, Australia, gallstone disease (GSD) is found in 10–15 % of the adult population, 40 and over — 15–20 % and the age group over 70 years in 35 %. In the U.S., about six thousand people die each year from causes related to complications of gallstone disease.

In European countries the lowest incidence was recorded in Ireland (5 %), while the highest — in Sweden (32 %). Among the indigenous African population cholelithiasis (CL) is rare — less than 1 %. In Indo-American GSD occurs 3 times more likely than Afro-American women. In Chile, cholelithiasis detected in 55 % of women and 30 % of men. In Pima Indians CL observed in 45 % of men and 75 % of women and women after 70 years — 90 % (reduction in the genetic pool of bile acids). In Russia, the annual uptake over the CL is the average 5–6 per 1,000 population.

Like accidental finding at autopsy revealed cholecystolithiasis in 10–20 %. According to the World Union of surgeons more than 1.5 million cholecystectomies are performed worldwide every year, including the U.S. — 400–500 thousand, in Russia, 250–300 thousand.

Cholelithiasis is detected at any age. Female to male ratio is about 4–6:1. Women suffering from duodenal ulcer have cholelithiasis 2–3 times less. During pregnancy, the CL develops at 5–8,5 % of women. Newborn found in the GSD of 0.5 %.

Cholangiolithiasis occurs in 4–10 % operated on for gallstone disease.

In all the gall stones cholesterol, pigment and lime components are present, but the predominance of these components differs. About 90 % of stones are cholesterol (the cholesterol content exceeds 50 %) or mixed (cholesterol content — 20–50 %). Calcareous rocks in pure form are extremely rare.

SURGICAL ANATOMY AND PHYSIOLOGY

Gallbladder

- Shape — The gallbladder is pear-shaped.
- Length — Usually 7.5 to 12.5 cm.
- Capacity — About 40 to 50 ml, but capable of considerable distension in certain pathological conditions.
- Anatomical subdivisions are a fundus, a body and a neck, which terminates in narrow fundibulum.
- Muscle fibers of gallbladder wall are arranged in a criss-cross manner and being well developed in neck.
- The mucous membrane contains indentations of the mucosa that sink into the muscle coat; called crypts of Luschka.

Duct system

Cystic duct

- Length — About 2.5 cm and it contains the spiral valve of Heister.

- Connects infundibulum of gallbladder to common hepatic duct to form bile duct.

Common hepatic duct

- Usually less than 2.5 cm long.
- Formed by the union of the right and left hepatic ducts.

The common bile duct

- About 7.5 cm long
- Formed by the union of cystic and common hepatic ducts.
- It has four parts:

I. The supraduodenal portion, almost 2.5 cm long and runs in the free edge of lesser omentum.

II. The retroduodenal portion

III. The infraduodenal portion lies in a groove, but at times in a tunnel in the posterior surface of the pancreas.

IV. The intraduodenal portion passes obliquely through the wall of the second part of the duodenum where it is surrounded by the sphincter of Oddi. It terminates by opening on the summit of the papilla of Vater.

The arterial supply of the gallbladder

The gallbladder is supplied by the cystic artery, which usually is a single branch of the right hepatic artery. The cystic artery may also originate from the left hepatic, common hepatic, gastroduodenal, or superior mesenteric artery. An accessory cystic artery occasionally arises from the gastroduodenal artery. In some cases the right hepatic artery and/or the cystic artery cross in front of the common hepatic duct and the cystic duct. The cystic artery is usually located parallel and medial to the cystic duct, but its course varies with its origin. The cystic artery divides into superficial and deep branches before entering the gallbladder. In some cases the hepatic artery takes a tortuous course, the most dangerous anomalies, in front of the origin of the cystic duct or the right hepatic artery is tortuous and the cystic artery is short. The tortuosity is known as the «caterpillar turn» or Moynihan's hump.

Lymphatics: The subserosal and submucosal lymph vessels of the gallbladder drain into the cystic lymph node of Lund (the sentinel lymph node), which lies in the fork created by junction of cystic and common hepatic ducts. Subserosal lymphatics also connects with the subcapsular lymph channel of the liver.

Surgical Physiology

The sphincter of Oddi, gallbladder and bile ducts act in concert to modify, store and regulate the flow of bile. During its passage through the bile ductules and the hepatic duct, canalicular bile is modified by the absorption and secretion of electrolytes and water. Bile, as it leaves the liver, is composed of 97 % water, 1–2 % bile salts and 1 % pigments, cholesterol and fatty acids. The liver excretes bile at a rate about 40 ml/hour.

Functions of gallbladder: The healthy gallbladder has several functions.

- Reservoir for bile: In the state of fasting resistance to flow through the sphincter of Oddi is high and bile excreted by the liver is diverted to the gallbladder. In response to meal the resistance to flow through the sphincter is reduced, the gallbladder contracts and bile enters the duodenum. These motor responses of the biliary tract are in part effected by the hormone cholecystokinin, released by the upper intestinal mucosa in response to food, especially fats.

- Concentration of bile: By the active absorption of water, sodium chloride and bicarbonate by the mucous membrane of the gallbladder, the hepatic bile which enters the gallbladder becomes concentrated 5 to 10 times with the proportional increase of bile salts, bile pigments, cholesterol and calcium it contains. The gallbladder mucosa has the greatest absorptive capacity per unit area of any structure in the body. The bile duct epithelium is also capable of water and electrolyte absorption, which may be of primary importance in the storage of bile during fasting in patients who have previously undergone cholecystectomy.

- Secretion of mucin: Each 24 hours about 20 ml is secreted.

