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ROLE AND PLACE OF MODIFIED CHOLECYSTECTOMY FROM A MINI-ACCESS IN THE SURGERY OF CHRONIC CALCULOUS CHOLECYSTITIS

(monograph)

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ANNOTATION

The monograph examines the theoretical and practical aspects of the diagnosis and treatment of patients with chronic calculous cholecystitis. The theoretical positions are supported by extensive empirical material presented in the form of detailed clinical cases. The authors have developed innovative, in some cases original, methods of surgical intervention that significantly reduce the incidence of postoperative complications and deaths.

The authors focus on the choice of surgical tactics and techniques for cholecystectomy. The monograph is aimed at surgeons and doctors of various specialties involved in internal medicine.

АННОТАЦИЯ

В монографии рассматриваются теоретические и практические аспекты диагностики и лечения пациентов с хроническим калькулёзным холециститом. Теоретические положения подкреплены обширным эмпирическим материалом, представленным в виде детальных клинических кейсов. Авторами разработаны инновационные, в некоторых случаях оригинальные, методы хирургического вмешательства, которые существенно снижают частоту послеоперационных осложнений и летальных исходов.

Авторы акцентируют внимание на выборе хирургической тактики и методик проведения холецистэктомии. Монография ориентирована на хирургов и врачей различных специальностей, занимающихся внутренней медициной.

ANNOTATSIYA

Monografiyada surunkali toshli xoletsistit bilan og'rigan bemorlarni tashxislash va davolashning nazariy va amaliy jihatlari ko'rib chiqiladi. Nazariy qoidalar batafsil klinik holatlar orqali taqdim etilgan keng empirik materiallar bilan qo'llab-quvvatlanadi. Mualliflar operatsiyadan keyingi asoratlar va o'lim holatlarini sezilarli darajada kamaytiradigan innovatsion, ba'zi hollarda original jarrohlik usullarini ishlab chiqdilar.

Mualliflar jarrohlik taktikasi va xoletsistektomiya usullarini tanlashga e'tibor berishadi. Monografiya tibbiyot bilan shug'ullanadigan turli mutaxassisliklar jarrohlari va shifokorlariga qaratilgan.

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Foreword

Cholelithiasis (ChL) ranks third in prevalence among general medical conditions, following cardiovascular diseases and diabetes mellitus. It remains a significant medical and social issue, impacting population health and frequently leading to life-threatening complications and an increased incidence of surgical interventions. According to the VI World Congress of Gastroenterologists, approximately 10% of the global population is affected by cholelithiasis. In developed countries, the incidence of the disease doubles every decade, the highest incidence occurs in adulthood (45-59 years) and there is a "rejuvenation" of the incidence..."[1] In the context of an increase in the incidence of chronic calculous cholecystitis (CCh), there is an increase in the number of patients with complicated forms of cholelithiasis (cholelithiasis), which leads to an increase in the frequency of surgical interventions. In medical practice, a variety of surgical techniques are employed for treatment, including conventional laparotomy, laparoscopic cholecystectomy (LChE), and minilaparotomy procedures. Among these, laparoscopic cholecystectomy is often considered the standard of care for this patient population. The selection of a particular surgical technique is frequently influenced by the personal preferences of the operating surgeon and the established protocols within the medical facility.

In recent decades, laparoscopic cholecystectomy (LChE) and mini-access cholecystectomy have become popular treatments for cholelithiasis. However, there is still no uniform standard of treatment. Known methods of cholecystectomy from mini-access to the gallbladder are limited in use, which is due to the complexity of the design of the instruments, which has led to limited use, and is also accompanied by complications due to existing disagreements between surgeons in determining indications and contraindications. This explains the increased interest in the optimization of surgical manuals and surgical tactics in ChC.[2]

[1] Vakhrushev Y.M., Khokhlacheva N.A. Cholelithiasis: epidemiology, risk factors, features of the clinical course, prevention. -2016. –v.6, No3 (29). - pp. 30-35.

[2] Amjad S., Rizvi A., Asmat S., Akhtar S., Faridi S., Ahmad M. Forecast of difficult Laparoscopic cholecystectomy by Sonography: An added advantage. Biomedical Research. 2012; 23(3):425-429.

In terms of diagnosis and determination of surgical tactics, significant progress has been achieved with the development of the medical industry and the introduction of more modern diagnostic equipment, such as ultrasound, endoultrasound, which in the preoperative period make it possible to determine the degree of severity of the inflammatory process and outline an algorithm of actions, and if surgery is necessary, to choose the method of surgery [3]. Operative access to the gallbladder (cholecystectomy) should comply with the fundamental principles of surgery, including the principles of asepsis, antiseptics, hemostasis and minimization of tissue trauma. It is important to provide sufficient visual overview for a detailed revision of the hepatobiliary system, including the gallbladder, bile ducts (biliary tract), liver, and surrounding structures. This is achieved by choosing the optimal approach, which can be laparoscopic, laparotomy or combined. Laparoscopic cholecystectomy, for example, allows you to minimize the invasiveness of the intervention, reduce the rehabilitation time and reduce the risk of postoperative complications. However, this procedure requires a highly qualified surgeon and the use of modern endoscopic equipment. Suboptimal access, whether too wide or too narrow, can lead to serious negative consequences both during surgery and in the postoperative period. Overreach increases the risk of intraoperative complications such as bleeding, damage to adjacent structures, and increased chance of infection. This is due to an increase in the area of the surgical wound, which contributes to microbial contamination and impaired hemostasis. On the other hand, too narrow an access can make it difficult to visualize anatomical structures, which increases the risk of technical errors such as incorrect positioning of instruments, damage to nerves and blood vessels, and insufficient resection of pathological tissues. As a result, postoperative complications may occur, including postoperative pain, hematomas, seromas, as well as prolonged wound healing. In addition, insufficient access can increase the time of surgery, which in turn increases the risk of tissue hypoxia and metabolic disorders. Optimizing access is therefore a key aspect of modern surgery, requiring careful planning and consideration of a variety of factors, including patient anatomy, the nature and extent of the intervention to be

