



The Current State of Epidemiological Aspects and Medical and Social Significance of the Problem of Cholelithiasis and its Complications

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ABSTRACT: In terms of prevalence, frequency of surgical intervention and economic losses, cholelithiasis belongs to one of the most costly areas of world health care and occupies one of the leading positions in the structure of morbidity. Many authors have proven the leading risk factors for cholelithiasis. However, to this day, there are often difficulties in the timely differential diagnosis of cholelithiasis and breast syndrome. The use of modern highly sensitive research methods does not exclude diagnostic errors that occur in 10–42% of cases.

To date, to help surgeons, further study of this problem is required, because they are aimed at improving the results of surgical treatment of this group of patients.

KEYWORDS: obstructive jaundice, cholelithiasis, chronic calculous cholecystitis, radiopaque computed tomography, endoscopic retrograde cholangiography, ultrasound.

Surgical treatment of gallstone disease (GSD) and its complications remains an urgent problem throughout the history of the development of hepatobiliary surgery, despite the fact that many monographs, scientific articles and publications are devoted to this section of abdominal surgery. Chronic calculous cholecystitis (CCC) undoubtedly occupies one of the leading positions in the structure of morbidity [4; 45].

According to statistical studies of recent years, 10–20% of people in the world suffer from cholelithiasis [13; 27]. According to most researchers, cholelithiasis suffers from almost every fifth woman and every tenth man [7].

Human health is influenced by genetic factors in 15–20%, conditions and lifestyle – 50–55%, the work of health care institutions – up to 10–15%, the environment – 20–25% [28].

The high prevalence of cholesterol gallstones, the observed increase in the number of adolescent patients, the identification of new links in etiopathogenesis, and the excessive healthcare costs for the treatment of patients with cholelithiasis determine the particular relevance of this problem [44; 48].

Surgical treatment of cholelithiasis is today the gold standard, which requires further developments in the implementation of treatment technology and evaluation of the effectiveness of cholelithiasis, which is the second most common surgical intervention after appendectomy. Within the framework of the foregoing, the incidence of cholelithiasis has a general medical, socio-economic significance [1].

Sogdatova A.A. [34] notes that the pathogenesis of cholelithiasis is not completely clear. Functional disorders of the gallbladder in cholelithiasis are characterized by a decrease in the contractile function of the bladder. In this disease, bile lithogenicity (oversaturation of bile with cholesterol) is observed. Bile production and excretion is an important function of the liver. It is known that a healthy person secretes about 500–1200 bile per day [9]. Cystic bile consists of many components, the main of which are: water (80%), bile salts (12%), phospholipids (4%), cholesterol (0.7–1.6%), plasma proteins (0.8–1%), bilirubin (0.1–0.6%), inorganic electrolytes [33].

Munnuch A. et al. [47] cites data from several large epidemiological studies in the United States, Europe, China, and Japan, which indicate that a long period of overnutrition with the dominance of refined carbohydrates in the presence of hypertriglyceridemia against the background of dietary fiber deficiency is a delinquent etiological risk factor. The prevalence of



cholelithiasis, the high frequency of surgical intervention, significant economic losses put forward this pathology among the leading problems of modern clinical medicine.

GSD in terms of prevalence, frequency of surgical intervention and economic losses is one of the most costly areas of world health care [43]. In Germany, stones in the gallbladder are verified annually in 15–20% of the population, and more than 190,000 cholecystectomies are performed annually in this country [46]. The ubiquitous trend towards an increase in the number of overweight people, which has reached the threshold of an epidemic, contributes to an increase in the incidence of cholelithiasis [14].

In the United States alone, the number of CEs exceeds 700,000 per year [49]. As a result, cholelithiasis has a significant financial burden on the healthcare system. For example, in the United States, the annual cost of surgical treatment of patients with cholelithiasis is estimated at \$6.5 billion [49]. Unfortunately, stone carrying can affect the quality of life of the patient, due to the occurrence of pain in the upper abdomen, excruciating nausea, vomiting and a feeling of heaviness in the right hypochondrium after eating. At the same time, it is extremely difficult to characterize the true incidence, since in a significant number of people it is latent for a long time [29; 30].

Numerous studies indicate the existence of complex etiopathogenetic pathways that link the occurrence of gallstones with changes in systemic homeostasis and involvement of several of the most important human organs in the pathological process [21; 43; 51].

Critical factors contributing to the formation of cholesterol gallstones are: dysmotility of the gallbladder; hypersecretion and accumulation of mucin in the lumen of the gallbladder with ongoing local immune-mediated inflammation, with a rapid phase transition of cholesterol from supersaturated hepatic bile and precipitation of solid cholesterol crystals [30; 43].