METHODS OF DIAGNOSIS

- Ultrasonography: It is now gold standard with almost 99 % accuracy. A non-invasive and is used as prime imaging technique for the investigation of gall stones and jaundiced patients. It can demonstrate biliary calculi, size of calculi, size of gallbladder, thickness of gallbladder wall, presence of inflammation around the gallbladder, size of common bile duct, presence and size of calculi within the biliary tree. It also shows a carcinoma of the pancreas occluding the common bile duct.

- Plain radiograph: It shows radio-opaque gallstones in 10 % of patients, also shows calcification of the gallbladder (porcelain gallbladder) and limey (lime water) bile. It will also show up air and gas in the duct system.

- Oral cholecystography (Graham-Cole test): Though discarded, it is still used to show diverticulae and polyps and to assess gallbladder function. Iopanoic acid BP is the contrast medium used commonly.

- Intravenous cholangiography: Biligram-meglumine is given intravenously, which is rapidly secreted by the liver into the biliary tree. Subsequent radiographs clearly define the ducts and the gallbladder delineating the presence of gallstone disease. Indications for this method are becoming few, and many radiologists avoid this investigation because of side effects of biligram.

- Radioisotope scanning: Technetium-99m labelled derivatives of imino-diacetic acid (HIDA, PIPIDA) is excreted in the bile and is used to visualize the biliary tree.

- Computed tomography: Usually useful for patients with carcinoma of gallbladder or bile ducts, to define its extent and presence of metastases.

- Endoscopic retrograde cholangiopancreatography (ERCP): The ampulla of Vater is cannulated with the aid of a fiber-optic duodenoscope and the bile ducts are visualized after injecting water-soluble contrast, thus differentiating

surgical from medical causes of jaundice. Procedures like papillotomy to extract stones from CBD and placing of stents through strictures can also be performed.

- Percutaneous transhepatic cholangiography (PTC): This investigation should not be undertaken if the patient has a bleeding tendency.

- Preoperative cholangiography: During cholecystectomy a catheter is placed in the cystic duct and contrast injected into the biliary tree. Subsequent imaging will define the anatomy and confirms the presence or absence of stones.

- Operative biliary endoscopy (choledochoscopy): At operation a flexible fiber-optic endoscope can be passed into the cystic and CBD. Stones can be identified and removed under direct vision, and strictures inspected and biopsied.

- Peroperative postexploratory choleangiography: A choleangiogram via a catheter or the T-drainage tube can be performed after choledochotomy, to make sure that all stones have been removed.

CHOLELITHIASIS (GALLSTONE DISEASE)

The most common biliary pathology is cholelithiasis. According to their chemical composition they are classified as below:

- Cholesterol stones: consists almost entirely of cholesterol and are often solitary (cholesterol solitaire).

- Mixed stones: Almost 90 % of the gallstones are mixed. Cholesterol is the major component, other components include Ca bilirubinate, Ca phosphate, Ca carbonate, Ca palmitate & proteins.

- Pigment stones: composed almost entirely of calcium bilirubinate. They are mostly multiple, small in size and black.

AETIOLOGY

The aetiology of gallstones is multi factorial. These factors are metabolic, infective and bile stasis.

Predisposing factors:

It is generally accepted «rule of five «F»»:

- Female — female gender,
- Forty — age older than 40 years;
- Fat — obesity with body mass index (BMI) over 30;
- Fertile — multiple pregnancy;
- Flatulent — dyspepsia, flatulence.

The most important risk factor for disease is a genetic predisposition. At present, about 50 genes described, which playing a role in the pathogenesis of gallstone disease. Obesity — a major factor. At 4 degree of obesity the secretion of cholesterol in the bile is 3 times more. When BMI is 25–30 risk of gallstone disease increased 2-times and with BMI higher than 35 — risk increases up to 20 times.

Age also has a great importance: with the age secretion of cholesterol increases in the bile and reduces bile acid pool. The important role played by ethnic characteristics e.g. high frequency of gallstone disease in women of some Scandinavian countries, high-calorie diet with an excess of solid fats, animal proteins, carbohydrates and lack of light vegetable proteins, prolonged use of oral contraceptives, drugs that reduce serum cholesterol, fasting, rapid weight loss and a number of metabolic disorders associated with high levels of cholesterol in the blood (diabetes, hyperlipidaemia congenital, primary biliary cirrhosis). The important role played by the accompanying disease: coronary artery disease, hyperparathyroidism, ulcerative colitis, Crohn's disease, ileal resection, gastric resection, truncal vagotomy.

Disorder of the bile contents is called Dyscholi. The last may be primary — when the hepatocytes produce lithogenic bile and secondary — by disturbance of the concentration of bile in the gall bladder.

Saint's triade. (1) Gallstones, (2) diverticulosis of the colon and (3) hiatus hernia frequently coexist. It is important to find out which lesion is the cause of the patient's dyspeptic syndrome.

CLASSIFICATION

Clinical forms of GSD:

1. Asymptomatic form.
2. Dyspeptic form.
3. Chronic pain form.
4. The chronic recurrent form.
5. Complicated form

COMPLICATIONS (CLINICAL EFFECTS) OF GALLSTONES

In the gallbladder:

- Silent stones.
- Chronic cholecystitis.
- Acute cholecystitis:
 - Gangrene.
 - Perforation.
 - Empyema.
- Mucocele.
- Carcinoma of gallbladder.

In the bile ducts:

- Obstructive jaundice.
- Cholangitis.
- Acute pancreatitis.

In the intestine:

- Acute intestinal obstruction (gallstone ileus).