[3] Shmakov D.A., Shcherbatykh A.V., Sokolova S.V., et al. Differentiated approach to the choice of operative access in calculous cholecystitis. Siberian Medic. Review 2020; (1):66-72

performed, and individual risks and complications. Conventional surgical exposure techniques (ChE) exhibit several limitations, including restricted visual access, challenging reachability of anatomical structures, and heightened risk of injury to adjacent tissues. These limitations are compensated by one of the key advantages of this method — the ability to provide detailed and direct visual control over the operating field. This aspect is critical to minimize surgical errors and optimize outcomes. In contrast to traditional LChE, it is possible to perform the entire complex of surgical manipulations with the stomach, and is also characterized by low trauma, good cosmetic effect, fewer complications during surgery and in the postoperative period. However, the use of this technique is limited by certain contraindications. In particular, it is not recommended in the presence of a pronounced perivesicular infiltrate, which can make it difficult to visualize and manipulate anatomical structures. Also, the presence of previous surgical interventions is a contraindication, especially in the upper floor of the abdominal cavity, where there is a risk of damage to important anatomical structures and the development of postoperative complications. Adhesions in the abdominal cavity are also a relative contraindication, as it can complicate laparoscopic cholecystectomy (LChE) and increase the risk of complications.

If there are contraindications to performing LChE, cholecystectomy from a mini-approach may be an alternative. This technique preserves all the benefits of wide access, including excellent visualization and the capability for precise monitoring of anatomical structures, without the necessity of creating pneumoperitoneum. This omission reduces the likelihood of complications typically associated with pneumoperitoneum, such as gas embolism and hypotension, among others.

The optimization of surgical tactics and techniques utilizing minimally invasive approaches, along with a comparative analysis of the efficacy of laparoscopic cholecystectomy (LChE) versus mini-access cholecystectomy in the treatment of cholelithiasis (ChL), represents a significant yet under-investigated challenge in contemporary surgical practice.

Laparoscopic cholecystectomy (LChE) is one of the most common minimally invasive gallbladder removal techniques, which is characterized by minimal postoperative

complications, rapid recovery of the patient and a low level of pain. However, despite its many benefits, LChE requires a highly skilled surgeon and specialized equipment, which limits its availability in some healthcare settings.

Mini-access cholecystectomy represents a surgical technique that integrates the benefits of minimally invasive procedures with cost-effectiveness. This approach involves performing the operation through a small incision in the abdominal wall, which mitigates the risk of postoperative complications and expedites patient recovery. However, a comparative assessment of the effectiveness of LChE and cholecystectomy through a mini-access is still a subject of discussion among specialists. To elucidate the mechanisms underlying the efficacy of various surgical techniques for treating cholelithiasis, additional research is required to investigate the anatomical and physiological parameters of patients, as well as to evaluate long-term outcomes and postoperative quality of life.

Thus, the optimization of tactics and techniques for minimally invasive operations in cholelithiasis is an important task of modern surgery, which requires an integrated approach and interdisciplinary cooperation. In this regard, a comparative analysis of the results of cholecystectomy was carried out, as well as the role and place of various surgical methods in the surgical treatment of patients with cholelithiasis was determined.

CHAPTER I. CURRENT STATE OF THE PROBLEM OF SURGICAL TREATMENT OF CHOLELITHIASIS (literature review)

§1.1. Cholelithiasis (ChL) – epidemiology, medical and social aspects of the problem

According to the world literature of recent decades, cholelithiasis continues to affect 15-20% of the world's population, of which women make up a fifth, and men a tenth [2;39;62; 63; 66]. Surgical treatment of cholelithiasis and its complications continues to occupy one of the leading positions in the structure of morbidity [15; 20; 37; 79; 127].

Surgical treatment of chronic calculous cholecystitis (CCh) today requires an assessment of its effectiveness, which is the second most common surgical intervention after appendectomy. Within the framework of the above, the incidence of chronic calculous cholecystitis (CCh) is of general medical, socio-economic importance [1;12; 19; 25; 28; 72;147].

Human health is determined by a complex of factors, including genetic predisposition (15–20%), lifestyle and living conditions (50–55%), quality of medical care (10–15%) and environmental impact (20–25%). [58].

The high incidence of cholelithiasis (ChL) is a serious medical and socio-economic problem. New risk factors such as genetic predisposition, metabolic disorders, hormonal changes, as well as pathogenetic mechanisms, including imbalances in the synthesis and secretion of bile acids, impaired gallbladder function, and inflammatory processes, are constantly being identified. These factors contribute to the formation of cholesterol and pigment stones, which can lead to the development of complications such as cholecystitis, pancreatitis, and obstructive jaundice. Significant financial costs for diagnostics, including ultrasound, computed tomography and magnetic resonance cholangiopancreatography, as well as for treatment, including drug therapy, laparoscopic cholecystectomy and other surgical interventions, make this problem especially relevant in conditions of limited health care resources. [33; 67; 96; 118; 123; 132].