Additional stone formation factors include: female gender, gene polymorphism, increased absorption of bile and dietary cholesterol, sluggish intestinal motility, qualitative, quantitative or topographical changes in the intestinal microbiota, *H. pylori* infection, consumption of high-calorie foods [29; 51].

It is known that bile proteins, cholesterol or bilirubin crystals are the matrix of stone formation. The physical properties of bile in patients with cholelithiasis change—there is an increase in specific gravity, viscosity and surface tension. In turn, thickening of bile and an increase in its viscosity leads to a decrease in the solubility of various stones in it, which contributes to the precipitation of cholesterol crystals [4; 41].

Many authors have proven that the leading risk factors for cholelithiasis are female sex, age, multiple pregnancies, menopause, obesity, aggravated heredity, dietary habits, certain genes, and insufficient physical activity [36; 50].

According to a meta-analysis, large-scale epidemiological studies have established that the main factors in the development of cholelithiasis are heredity, overweight, hyperlipidemia, predisposition to the female sex [8].

Difficulties in timely differential diagnosis in this category of patients are due to the polyetiological nature of the syndrome of obstructive jaundice (JJ), the absence of pathognomonic symptoms and laboratory parameters characteristic of various causes of biliary block. The use of modern highly sensitive research methods does not exclude diagnostic errors that occur in 10–42% of cases [11; 31].

Establishing the cause and level of biliary tract block is the second diagnostic task and one of the key points in choosing further treatment tactics. The instrumental methods used for this purpose can be divided into non-invasive (ultrasound, endoscopy, MRI, MRCP, endo-ultrasound, CT, spiral CT, hepatobiliscintigraphy) and invasive (ERCP, PTCG, laparoscopy) [16].

Ultrasound rightfully occupies a leading position in the differential diagnosis of obstructive jaundice and is the primary screening instrumental method for diagnosing patients with pathology of the biliary system. The main advantages of ultrasound include accessibility, non-invasiveness, the absence of contraindications and complications after the procedure, high information content without radiation exposure, visualization of non-contrast calculi, mobility, the possibility of repeated repetition and minimally invasive diagnostic and therapeutic manipulations under its control, as well as relatively low cost [39]. The sensitivity of ultrasound in identifying the causes of breast cancer is 62–96%, and the specificity is 80–85% [5], however, according to a number of authors, the frequency of detection of stones in the ducts averages 50–80% of cases, tumors – 50–60% [2]. The use of ultrasound in dynamics and careful preparation for the study increases the sensitivity of the method to 86.4% [17]. With ultrasound, in addition to the topical diagnosis, it is important to assess the condition of the liver and gallbladder in order to identify pathological formations that compress the biliary tract. However, the diagnostic capabilities of the method have a limit of



accuracy, so ultrasound data must be verified by other research methods. The disadvantages of ultrasound include the low level of spatial resolution, the difficulty of visualizing the distal sections, and the impossibility of obtaining a holistic view of the ductal system and its relationship with adjacent organs [25].

Additional information about the state of the biliary tree can be obtained with a three- and four-dimensional reconstruction of an ultrasound image, which allows you to evaluate the ultrasound picture in three planes, examine the liver parenchyma and visualize the foci of metastatic liver tissue. Three-dimensional ultrasound angiography makes it possible to spatially represent the relationship of foci with the main vessels of the liver, more clearly determine the tactics of patient management and reduce the risk of possible intraoperative bleeding. Endoscopic diagnostics for breast cancer is mandatory, it allows you to visually assess the condition of the stomach and duodenum, OBD and perampullary zone, makes it possible to take a biopsy, bile samples, and, if necessary, go to EPST. The sensitivity of the method in determining the cause of breast cancer is 37.4% [11; 37].

An endoscopic ultrasound is becoming more and more common. Endosonography in the diagnosis of breast cancer adequately demonstrates the type, localization and severity of biliary obstruction, allows you to accurately diagnose choledocholithiasis in patients with questionable and negative data from conventional ultrasound, which determines further tactics regarding the need to perform such invasive interventions as ERCP and EPST. Also, this method is in first place in the diagnosis of pancreaticoduodenal cancer (sensitivity – 95%), most accurately diagnoses small formations (tumors, cysts, stones) of the pancreas, bile and Wirsung ducts, the BDS zone, determines the ingrowth and resectability of tumors in these areas. Endosonography has established itself as an indispensable method in the diagnosis of diseases of the bile ducts and obstructive pulmonary disease, identifying tumors and stones in this zone with high reliability [35].