COMPLICATIONS OF GALLSTONE DISEASE:

- Acute destructive (phlegmonous, gangrenous) cholecystitis with or without perforation.
 - Perivesical infiltration.
 - Perivesical abscess.
 - Subhepatic abscess.
 - Abscesses of any other sites.
 - Nonspecific bacterial peritonitis.
 - Bile — peritonitis (because of destruction of the gall bladder).
 - Mucocele of the gall bladder.
 - Empyema of the gallbladder.
 - Acute pancreatitis.
 - Choledocholithiasis.
 - Jaundice.
 - Cholangitis.
 - Cholangiogenesis liver abscesses.
 - Strictures of the bile ducts.
 - Stricture of the major duodenal papilla.
 - Bile fistulas: external and internal (biliodigestive).
 - Gallstone ileus.
 - Sclerosed (wrinkled) gall bladder.
 - Calcification of the gallbladder («porcelain» gallbladder).
 - Cancer of the gallbladder.
 - Haemobilia.

CHRONIC CALCULOUS CHOLECYSTITIS

Chronic and acute calculous cholecystitis has similar clinical features with variation in severity of symptoms and signs.

Clinical features:

Pain

Site — right hypochondrium.

Radiation — between the shoulder blades.

Onset — In chronic cases it begins after having meal but not so closely related as peptic ulcer. Fatty foods often precipitate it and begins 15–30 minutes after meal and lasts for 30–90 minutes. It can be last for several hours, if an attack lasts for more than 12 hours, the diagnosis is more likely acute cholecystitis.

Severity — In some it is merely discomfort, in others it is excruciating.

Relieved by nothing, except analgesic drugs. Associated factors are nausea, vomiting and heartburn.

In acute cholecystitis, tenderness in the hypochondrium is present. Murphy's sign may be positive (ask the patient to breathe in while gently palpating the gallbladder area. The patient experiences pain and «catch her breath» just before the zenith of inspiration. If the temperature and the white blood count are elevated, the diagnosis of acute cholecystitis should be considered.

Flatulent dyspepsia: it is a feeling of fullness after food associated with belching and heartburn. It is brought on by a large or a fatty meal.

CLINICAL FEATURES OF DIFFERENT FORMS OF GSD

- Asymptomatic (latent, stone carrier). In this form no clinical features are present. Usually detected by accident. It occurs in 70–80 % of patients. The risk of transition in clinically manifested form (biliary colic) is 1–4 % per year and the risk of biliary complications — 0.1–0.4 % per year. Approximately 50–80 % of patients with asymptomatic form will never in their lifetime have any sign, symptoms and complications of cholelithiasis.

- Dyspeptic form. Occurs only with dyspeptic disorders — bitter taste in mouth, belching, discomfort, heaviness in the right hypochondrium, etc.

- Chronic pain form. Manifest constant aching pain in the right upper quadrant or epigastric pain.

- The chronic relapsing form (chronic calculous cholecystitis) shows typical clinical picture for GSD with hepatic (biliary) colic. Colic — a clinical reflection of the bladder neck or cystic duct obstruction by a gallstone. Pain appears suddenly after a heavy meal, eating fatty or spicy foods, exercise, driving on a bumpy road, and emotional stresses and localizes in the right upper quadrant and/or epigastric pain. The pain is arching or compressive in nature, rapidly (within 20–30 minutes) becomes very intensive and can irradiate to the right shoulder, shoulder girdle, the right half of the neck, right shoulder blade. In some cases, pain may be the nature of shingles. Attack of pain may be accompanied by vomiting, not bringing relief. Over time (several hours) even without treatment the pain can go as suddenly as it began. This occurs if the calculus departs into the lumen of the gall bladder, or more rarely, migrate to the common bile duct. If the cystic duct obstruction persists, the process progresses and develops acute cholecystitis. Objectively, in chronic calculous cholecystitis usually no changes without biliary colic. Rarely is pain in the projection of the gallbladder. In hepatic colic pain in the epigastric or right upper quadrant reveals quite clearly, there is no tension in the muscles, the gallbladder is not palpable. There may be no Murphy symptoms (a sharp pain on inspiration with the introduction of fingers into the right upper quadrant), Grekov — Ortner symptom (sharp pain effleurage hand edge of the right costal arch), Mussie — George symptom (tenderness over the right clavicle between sternocleidomastoid muscle). Specific laboratory findings in chronic calculous cholecystitis does not exist. The main method of diagnosis is ultrasound.

DIAGNOSTIC INVESTIGATIONS

Ultrasonography is usually the only investigation needed to show gallstones and also describes the size of stones, the thickness of the wall, the presence of the inflammation and the size of the common bile duct. If a bile duct is more than 8 mm in size, an endoscopic cholangiography should be done to determine the cause of the dilatation.

Plain x-ray of abdomen shows radio-opaque gallstones.

CT scan is useful for patients, in whom USG is difficult, e.g. obese or those with excessive bowel gas.

TREATMENT OF DIFFERENT FORMS OF GSD

SURGICAL MANAGEMENT IN AN ASYMPTOMATIC FORM: No specific treatment is required. Only general recommendations: right diet, weight loss. The patient should be aware that the development of clinical signs he has to consult a surgeon. There are exceptions, in which patients with no symptoms should be referred to the planned operation:

1. The combination of cholecystolithiasis with polyposis of the gallbladder.
2. Stone size greater than 25–30 mm (high risk of developing cancer of the gall bladder).
3. The presence of diabetes in a patients (high risk of complications).
4. Calcification of the gallbladder (high risk of developing cancer of the gall bladder).

Some authors also recommend to operate with asymptomatic cholecystolithiasis in patients with sickle cell anemia.

SURGICAL MANAGEMENT of dyspeptic, chronic pain, chronic relapsing forms is one: routine surgical treatment (Cholecystectomy).

Non surgical treatment:

For pain:

- Analgesics may be required.
- Antiemetics may be needed.
- The patient should be put on low-fat diet until cholecystectomy.