Sogdatova A.A. (2018) points out that the pathogenesis of cholelithiasis (cholelithiasis) is not fully understood. Functional disorders of the gallbladder in chronic calculous cholecystitis (CCh) are manifested by a decrease in its contractile activity [82].

In a healthy adult, the daily amount of bile secreted by the liver varies from 500 to 1200 milliliters. This process, known as cholekinesis, is an important component of the digestive system and is regulated by complex biochemical mechanisms. Bile, consisting of water, bile acids, salts, pigments, cholesterol and other components, is synthesized in the hepatocytes of the liver and stored in the gallbladder until it is released into the duodenum. The bile produced by the gallbladder includes many components. The main ones are: water (80%), bile salts (12%), phospholipids (4%), cholesterol (0.7–1.6%), plasma proteins (0.8–1%), bilirubin (0.1–0.6%) and inorganic electrolytes. [34].

According to Pak M., Lindseth G. (2016), more than 700 thousand HE are performed in America per year, which has a significant financial burden on the health care system, which annually costs the health care budget $6.5 billion [62; 134]. This is the reason for high financial costs in the health care system [30; 46; 116; 143].

Nikitin I.G. et al. (2020), as well as Di Ciaula A., Portincasa P. (2018), as well as a number of researchers [45; 115; 147], the main causes of stones in the stomach are:

1) impaired motility of the stomach;

2) hypersecretion and accumulation of mucin in the lumen of the gallbladder with inflammation, rapid transition of cholesterol from the hepatic bile and its precipitation in the form of cholesterol crystals [62; 115].

The main pathogenetic factors in the formation of cholesterol gallstones are genetic predisposition, hypersecretion of cholesterol by the liver, violation of the composition of bile with an increased content of cholesterol, as well as a decrease in the concentration of bile acids and phospholipids. Genetic mutations in genes encoding the synthesis of proteins involved in the metabolism of bile acids and cholesterol can significantly increase the risk of stone formation hepatocyte dysfunction or lipid metabolism disorders. Oversaturated bile, containing an excessive amount of cholesterol in relation to bile acids and phospholipids, creates conditions for the crystallization of cholesterol and the formation of microliths, which can then increase in size and turn into stones. [115].

Based on the data of 43,141 twin pairs, the influence of genetic factors in 25% of cases among twins was proven [141].

Factors of stone formation are also female sex, gene polymorphism, H. pylori

infection, and consumption of high-calorie food [19; 36; 62; 112; 149].

Stone formation matrices can be bile proteins such as mucins and lipoproteins, as well as cholesterol or bilirubin crystals (especially its conjugated form). Calcium, magnesium, phosphate and oxalate ions also play an important role in the formation of stones. These components interact with each other, forming complex crystal structures that gradually increase in size, turning into gallstones. The process of stone formation can be initiated by disturbances in the metabolism of lipids, proteins and minerals, as well as changes in the physicochemical properties of bile, including viscosity, osmolality and concentration of surfactants. An increase in bile density and an increase in its viscosity contribute to a decrease in the solubility of various stones, which stimulates the precipitation of cholesterol crystals. [19; 68; 112].

Studies aimed at elucidating the role of Helicobacter pylori (H. pylori) infection in the pathogenesis of cholelithiasis are of considerable interest to the scientific community. Helicobacter pylori is a gram-negative bacterium that colonizes the lining of the stomach and duodenum. It plays a key role in the development of gastritis, peptic ulcer and, possibly, other diseases of the gastrointestinal tract.

Cholelithiasis is a multifactorial disease characterized by the formation of stones in the gallbladder or bile ducts. There are many factors that affect the development of cholecystitis, including genetic predispositions, metabolic disorders such as obesity and dyslipidemia, and dietary habits.

Studies show that H. pylori infection may affect the risk of developing cholecystitis in several ways. Firstly, the bacterium is able to cause inflammatory changes in the mucous membrane of the stomach and duodenum, which can contribute to impaired secretion of bile acids and changes in the composition of bile. Second, H. pylori can disrupt gastrointestinal motility, which can also contribute to the formation of gallstones.

In addition, some studies point to a possible link between H. pylori infection and metabolic abnormalities that may be associated with the development of cholelithiasis. For example, bacteria can affect insulin resistance levels and lipid metabolism, which in turn can contribute to the formation of gallstones.

Thus, the study of the role of Helicobacter pylori in the pathogenesis of cholelithiasis

is a promising area of scientific research, which can lead to the development of new methods for the prevention and treatment of this common disease. [126; 131; 146; 149].

Cen L. et al. (2018) cite the data of a meta-analysis to determine the association of H. pylori infection with chronic cholecystitis and cholelithiasis [110;].

The presence of representatives of the intestinal microbiota in lithogenic bile may be a sign of increased intestinal permeability in biliary obstruction, which contributes to the development of an inflammatory response and the formation of stones [115; 136].

A number of studies have demonstrated a close relationship between the presence of calculi in the stomach, dyslipidemia, MS, and cardiovascular diseases [116; 121; 152].