Hepatobiliary scintigraphy is performed for the purpose of differential diagnosis of jaundice and determining the level of the location of the obstruction to the outflow of bile from the liver. The method is indicated in doubtful cases, determines further tactics in relation to invasive methods. The use of radioisotope scintigraphy makes it possible to identify direct and indirect signs of benign stenosis of the obstructive duct and the presence of cicatricial strictures of the bile ducts with high reliability. According to the results of hepatobiliary scintigraphy, it is possible to assess the functional state of hepatocytes [37]. Also, the type of bile flow through the ducts and through the BDS ampulla into the intestine, narrowing of the lumen of the BDS ampule, the preliminary level of damage (stricture) of the bile ducts, the presence of bile streaks in the abdominal cavity. The advantages of the technique include non-invasiveness, the possibility of using in severe breast cancer, and the absence of contraindications [20].

X-ray contrast computed tomography (RCT) is a highly informative non-invasive method of topical diagnostics, the sensitivity and specificity of which is comparable to those of ultrasound [5; 22]. The informativeness of the method in the diagnosis of breast cancer is 85–92%, the sensitivity of the method in the differential diagnosis of the pathology of GPBZ is 63.6%. In addition to a qualitative assessment of the state of the biliary tract, a quantitative analysis is carried out during CT – the diameters of the lobar hepatic ducts, the common hepatic and common bile ducts are measured. At the same time, the expansion of the ducts is detected in 96.4%, normal ducts are not visualized. CT is a highly sensitive and specific method for diagnosing pancreaticoduodenal cancer; in the detection of liver metastases, the accuracy of CT is 86.0%. The overall diagnostic efficiency of the method can be increased by the use of intravenous contrast, but there is an element of invasion and the risk of complications. The disadvantages compared to ultrasound and ERCP include less accessibility, stationary position, the need for intravenous contrast in some cases, radiation exposure, patient weight restrictions, and relatively high cost. A further increase in the efficiency of the method is associated with the introduction of multispiral QT [38; 40].

MRI is a highly informative diagnostic method, which allows visualizing the tumor, clearly identifying the ductal system of the liver and vascular structures, well visualizes the pancreatic tissues and elements of the hepatoduodenal ligament. However, the presence of some foreign bodies, for example, a staple suture after the application of tissue stapling devices, creates interference, which interferes with the visualization of the organ under study. At present, the MRCP method has found wider application in the diagnosis of breast cancer and GPBZ diseases. It provides a high degree of reliability in the diagnosis of surgical diseases of the liver, biliary tract and pancreas, makes it possible to determine the level, extent, and cause of obstruction. In cholangiolithiasis, the sensitivity, specificity, and overall accuracy of the method are 100, 98.5, and 98.9%, respectively [15].

According to Lutsevich E.V. et al., [23] patients with diseases of the bile ducts firmly occupy one of the first places in surgical hospitals. Choledocholithiasis, the frequency of which is 8–23%, requires enormous efforts on the part of the attending



physicians and, in particular, this affects the patient's health status, ability to work and, often, life itself. Many researchers note a consistently high mortality in choledocholithiasis, which, despite the successes achieved, averages 2.5% [5].

Faced with jaundice, patients often do not know what to do and which doctor to contact. However, jaundice requires immediate action by both the patient and the doctor. Breast cancer in the pathology of the organs of the hepatopancreatoduodenal region occurs from 12 to 45.2%. It should be noted that in benign pathology, the level ranges from 4.8 to 22.5%, and in malignant lesions of the organs of the indicated localization, it ranges from 36.6 to 47% [26; 32]. The problem is that with cholelithiasis and with tumors of the pancreaticoduodenal zone, breast cancer is more common in elderly and senile patients suffering from severe comorbidities [19].

According to Gudiev I.R. [12] the incidence of jaundice in cholecystitis was 43.2%. The majority of patients were over the age of 55 years (70%). Among the comorbidities of the cardiovascular system, the most patients were identified with hypertension (50%).

Traditional laparotomic interventions aimed at restoring bile outflow and performed at the height of the "icteric" period are accompanied by a large number of postoperative complications, and mortality reaches 15–40%, so the staged tactics of surgical treatment of patients with breast syndrome is now widespread [5]. However, despite the progress achieved, due to the introduction into clinical practice of minimally invasive methods for the implementation of biliary excretion and restoration of bile outflow, surgical tactics, depending on the etiological factor in the development of breast syndrome and the level of biliary block, are not well defined [6; 24]. Questions remain open about the choice of access to the bile ducts, the duration of the period of preliminary decompression of the biliary tract and the timing of the radical intervention, the prevention of the development of the "rapid decompression" syndrome [10; 18].

In the era of dominance of endoscopic surgery in the treatment of patients with cholelithiasis complicated by breast syndrome, the advantages of transpapillary interventions are undeniable [42]. Despite this, the opinion that traditional surgical interventions for this type of pathology are operations of desperation does not correspond to reality [3; 26].

According to the 2016 recommendations, further study and development of intraoperative evaluation is required to assist surgeons in choosing the method of completing the operation in conditions of increased operational risk, since the study of this issue remains open [44].

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