Medical dissolution of gallstones (Litholytic therapy): Treatment with drugs, ursodeoxycholic acid: ursofalk, Ursosan etc. are inhibitors of the synthesis of cholesterol allocated into bile. For successful therapy conditions are as follow:

- A few small floating Rtg (-ive) gallstones (size < 10 mm).
- Functioning gallbladder.
- Cystic duct without obstruction.
- The BMI not more than 35.

The treatment course is 1–2 years. According to various studies, subject to all conditions, gallstones dissolve from 10–15 to 50–70 % of patients. After cessation of treatment recurrent stone formation is highly reported.

The only justifiable indication- the elderly, patients with high operative risk.

Local dissolution of gallstones: Methyl ter-butyl ether (MTBE) is a powerful organic solvent which dissolves cholesterol gallstones within hours. It is administered locally via a pigtail or other self retaining catheter introducing percutaneously into the gallbladder under radiological control. When dissolution is achieved, the gallbladder liquid contents are aspirated and the catheter removed.

Lithotripsy: Extracorporeal shock waves produced by spark-gap (Dornier system), piezoceramic (Wolf system) or electromagnetic (Siemens system) generators are focused by a concave reflector and targeted under ultrasound guidance to the stones, thereby inducing fragmentation; the debris pass into bile duct and beyond. It is suitable for patients with 1–3 stones in a functioning gallbladder.

Indications: Traversed cystic duct(no obstruction), functioning gall bladder, cholesterol stones with a total size of 30 mm or a stone of similar size. The efficiency of lithotripsy can be improved with the combination of litholytic therapy. The method has many contraindications. Frequent complications: acute cholecystitis, choledocholithiasis. After lithotripsy is usually expressed pericholecystitis, that hinders the cholecystectomy.

Once a diagnosis has been made, the gallbladder should be removed providing that the patient is fit.

ACUTE CHOLECYSTITIS

Acute cholecystitis is at 2-nd position in all acute abdominal diseases, yielding to acute appendicitis. In 95 % of cases inflammatory process develops by a stone obstruction in the neck of the gallbladder or cystic duct. In other cases, causes are vascular (primary gangrenous cholecystitis), enzymatic or allergic. Pathogenesis is due to overdistension of the gallbladder and impairment of the blood circulation in the vessels of the gall bladder's wall. Later on, microflora activated, penetrating enterogenous, lymphogenous and hematogenous route. In destructive cholecystitis gallbladder's bile contains aerobic and anaerobic non-clostridial flora.

Local changes in order are as follows:

- Cystic duct obstruction;
- Pressure increase in the gall bladder;
- Stasis in the vessels of the gall bladder;
- Contamination of bile with bacterias;
- Destruction of the gallbladder wall (with or without perforation);
- Perivesical infiltration;
- Local peritonitis (perivesical abscess);
- Diffuse peritonitis.

According to morphology: catarrhal (simple), phlegmonous and gangrenous cholecystitis. In elderly patients atherosclerosis and/or a hypercoagulable state is present and primary gangrenous cholecystitis can be found (due to thrombosis or

embolism of cystic artery). Clinic features of acute cholecystitis is represented by the following symptoms: pain, fever, bitter taste in the mouth, nausea, and vomiting. In simple acute cholecystitis abdomen is soft, for destructive cholecystitis characterized defense muscle symptom in the right upper quadrant. Often the Murphy, Kera, Ortner, Musse symptoms are present and peritoneal symptoms appear later (Shchetkina - Blumberg, Voskrisenski). Usually common symptom of acute cholecystitis is a palpable painful fundus of the gall bladder or palpable perivesical infiltration. In CBC typical leukocytosis. The main method of diagnosis is ultrasound. Leading ultrasound signs of acute cholecystitis: an increase in the size of the gallbladder, wall thickening, dual-wall, presence of infiltration and fluid in the sub hepatic and intra abdominal space.

SIGNS present in acute cholecystitis:

- Patient is distressed and breathing shallowly.
- Tachycardia 90–100 bpm
- Pyrexia and there may be rigors.
- Tenderness and rigidity in right hypochondrium.
- Murphy's sign is positive.
- A mass, consisting of inflamed gallbladder with adherent omentum attached, may be felt.
- Boas's sign may be present — There is an area of hyperesthesia between 9th and 10th ribs posteriorly on right side.

SURGICAL APPROACH IN ACUTE CHOLECYSTITIS

1. All patients with acute cholecystitis must be admitted in the surgical department and treated as patients with acute surgical diseases of the abdominal cavity.
2. In the case of acute cholecystitis complicated by peritonitis, emergency surgery is shown in the first 2 hours.
3. In the absence of peritonitis shown conservative treatment (analgesics, antispasmodics, infusions, antibiotics) for 24–72 h
4. If after conservative treatment an acute process is subsided, after 7–12 days or more an elective surgery is shown. If the attack had been docked in the short term, planned operation can be performed within 2–3 days.
5. In the absence of effect of conservative treatment shows an operation.
6. At high risk operations, particularly in elderly patients with destructive cholecystitis possible palliative surgery — cholecystostomy is recommended.

Cholecystostomy is decompression of the gallbladder, which eliminates the impairment of in-wall blood flow, preventing further progression of destructive changes. Cholecystostomy can be performed by percutaneous transhepatic puncture of the gall bladder under ultrasound control, laparoscopy and laparotomy. Use local anesthesia, but the intervention is under the supervision of an anesthesiologist. Mortality in acute cholecystitis in the case of urgent surgery is 2–3 %, in the case of an emergency operation may not exceed 4–6 %.

SURGICAL TREATMENT

Preparation for operation:

- Premedication.
- Prophylactic antibiotics.
- Provision is made for preoperative cholangiography.