Epidemiological and clinical studies have identified several risk factors associated with the development of chronic calculous cholecystitis (ChCCh). These include gender, advancing age, a history of multiple pregnancies, menopausal status, obesity, genetic predisposition, specific dietary patterns, certain genetic polymorphisms, and low levels of physical activity. [45; 96; 141].

Meta-analysis findings indicate that large-scale epidemiological investigations have identified hereditary predisposition, obesity, hyperlipidemia, and female gender as significant risk factors for the development of chronic calculous cholecystitis. [22; 50].

Diagnosis and differential diagnosis of cholelithiasis is often difficult due to its polyetiological nature [4; 6;10;20; 34; 107].

The use of modern equipment does not exclude diagnostic errors [11;69; 91; 118].

Instrumental methods used for this purpose can be classified into non-invasive and invasive. [37; 70; 91].

Currently, ultrasound examination (USE) is the leading method of screening for the diagnosis of diseases of the gallbladder and biliary tract. This method is highly informative, non-invasive, accessible and free of radiation exposure, as well as relatively low cost. [8;43; 80].

The sensitivity of ultrasound in the diagnosis of cholelithiasis and gallbladder microlithiasis ranges from 62% to 96%, and the specificity is 80–85%. [21; 38;125].

The disadvantages of ultrasound are difficulties in visualizing the distal areas and limitations in obtaining complete information about the ductal system, as well as its

interaction with neighboring organs. [38; 86].

Additional information can be obtained using three- and four-dimensional reconstruction of ultrasound images in three mutually perpendicular planes. [23; 41;102;122; 130].

X-ray contrast computed tomography (CT) is a highly informative non-invasive method of topical diagnostics that demonstrates sensitivity and specificity comparable to ultrasound (USE). [48].

The informative value of the method ranges from 85 to 92%, and the sensitivity is 63.6%. The sensitivity of RCT reaches 86.0%. The effectiveness of RCT increases with the use of intravenous contrast, but this increases the invasiveness of the procedure and the risk of complications. [49;98;99;115].

Magnetic resonance imaging (MRI) is an advanced diagnostic technique characterized by high information content. It demonstrates a high level of diagnostic reliability for diseases affecting the hepatopancreatobiliary system. The sensitivity and specificity of this method are reported to be 100% and 98.5%, respectively. [115].

According to Gudiev I.R. (2018), the incidence of jaundice in cholecystitis was 43.2%. At the same time, most patients were over the age of 55 years (70%). Among the concomitant pathologies, patients with hypertension (50%) were most often identified [28].

The 2016 guidelines emphasize the necessity for continued research and refinement of intraoperative assessment techniques to aid surgeons in selecting appropriate surgical methods under conditions of elevated surgical risk. This area of investigation remains an open field for future study. [118].

§1.2. Methods of surgical treatment of cholelithiasis

In the process of the transition of food chyme from the stomach to the duodenum, there is a sequential contraction of the gallbladder (GB), which causes the release of bile into the lumen of the intestine. This process is regulated by complex neurohumoral mechanisms, including the activation of cholecystokinin (ChCK), secretin, and other gastrointestinal hormones. The excretion of bile is 40-60 ml, which contributes to the emulsification of fats, the activation of pancreatic enzymes and the neutralization of acidic

chyme. Bile is also involved in the absorption of fat-soluble vitamins and calcium salts. Bile, secreted by the liver and stored in the gallbladder, plays a crucial role in the digestion process by emulsifying fats. However, pathological alterations in the stomach can impair its function, leading to symptoms such as pain, chronic inflammation, and infections. These conditions can also affect the biliary system and the exocrine function of the pancreas. In severe cases, cholecystectomy (CCY), performed for medical indications, can significantly improve the patient's clinical status without causing substantial adverse effects on the digestive process. [14; 74; 79; 89; 95].

Planned surgical treatment of cholelithiasis (cholelithiasis) requires careful preoperative preparation. The main goal of this preparation is to stabilize the patient's condition, correct concomitant metabolic disorders and minimize the risks of intra- and postoperative complications. Preoperative preparation includes several key stages:

1. Diagnostic stage: Conducting a comprehensive examination, including laboratory tests (biochemical blood test, coagulogram, general urinalysis), instrumental methods (ultrasound, computed tomography, magnetic resonance imaging) and, if necessary, endoscopic examinations. This allows you to get a complete picture of the patient's condition and identify possible contraindications to surgery.

2. Drug therapy: Prescription of drugs aimed at relieving complications of cholecystitis, such as cholecystitis, cholangitis or obstructive jaundice. Antibiotics, antispasmodics, anti-inflammatory drugs and, if necessary, drugs to correct electrolyte disorders are used.

3. Correction of metabolic disorders: In case of concomitant diseases, such as diabetes mellitus, obesity or cardiovascular pathology, their drug correction is carried out. This includes the prescription of hypoglycemic drugs, antihypertensives and other necessary medications.

4. Psychological preparation: An important aspect of preoperative preparation is working with the patient to reduce anxiety and increase confidence in the successful outcome of the operation. This may include consulting with a psychotherapist or psychologist.

5. Physiotherapy and therapeutic exercises: The use of physiotherapeutic methods

and a set of exercises are aimed at improving the general condition of the patient, increasing muscle tone and reducing the risk of postoperative complications.

6. Infusion therapy: Infusions of electrolyte solutions, glucose, and other essential substances to correct fluid and electrolyte balance and provide the body with essential nutrients.

The purpose of all these measures is to create optimal conditions for surgery, minimize the risks of complications and ensure a smooth postoperative period. Removal of the gallbladder (cholecystectomy) is a traumatic procedure for the body, so careful preoperative preparation plays a key role in ensuring a favorable outcome of the operation and a quick recovery of the patient.

A gastroenterologist, based on the results of a comprehensive examination, decides on the need for planned surgical treatment. He coordinates all stages of preoperative preparation and monitors the patient's condition at every stage. This allows you to minimize risks and ensure the success of the operation. Cholecystectomy, which is a radical removal of the gallbladder, remains one of the most common and sought-after surgical procedures in modern abdominal surgery. Despite the active development and implementation of non-invasive technologies, such as lithotripsy and medical litholysis, cholecystectomy remains the gold standard for the treatment of calculous cholecystitis and cholelithiasis (ChL).

Current trends in cholelithiasis surgery are aimed at significantly reducing the invasiveness of surgical intervention. This is achieved through the transition from traditional abdominal approaches, such as laparotomy, to minimally invasive techniques, the most common of which is laparoscopic cholecystectomy (LChE). LChE is characterized by minimal tissue damage, rapid rehabilitation of patients and a decrease in the frequency of postoperative complications. The laparoscopic technique allows the operation to be performed through several small punctures (usually 3-4), into which laparoscopic instruments and an optical system are inserted. This provides high visualization of the surgical field, which allows for precise and safe removal of the gallbladder. In addition, the use of carbon dioxide to create a pneumoperitoneum improves access to the abdominal organs and facilitates the manipulation of instruments. The

advantages of laparoscopic cholecystectomy include a reduction in pain in the postoperative period, a reduction in the length of hospital stay, a reduction in the risk of infectious complications and a rapid recovery of physical activity in patients. These factors make LChE the preferred treatment for cholecystitis in most clinical situations. However, despite the obvious advantages, the laparoscopic technique requires a highly qualified surgeon and specialized equipment, which limits its availability in some medical institutions. In such cases, an alternative can be minilaparotomy, which is an intermediate option between traditional laparotomy and LChE, which reduces the trauma of the intervention while maintaining sufficient visualization.

Thus, the evolution of surgical methods for the treatment of cholecystectomy is aimed at optimizing the balance between efficiency, safety and invasiveness of the intervention. Laparoscopic cholecystectomy and its modifications continue to be the standard in this field, offering patients minimal risks and quick recovery after surgery. Cholecystectomy provides a more aesthetic result of the operation. [3; 11; 94;135; 138].

Currently, traditional cholecystectomy (TChE), ChE from a mini-access, and laparoscopic cholecystectomy (LChE) are used to remove the stomach. Robot-assisted operations and endoscopic interventions through natural orifices have also begun to be used in clinical practice, which are limited in use due to the high cost and availability of equipment [7; 85].

§1.2.1. Traditional cholecystectomy

Traditional cholecystectomy (TChE), first performed by S. Langenbuch in 1882, for many decades, remained the only effective method of surgical treatment of cholelithiasis (ChL). However, despite the rapid development of medical technologies and the accumulation of vast experience, in everyday clinical practice, surgeons, in certain situations, continue to perform TChE. This concept is adhered to by the majority of domestic and foreign surgeons [55].

Only a wide laparotomy made it possible to perform the necessary amount of surgical intervention. However, when performing the traditional approach, it is accompanied by pronounced trauma, which is due to the intersection of the muscular-aponeurotic layers, large blood vessels and nerves, which often contribute to wound suppuration and the

occurrence of postoperative complications (eventrations and incisional hernias), which increases the rehabilitation time of patients [12;99;150].

The widespread use of the technique of traditional cholecystectomy during the 20th century was due to the lack of modern laparoscopic technologies, as well as the fact that some leading surgeons were against small incisions (less than 10-12 cm long), due to the high risk of postoperative complications [16;47].

In Russia, the first HE was performed in 1895, when a successful operation was performed in Simferopol by surgeon A.F. Kablukov. By the beginning of the twentieth century, the operation of ChE was performed extremely rarely and only in complicated forms of the disease [16; 17].

It is known from the literature that the performance of ChE is carried out by vertical, oblique and angular approaches. All these incisions are accompanied by a violation of the integrity of the right rectus muscle and the lateral muscles and nerves of the anterior abdominal wall over a significant distance, which is accompanied by high trauma and frequent development of postoperative complications.

There are two methods of cholecystectomy: 1) cholecystectomy from the cervix; 2) cholecystectomy from the bottom [65; 78].

Possible complications:

1. Bleeding from the artery stump when the ligature slips.

2. Damage to the right branch of the hepatic artery.

3. Damage to the portal vein.

4. Leaving an excessively long stump (more than 1.5 cm) leads to the formation of a "false" stump with subsequent stone formation.

5. Leaving an excessively short stump (less than 0.5 cm) leads to a violation of the bile flow in the total liquid fluid due to the possibility of strictures in it.

6. When moving away "from the bottom", the stones can be pushed into the underlying channels [71; 101].

At present, traditional ChE is usually performed in acute calculous cholecystitis and in pathology of the gallbladder. There are two types of traditional ChE: cervical ChE (by ligation and excision of the cystic duct and cystic artery) and bottom-based ChE: it is

performed in cases where it is not possible to reach the duct [17; 65].