CHOLECYSTECTOMY

The surgical treatment of gallstone disease. There are several methods (choices) of cholecystectomy. Open cholecystectomy, minicholecystectomy and laparoscopic cholecystectomy.

Open cholecystectomy: The procedure of cholecystectomy is given below:

- Incision — Right paramedian or Kocher's incision (right subcostal incision).
- Examine all abdominal organs, including gallbladder.
- Place the packs to isolate the gallbladder area.
- Aspirate the gallbladder, if it is greatly distended, through the fundus by trocar and cannula attached to a suction apparatus.

• By grasping the neck of gallbladder, with sponge holding forceps, display the junction of cystic, common hepatic and bile ducts via dissection. Identify cystic artery and its relation to common hepatic artery.

- The artery is then divided after ligation.
- If necessary, a cholangiography is performed to exclude the presence of stones in CBD.
- Divide the cystic duct after ligation.
- From below and upwards dissect the gallbladder from its bed, dividing the peritoneum on gallbladder.
- Assure the haemostasis and close the abdominal wall.
- Drainage is not mandatory, if used, it should be a 3 mm closed suction drain.

Minicholecystectomy: It is standard cholecystectomy through a 5 cm transverse incision using special instruments and a stabilized ring retractor for exposure. The smaller incision enables rapid recovery.

Laparoscopic cholecystectomy: The treatment of choice is elective laparoscopic cholecystectomy. It is first choice of operation now days. This technique is applicable in 90 to 95 per cent of patients. The procedure is given below:

- The patient is placed in the spine position on the operating table.
- After creating the pneumoperitoneum, an 10 mm trocar is placed in the umbilicus and epigastrium and two 5 mm trocars are placed in the right side of the abdomen.
- Dissection of the gallbladder with a diathermy hook starts on the gallbladder near the triangle of Calot.
- Cystic duct and cystic artery is carefully defined, clipped and divided.

- Gallbladder is then dissected from the gallbladder bed with a diathermy hook and once free removed via the umbilical and epigastric port.
- Large stones can be removed from the gallbladder with forceps before delivery of the whole gallbladder.
- After assuring the haemostasis close the wounds.

The morbidity and mortality of laparoscopic cholecystectomy are almost similar to those patients undergoing elective open cholecystectomy for chronic cholecystitis. The mortality rate for both procedures is around 0.1 %, with cardiovascular complications being the most common cause of death. The most significant complication after laparoscopic cholecystectomy is injury to the biliary tract (esp. CBD). Overall, complications occur in less than 10 % of patients. Conversion to an open cholecystectomy is needed in less than 5 % of patients undergoing laparoscopic cholecystectomy for chronic cholecystitis.

OTHER COMPLICATIONS OF GALLSTONE DISEASE

PERIVESICAL INFILTRATION:

Forms at 3–4 day of disease. Characterized by the presence of a dense mass at right upper quadrant with clear borders. Infiltrate is an indication for conservative treatment. Complete resolution of the infiltrate with medication occurs in 1.5–2 weeks. In virulent infections perivesical abscess may form. With further progression sub hepatic abscess is formed. In the presence of an abscess cavity it sanitizes and cholecystectomy performed. The operation ends with draining (plugging) the abscess.

MUCOCELE of the gall bladder is the outcome of obstruction with virulent flora. At the same time in the gall bladder components of bile are absorbed, bacteria are killed and the content becomes colorless, slimy character. Can exist for long without any symptoms or with minor symptoms. In some cases enlarged gall bladder is palpable. Treatment is planned cholecystectomy.

EMPYEMA OF THE GALLBLADDER: It is an infected mucocele. In some cases, outcome of conservative treatment of acute phlegmonous cholecystitis forms chronic empyema. Clinical features are — dragging pain in the right sub hepatic region, occasional fever. In some cases by palpation can define an enlarged, moderately painful mass in the right sub chondrium. Treatment: Cholecystectomy.

STRICTURES OF THE BILE DUCTS: The main reason — Choledocholithiasis. There are high, low, limited and widespread strictures. Often develop after intraoperative damage to common bile duct. Clinical sign is transient obstructive jaundice. Cholangiography is method of diagnosis, which reveals narrowing of the duct. Treatment: Choledocho-jujunoanastomosis on the blind loop by Roux. The results are often unsatisfactory –high incidence of recurrent stricture.

STRICTURE (STENOSIS) OF THE PAPILLA OF VATER: Occurs mainly during the passage of small stones through the duodenal papilla, which leads to fibrosis and scarring of local tissues. There are 3 degrees of stenosis:

1 — without functional impairment (compensated);
2 — narrowing upto 3 mm with a moderate expansion of the ducts (sub-compensated);

3 — severe stenosis with cholestasis — a complete block (decompensated).

Except choledocholithiasis additional causes of stenosis are diseases of pancreas, cholangitis, damage to papilla during surgery, duodenal ulcer, parapapilla diverticula, etc.

Treatment — surgical. Variety of options are used for the internal drainage: papillosphincterotomy (endoscopic, transduodenal, endocholedocheal, combined), choledochoduodenostomy, choledochojujenostomy.

CHOLEDOCHOLITHIASIS

Choledocholithiasis occurs during the passage of gallstones from the bladder to the common bile duct, or less common, their formation directly into the common bile duct. At cholecystectomy 4–12 % of cases are detected.

Clinical features — the strong attack of pain in the epigastric and right upper quadrant, usually after the onset of pain jaundice appears. At the same time and in severe obstructive jaundice in the presence of choledocholithiasis in some cases may not have pain. Jaundice may be remitting in the case of «valve» stone. In some cases, choledocholithiasis can be asymptomatic for a long time and in 40 % of the cases are without jaundice. In 4–5 % of cases of choledocholithiasis have no gallstones in the gallbladder. The main diagnostic methods: ultrasonography, endoscopic retrograde cholangiopancreatography (ERCP), percutaneous transhepatic cholangiography, intravenous cholecystocholangiography (without jaundice). Ultrasound reveals stones in the bile ducts in an average of 75–80 % of cases. The most reliable method is to ERCP, however, its use is limited, because of the risk of developing acute pancreatitis.

Treatment — only operative, possibly in one or two stages.

1. The traditional cholecystectomy, choledocholithotomy. The operation is completed with either a temporary external drainage or internal drainage.

2. The first step is papillosphincterotomy with endoscopic extraction of stones, the second step is performing laparoscopic cholecystectomy.

Choledochal drainage options:

• External drainage:

1. Through the cystic duct stump (Holstead);
2. After choledochotomy (Keru, Wisniewski, Kurt).

• Internal drainage:

1. Choledochoduodenoanastomosis;
2. Choledochojujenoanastomosis;
3. Papillosphincterotomy (endoscopic, transduodenal, endocholedocheal, combined).

• Doubl internal drainage: Choledochoduodenoanastomosis in combination with papillosphincterotomy.

JAUNDICE

One of the main symptoms of gallstone disease or its complications is jaundice, occur in 5–10 % of cases. Clinical signs: Pain in the epigastrium and right upper quadrant, nausea, vomiting is rare, pruritus, loss of appetite. 1–2 days after complete occlusion of the common bile duct skin and visible mucous membranes become icteric (yellowish), discolored stools, dark urine. Traces of scratching the abdomen skin, liver enlargement.

Laboratory: increased bilirubin, mainly due to direct (bound) bilirubin, hypoproteinemia, hypoalbuminemia, increased alkaline phosphatase. ALT, AST often are not changed or increased slightly. Characteristic hypocoagulation. On ultrasound — the expansion of hepatic and non hepatic ducts (choledochal normal width — 7–8 mm). Highly informative diagnostic methods are ERCP and percutaneous transhepatic cholangiography.

SURGICAL APPROACH TO THE JAUNDICE

In the case of an increasing or unresolved jaundice (confirmed by clinical and laboratory data) is recommended :

1. Detoxification, transfusion therapy, hemodilution, forced diuresis. Extracorporeal detoxification — hemodialysis, lymphosorption, plasmapheresis, hemosorbition, hyperbaric oxygenation.

2. Decompression of the biliary tract: Endoscopic papillosphincterotomy, Cholecystostomy, Percutaneous transhepatic cholangiostomy, Percutaneous transhepatic cholecystostomy, Nazobiliary drain into the biliary tract, Laparoscopic microcholecystostomy.

3. If no result from conservative therapy and instrumental manipulation, shown an urgent surgery at 4–6 day of patient's admission. In case of severe jaundice shown preoperative preparation of the patient in the intensive care unit for at least one day.

4. In resolving jaundice surgical treatment in a planned manner.

The choice of surgery depends on the cause of jaundice. Basically, there are different options for internal drainage of the biliary tract.

CHOLANGITIS

It is the result of disorder of the outflow of bile and infection. The main microbe is *E. coli*. The leading cause of cholangitis is choledocholithiasis. The Charcot triad is common — fever, jaundice and pain in the upper right quadrant of the abdomen. Enlarged palpable liver is usually painful. The Reynolds pentad can be found: pain, fever, jaundice, confusion and hypotension.

Depending on the nature of inflammation cholangitis could be serous, fibrous and purulent . In suppurative cholangitis emit three forms depending on the clinical features course: acute, acute recurrent and chronic. Recently septic (toxic) cholangitis is also defined. The latter is diagnosed with a body temperature of 38 °C or higher, chills, and leukocytosis stunning over 12. The most fre-

quent complications of acute cholangitis are the development of multiple liver abscesses and acute renal failure.

Treatment:

1. In the presence of peritonitis, emergency surgery is shown.
2. In the absence of peritonitis, conservative treatment is shown no more than 24–48 hours.
3. If no response to conservative treatment, an urgent decompression of the biliary tract is required, possible minimally invasive techniques.
4. When conservative treatment is effective, an elective surgery in the cold period is recommended.

The purpose of the operation — removal of obstruction. Any doubts about the patency is an indication to the imposition of biliodigestive anastomosis.

In suppurative cholangitis only external drainage is used.

BILIARY FISTULA

As a result of pericholecystitis and pressure sores (by stones), fistula can occur with the gall bladder and hollow organs, anatomically located nearby the gall bladder, most often with the duodenum.

Following are the types of internal biliary fistula:

- Cholecystoduodenal;
- Cholecystogastric;
- Cholecystocolonic;
- Cholecystojejunal;
- Cholecystocholedocal (Mirizzi syndrome).

In the first three types clinical manifestations of fistula are usually minimal. Pathogenic sign of a fistula is Pneumobilia or aerobilia (gas in the biliary tract), determined by X-ray. Mirizzi's syndrome is usually manifested remittent jaundice.

GALLSTONE ILEUS

Develops in the presence of biliodigestive fistulas, often (in 80–82 %) at cholecystoduodenal fistulas. Stone size should be more than 2 cm and obstruction most often occurs at the bottleneck — the terminal ileum and the sigmoid colon. It occurs rarely, usually in the elderly. A characteristic feature in the X-ray: signs of small bowel obstruction in conjunction with aerobilia.

Treatment: Cholecystectomy, the removal of obstruction, biliary fistula closure. In a serious condition first eliminate the obstruction, biliary fistula closure performed after the stabilization of the patient's condition.