Traditional open cholecystectomy (ChE) is performed through large incisions in the abdominal wall, which leads to significant tissue trauma and increases the risk of postoperative complications, such as incisional ventral hernias and infectious processes. In the early postoperative period, complications are also possible, including intestinal paresis and respiratory disorders.

When performing a traditional cholecystectomy with a right-sided approach, a complete crossing of the right rectus abdominis muscle is performed. This stage of the operation requires careful preoperative preparation and anatomical assessment, since the right rectus abdominis muscle is a significant structure of the anterior abdominal wall. Crossing this muscle provides access to the gallbladder and biliary tract, which is critical for the success of cholecystectomy. After crossing the right rectus abdominis muscle, the surgical field is expanded using standard wound dilators. These instruments are designed to spread the edges of the surgical wound, providing optimal visibility and access to the operated organ. In the process of expanding the surgical field, it is important to take into account anatomical features and possible neurovascular structures in order to avoid damage to them. Thus, traditional cholecystectomy of the right-sided approach is a technically complex process that requires a highly qualified surgeon and compliance with all anatomical and surgical principles. The stomach is removed from the neck or from the bottom. The cystic duct is crossed between Fedorov's clamps, stepping back 1-1.5 cm from the place where it flows into the common ZHPR. The cystic artery is ligated separately. The wound of the abdominal wall is sutured in layers, tightly [34; 65].

The use of TChE is associated with an increased risk of developing incisional ventral hernias, the incidence of which is 15.2%. This figure is higher after ChE performed for acute cholecystitis (18.1%) compared to chronic cholecystitis (8.5%). [18; 92]. The advantages of traditional ChE are the possibility of intraoperative revision of the extrahepatic bile ducts, probing of the ducts. Currently, traditional cholecystectomy demonstrates high efficiency and is the method of choice for complications of cholelithiasis, such as peritonitis, as well as for complex forms of bile duct pathology. [18; 92].

The disadvantages of TChE include: significant traumatization of the structures of the anterior abdominal wall and a high risk of early and late wound complications, including postoperative ventral hernias (POVH); significant cosmetic defect; a long period of postoperative rehabilitation; the development of adhesions [9;10; 18;19; 78; 94].

In recent years, surgeons have had the opportunity to resort to TChE less often, in particular, thanks to LChE and ChE from the mini-access. Unfortunately, in some cases there is no alternative to TChE. Forced transition to the traditional approach often occurs due to technical difficulties or iatrogenic injuries when performing LChE or ChE from the mini-access [52;71; 89; 113].

§1.2.2. Laparoscopic cholecystectomy

The first laparoscopic cholecystectomy (LChE) was performed by the German surgeon E. Mühe in 1985. Two years later, in 1987, the French surgeon F. Mouret performed the first four-port laparoscopic cholecystectomy in Lyon. [56; 78; 87; 93].

At present, in chronic CCh, the vast majority of AS are removed laparoscopically. LChE has deservedly become the "gold standard" in the surgical treatment of cholelithiasis [42; 53; 57;64;88].

Single-port laparoscopic surgery is designed to reduce the invasiveness of traditional laparoscopy [73;75; 77;78].

However, it is not always possible to perform LChE, which is mainly due to pneumoperitoneum problems in patients with diseases of the cardiovascular and respiratory systems [109]. At the same time, there are still disagreements in determining indications and contraindications [1; 54;75; 77;89].

When performing LChE, a number of surgeons note the presence of many contraindications and note the high cost of equipment and the constant need for consumables [16; 44].

In recent years, as the surgical technique has improved, the previously accepted contraindications to LChE have been canceled [27; 51; 56; 72]. In particular, LChE is not contraindicated in the elderly, class A and B cirrhosis of the liver (but not in decompensation, obesity, pregnancy). Conversion is performed in 5-25% of cases. According to the meta-analysis, the mortality rate in LChE-8-16 per 10000 patients. Bile

duct injuries accounted for 36-74 cases per 10,000 patients and 19-29 cases per 10,000 in traditional CACs [37].

The general complications of the postoperative period after LChE are 3.6-13.3% of cases, with mortality - 0.08-1.2%. In addition, carboxyperitoneum is a serious problem of laparoscopic operations in patients with concomitant diseases of the cardiovascular system [32; 37; 77].

Aliev M.A. et al. (2014) believe that pronounced inflammatory changes in the stomach are the basis for switching to traditional ChE, which reduces the risk of iatrogenic damage to tubular structures [5].

Greyasov V.I. et al. (2018) conducted 14,764 LChEs. A retrospective analysis of the number and causes of intraoperative injuries of extrahepatic VPs was carried out. Three main forms of non-functioning PEP (dropsy, sclerosis and atrophy, total filling with concrements) have been identified, in respect of which a unified therapeutic and diagnostic tactic has been developed. Damage to the stomach and biliary discharge occurred in 38 (0.25%) patients. Parietal wound was noted in 3 (7.8%) patients, complete crossing of the common bile duct in 8 (21%). At the same time, in 6 of them it occurred against the background of sclerosis and atrophy of the stomach, and in another 2 with total filling with concrements. According to the developed tactics, biliary discharge was noted only in 2 (0.04%) patients, and no injuries were observed. Three forms of non-functioning VP have been identified as risk factors (sclerosis, wrinkling, calcification of the VP, obstruction of the cystic duct due to blockage or stenosis, total filling of the BP). Of these, the most technical difficulties arise in sclerosis and atrophy of the gallbladder [27].