SCLEROSED (SHRUNKEN) GALL BLADDER

It is the result of frequent attacks of acute destructive cholecystitis. Gall bladder shrinks, deforms, its wall thickens dramatically, condenses. Treatment: Cholecystectomy. Technically, the operation against the backdrop of sclerosed bladder is very complex.

GALL BLADDER CANCER

It is detected in 1 % of all cholecystectomies. The women suffer three times more than men. In 80 % submitted adenocarcinoma. Characterized by local invasive growth in the liver tissue. Lymphogenous metastasis in pancreatic, duodenal, and hepatic lymph nodes. The clinical features are nonspecific and the diagnosis is rarely established preoperatively. At the time of diagnosis, tumor is inoperable in half of the patient. Prognosis is poor. Five-year survival rate is less than 10 %.

STANDARDS FOR DIAGNOSIS AND TREATMENT OF ACUTE CHOLECYSTITIS

(NV Zavada, 2006)

1. STANDARDS FOR DIAGNOSIS OF ACUTE CHOLECYSTITIS:

A. Required methods of diagnosis of acute cholecystitis at admission in the surgical department of hospital;

1. Clinical evaluation: history taking, examination, palpation, percussion, auscultation of the abdomen, heart rate, blood pressure determination;

2. Blood test: blood hemoglobin, erythrocytes, leukocytes, leukocyte formula, ESR;

3. URE (urine routine examination);

4. Determination of blood group and Rh-factor;

5. Alpha-amylase of urine;

6. Determination of blood glucose;

7. Biochemical blood tests: bilirubin, urea, total protein, AST, ALT, electrolytes (K, Na, Ca, Cl), alpha-amylase;

8. In doubtful cases, diagnostic laparoscopy;

9. ECG.

B. Required methods of diagnosis of acute cholecystitis in the first 12 hours of admission:

1. Ultrasonography of the liver, gallbladder, bile ducts, pancreas and kidneys.

2. Esophagogastroduodenoscopy with the inspection of duodenal papilla.

C. Required methods of diagnosis of acute cholecystitis in the first 24–48 hours of admission (further — if indicated):

1. Dynamic (re) ultrasound of the gallbladder, bile ducts and pancreas.

D. Additional methods of diagnosis of acute cholecystitis (if indicated):

1. Coagulogram: PTI, APTT, TT, fibrinogen;

2. Radiography of the chest and abdomen;

3. Retrograde cholangiopancreatography;

4. Irrigo- or colonoscopy;

5. Blood test for markers of viral hepatitis;

6. Consultations, if required (physician, gynecologist, endocrinologist, etc.).

2. STANDARDS FOR TREATMENT OF ACUTE CHOLECYSTITIS;

Surgical approach:

In the early hours of the admission, all patients should be allocated into two groups:

1st — in need of emergency surgery (urgent acute cholecystitis);

2nd — to start with conservative treatment;

Patients in Group 1 (urgent acute cholecystitis) operation (cholecystectomy) should be performed in the first 2 hours of admission to the hospital after preoperative preparation.

In certain conditions duration of preoperative preparation can be increased.

Indications for urgent surgery: peritonitis, perforation and gangrene of the gallbladder, etc.

PRINCIPLE OF OPERATION: elimination of the cause of peritonitis (generally cholecystectomy), decompression of the bile ducts if the bile hypertension is present, sanitation and drainage of the abdominal cavity. When obstruction of the bile ducts and inflammatory changes in the area of hepatoduodenal ligament are present, as well as the critical condition of patients, surgery can be performed in a minimal as possible (external drainage of bile ducts above the level of obstruction, sanitation and drainage of the abdominal cavity).

Patients in Group 2 — conservative treatment:

— Novocaine blockade (periomphalic, perirenal, or other);

— The introduction of antispasmodic drugs — papaverine hydrochloride (2 % — 2 ml i/m) or Drotaverine 40–80 mg 1–3 times a day or i/m, i/v.

— Non-narcotic analgesics: metamizol 2.0 ml of 50 % i/m, and others;

— Antibiotics: semi synthetic penicillins (ampicillin sodium 1 g i/m after 4–6 hours, oxacillin 1 g i/m after 4–6 hours, and others);

— Infusion therapy: saline (0.9 % sodium chloride solution, and others), 5 or 10 % dextrose.

Depending on the effectiveness of conservative treatment, the timing of which should not exceed 48–72 hours, patients should be sorted out with the progressive and regressive acute cholecystitis.

In the absence of co morbidity conditions and other factors that increase the risk of surgery and anesthesia, laparoscopic cholecystectomy should be performed. The optimal timing of operation is the first 24–48 hours of onset of the disease, when the process has not gained widespread nature.

If the patient has risk factors, decompression drainage of the gallbladder under control of laparoscope or ultrasound can be performed. Radical surgery, after laparoscopic or ultrasound, cholecystostomy is performed in the absence of contraindications in the «cold» period, 3–4 weeks after the onset of disease. According to the indications endoscopic papillosphincterotomy can be performed.

POSTCHOLECYSTECTOMY SYNDROME

Abdominal pain or other symptoms originally related to the gallbladder may persist or reappear months or years after cholecystectomy. Recurrence of pain or other symptoms after cholecystectomy has been reported in almost 20 % of cases. However, with improvements in biliary imaging the incidence of

«postcholecystectomy syndrome» has certainly decreased. Episodic right upper quadrant pain associated with jaundice and chills occurring shortly after cholecystectomy is most commonly associated with a retained common bile duct stone or bile duct injury or leak. Acute epigastric pain not associated with jaundice, nausea, may be due to unrecognized pancreatitis, peptic ulcer disease, or even irritable bowel syndrome. Formerly, a long cystic duct stump was believed to be a potential source of symptoms after cholecystectomy. However, with the laparoscopic technique, the cystic duct is left long by design to minimize the risk of bile duct injuries, and no increased risk of biliary symptoms has been observed. Finally, a small group of patients have persistent biliary-type pain after cholecystectomy as a result of abnormalities in the sphincter of Oddi.