Thus, today LChE is deservedly the "gold standard" in the surgical treatment of cholelithiasis, however, the issues of choosing access, determining indications and contraindications for this surgical intervention, as well as finding ways to improve the results, require further research.

§1.2.3. Minilaparotomy cholecystectomy

The prevalence of cholelithiasis among the working-age population ranges from 10 to 20% [20; 127]. In the United States of America, cholelithiasis (cholelithiasis) is detected in 15–20% of the population over the age of 40, and after reaching this age, the incidence

of the disease increases to 50%. [151]. The high prevalence of chronic calculous cholecystitis (ChCCh), the tendency to reduce the average age of patients, the identification of new pathogenesis factors, as well as the significant economic costs of surgical treatment determine the high urgency of this problem [118; 132]. Within the framework of the above, the incidence of ChCCh has a general medical, socio-economic significance [1].

Cholecystectomy (ChE) for complications of chronic calculous cholecystitis (ChCCh) is the most frequently performed operation in both emergency and elective surgery. [37].

Every year, about 2.5 million surgical interventions on the biliary tract are performed in the world, among which cholecystectomy dominates. In Russia, their number is about 110 thousand, in the United States - 700 thousand, in the UK - 45 thousand, and in France - 70 thousand. [22; 34].

Laparoscopic cholecystectomy (LChE) is the most preferred method of surgical treatment of cholelithiasis in most medical centers. This method has a number of advantages, including minimal invasiveness, reduced hospitalization time, reduced pain in the postoperative period and rapid recovery of the patient. However, LChE has certain limitations and cannot be used in patients with concomitant cardiovascular and pulmonary diseases.

In patients with severe cardiovascular pathology, such as coronary heart disease, chronic heart failure or arrhythmias, there is an increased risk of developing complications during and after surgery. This is due to the need for general anesthesia, which can have a negative effect on the cardiovascular system. Pulmonary pathology, including chronic obstructive pulmonary disease (ChOPD), pulmonary emphysema, and pneumonia, is also a contraindication to LChE. Such patients have an increased risk of developing respiratory failure and hypoxia, which can complicate the postoperative period and increase the risk of complications. In such cases, surgeons are forced to resort to the traditional technique of cholecystectomy, which includes a more extensive incision in the abdominal wall. This technique, known as open cholecystectomy, is associated with a higher risk of postoperative complications such as infections, incisional hernias, prolonged

rehabilitation, and increased pain. Thus, the choice of the method of surgical treatment of cholelithiasis should be carried out individually, taking into account all concomitant diseases and risk factors. In some cases, LChE may be contraindicated, and preference is given to open cholecystectomy as a safer and more effective method of treatment.

In recent years, cholecystectomy from a mini-access has been actively used to reduce the trauma of surgical intervention and improve the quality of life of patients. This method is an intermediate option between LChE and traditional cholecystectomy.

However, the widespread prevalence of LChE has led to an increase in the incidence of specific complications, among which bile duct damage (bile duct) is the most significant. According to meta-analyses, the incidence of AS injuries in LChE is 0.5–0.6%, which is 5 times higher than for open cholecystectomy (0.1–0.2%). These injuries significantly affect the quality of life and life expectancy of patients, which requires further study and development of measures to reduce the risk of such complications [29; 40; 63].

According to one estimate, the annual cost of litigation related to VR injuries exceeds $1 billion in the U.S. alone. In this country, 1400-3700 patients per year will suffer from damage to the gallbladder during ChE [139].

Also, in a quarter of cases of ductal injury, blood vessels are also damaged. The right hepatic artery is most often injured in 92%, which leads to necrosis of the right lobe of the liver in 10% of cases [51].

The technique of extraperitoneal access through mini-access has been used since the 1970s to minimize trauma to the abdominal wall. [59; 75; 81; 85; 99].

According to experts, the use of a mini-access for cholecystectomy is justified if there are contraindications to the laparoscopic technique. [59; 81; 85].

The priority in Russia belongs to Prudkov I.D. et al., (1996). Minilaparotomy cholecystectomy (MLChE) using the Mini Assistant instrument set [100].

When performing cholecystectomy by minilaparotomy approach, the main concept is to integrate the advantages of the traditional visual method and laparoscopic technique, which minimizes intraoperative trauma and postoperative complications [78].

For ChE through a mini-access, a transrectal approach up to 4 cm in size is used, and specialized instruments are used during the operation, including a wound dilator with

illumination [13; 72]. However, due to the complexity of the design of the wound dilator, its clinical use has not been widely used.

The ChE technology from mini-access has several advantages over existing methods [78; 100]. This method of cholecystectomy often does not require the use of general anesthesia, which is especially important for elderly patients with severe concomitant diseases. In such cases, intubation anesthesia and carboxyperitoneum may be undesirable, and epidural anesthesia is the only appropriate method of anesthesia. [78].

The use of the technique of minilaparotomic cholecystectomy can significantly reduce the cost of treatment in comparison with laparotomy and laparoscopic cholecystectomy. This is due to the reduction in the duration of surgical intervention and anesthesia support.

The economic efficiency of this technique is confirmed by the fact that the cost of purchasing equipment and implementing minilaparotomy surgery is 5-10 times lower compared to laparoscopic.