LITERATURE

Basic

1. Surgical Diseases: A Handbook / M. I. Kuzin [et al.]; Ed. M. I. Kuzina, 3rd ed. revised. add. — M.: Medicine, 2005. — 784 p.
2. Surgical Diseases: A Handbook: at 2 m / V. Saveliev [et al.], under Society. Ed. V. S. Saveliev, A. Kiriyenko. — M.: GEOTAR Media, 2005.
3. Schott, A. The book of lectures on surgery / A. Schott, V. A. Schott. — Minsk: Asar, 2004. — 525 p.
4. *Kovalev, A. I.* Propedeutics surgical pathology / A. I. Kovalev [et al.], under Society. Ed. A. I. Kovalev, A. P. Chadayev. — M.: Book Medical, 2006. — 640 p.
5. Lectures on surgical diseases.

More

1. Endoscopic abdominal surgery / A. S. Balalykin [et al.], under Society. Ed. A. S. Balalykin. — M.: IMA-Press, 1996. — 144 p.
2. *Galperin, E. I.* Non-standard situations during operations on the liver and biliary tract / E. I. Galperin, E. I. Halperin, J. M. Dederer. — M.: Medicine, 1987. — 336 p.
3. *Greenberg, A.* Emergency abdominal surgery / A. Greenberg. — M., 2000. — 456 p.
4. *Grishin, I. N.* Cholecystectomy: practical guide / I. N. Grishin. — Minsk: Stitch. wk. 1989. — 198 p.
5. Cholelithiasis / S. A. Dadvani [et al.]. — M.: Publishing house of Vidar-M, 2000. — 144 p.
6. Hepatobiliary Surgery: A Guide for Physicians / V. P. Eremenko [et al.], under Society. Ed. N. Maistrenko, A. Accident. — Spb.: Special Books, 1999. — 268 p.
7. Complications in surgery of the abdomen: a guide for physicians / V. Zhebrovsky [et al.]. — M.: Medical News Agency, 2006. — 448 p.
8. *Zavada, N. V.* Emergency surgery of the abdominal cavity (the standards of diagnosis and treatment) / N. V. Zavada. — Minsk: BelMAPO, 2006. — 117 p.
9. Clinical Surgery / R. Condé [et al.], under Society. Ed. R. Conde and L. Nayhusa. English. — M.: Practice, 1998. — 716 p.
10. *Kovalev, A. I.* School emergency surgical practice / A. I. Kovalev, Y. T. Tsukanov. — M., 2004. — 911 p.
11. Propedeutics surgical pathology / A. I. Kovalev [et al.], under Society. Ed. A. I. Kovalev, A. P. Chadayev. — M.: Book Medical, 2006. — 640 p.
12. *Kozyrev, M. A.* Liver and biliary tract: Textbook. Manual / M. A. Kozyrev. — Minsk: Bel. Navuka, 2002. — 247 p.
13. *Korolev, B. A.* Emergency surgery of the biliary tract / B. A. Korolev, D. L. Pikovsky. — M.: Meditsina, 1990. — 240 p.

14. Surgery of the biliary tract / B. Niederle [et al.]. — Prague.: Avitsenum, 1982. — 492 p.
15. *Petrov, S.* General Surgery / S. Petrov. — St. Univ: Lan, 1999. — 672 p.
16. 50 lectures on surgery / V. S. Savelev [et al.], under Society. Ed. V. S. Saveliev. — M.: Triad-X, 2004. — 752 p.
17. *Savelev, V. S.* Guidelines for emergency abdominal surgery / V. S. Savelev. — M.: Triada-X, 2005. — 640 p.
18. Guide to Surgery / C. Schwartz [et al.], under Society. Ed. S. Schwartz, J. Shayersa, F. Spencer. English. — St. Peter Press, 1999. — 880 p.
19. Surgery of the liver and biliary tract / A. A. Shalimov [et al.] — Kiev: Health Protection, 1993. — 512 p.
20. Surgical Diseases: A Handbook: at 2 m / V. S. Saveliev [et al.], under Society. Ed. V. S. Saveliev, A. Kiriyeenko. — M.: GEOTAR Media, 2005.
21. *Schott, A. V.* The course of lectures on private surgery / A. V. Schott, V. A. Schott. — Minsk: Asar, 2004. — 525 p.
22. *Florkemeier, V.* Cholestatic liver Diseases / V. Florkemeier. — Dr. Falk Pharma GmbH, 2002. — 118 p.
23. *Forrest, A. P. M.* Principles and practice of surgery / A. P. M. Forrest, D. C. Carter, J. B. Macleod. — Churchill Livingstone, 1989. — 672 p.
24. *Mann, Ch. V.* Bailey and Love's short practice of surgery / Ch. V. Mann, R. C. G. Russel. — 21st Ed. — Chapman and Hall Medical, 1992. — 1519 p.
25. *Sabiston, D. L.* Textbook of surgery. The biological basis of modern surgical practice / D. L. Sabiston. — Churchill Livingstone, 2001. — 2158 p.
26. *Skandalakis, J. E.* Surgical anatomy and technique. A pocket manual / J. E. Skandalakis, P. N. Skandalakis, L. J. Skandalakis. — Springen-Verlag, 1995. — 674 p.
27. *Stillman, R. M.* General surgery. Review and Assessment / R. M. Stillman. — 3rd Ed. Appleton and Lange, 1988. — 438 p.

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