Minilaparotomy cholecystectomy provides access to the gallbladder and extrahepatic biliary tract, which minimizes the risk of iatrogenic damage to anatomically important structures and the incidence of postoperative complications. [13; 78].

Aliev D.G. et al. (2014) conducted a study on laparoscopic cholecystectomy (LC) performed through mini-access incisions. Special retractors-wound dilators were utilized, and 4-6 mirrors with adjustable geometry were employed. The average incision size was 5.5 cm. The duration of the procedure varied from 40 to 210 minutes, with a mean of 63.8 ± 2.2 minutes for mini-access LC. In contrast, traditional LC had an average duration of 74 ± 5.7 minutes, ranging from 40 to 150 minutes.

The authors concluded that the primary advantages of LC via mini-access, beyond its minimally invasive nature, include the application of standard surgical techniques, the ability to thoroughly assess the biliary ducts, the feasibility of cholangiography from the inferior aspect, and the capacity to suture the gallbladder bed. Challenges were encountered in the occlusion of the cystic duct. The findings suggest a high efficacy of mini-access cholecystectomy for chronic cholecystitis. Therefore, mini-access LC can be considered a viable, minimally invasive method for treating patients with cholelithiasis.

[5]. When performing a ChE from a mini-access, there is a need to perform conversion in 1.5 - 12.0% of cases [95; 4.5 см99; 101]. A number of surgeons provide data on the use of ChE from a mini-approach in complicated forms of cholelithiasis and choledocholithiasis, which is not corrected by the endoscopic method with satisfactory results. The main contraindication to performing cholecystectomy from a mini-access, according to the authors, is the presence of biliary peritonitis. [74; 153].

Compared to LChE, the incidence of postoperative complications after mini-available ChE is significantly lower and ranges from 1.9% to 4.9%, and the incidence of postoperative mortality ranges from 0.8 to 1.2% [44; 117].

Cholecystectomy (ChE) performed via mini-access offers several advantages. It reduces the risk of postoperative adhesions, allows for "bottom-up" ChE execution, and shortens hospital stay duration. Muscular dissection is avoided; instead, muscles are separated along their fibers. Wound healing is facilitated, leading to rapid recovery with minimal scarring. In cases where conversion to a conventional approach is necessary, the mini-access can be expanded. Additionally, mini-access ChE is preferable for patients with cardiovascular and respiratory diseases. [78; 81; 85].

§1.2.4. Single-port laparoscopic cholecystectomy

In parallel with the development of NOTES, there has been considerable interest in laparoscopic surgery techniques performed through a single incision (single port) of the abdominal wall. [142].

Single-port laparoscopic surgery (LChE) is recognized as a feasible and safe procedure, which represents the next stage in the evolution of minimally invasive surgical techniques [114].

Currently, the advantages and disadvantages of single-port laparoscopic cholecystectomy (LChE) are being actively discussed. In particular, according to a study by Allemann P. et al. [103], the conversion rate did not exceed 2%. The overall complication rate was 5.4%, and the incidence of wound complications ranged from 2% to 10%. The authors concluded that single-port laparoscopic cholecystectomy (LChE) is feasible, but more research is needed to standardize it. Unjustified expansion of the use of

this technique can lead to iatrogenic injuries.

A study by Antoniou S.A. et al. reported that the success rate of uniport laparoscopic cholecystectomy (LChE) is 90.7% and the complication rate is 6.1%. The authors emphasize the need for special caution when performing single-port LChE in patients over 60 years of age with complicated forms of calculous cholecystitis. Similar conclusions were reached by Rawlings A. et al. [105; 140].

Performing cholecystectomy through a single port attracts the attention of surgeons with the least traumatic and cosmetic advantages, but the indications and contraindications for this technique remain not fully understood [106; 111; 119; 148;145].

§1.2.5. Transluminal endoscopic surgery through natural openings

In recent years, abdominal surgery has seen the development of the concept of transluminal endoscopic surgery using the natural orifices of the human body, known as NOTES (Natural Orifice Transluminal Endoscopic Surgery). This approach allows surgical interventions to be performed through natural openings, such as the mouth, vagina, or rectum, without the need for an incision in the abdominal wall [142].

Currently, transgastric, transvaginal and transcolonic methods are used to access the abdominal organs. Transvaginal access was first described by Argentinian gynecologist Tsin D.A. of Mount Sinai Hospital in New York City. In Russia, the first successful transvaginal cholecystectomy was performed in 2008 by Professor K.V. Puchkov [76; 83; 133].

The adoption of NOTES technology has not been widely adopted. The main reason for this is the reluctance of patients to use natural access routes such as the vagina. [108; 142].

Research in the field of NOTES (Natural Orifice Transluminal Endoscopic Surgery) has significantly influenced surgical practice, stimulating specialists to find methods to minimize the number and size of incisions in laparoscopic operations. [142].

In modern abdominal surgery, the NOTES method has a significant advantage in the form of a cosmetic effect. However, there are concerns about minimizing pain after such operations, as well as the risk of severe surgical complications requiring a wide

laparotomy. In addition, the high cost of the equipment used may be an additional factor that reduces interest in this technology.

§1.2.6. Robotic surgery

In 1999, the American Corporation Intuitive Surgical introduced the groundbreaking robotic system known as "Da Vinci," marking a significant advancement in surgical technology. This revolutionary device revolutionized minimally invasive surgery by significantly enhancing the precision, ergonomics, and coordination in surgical interventions. The Da Vinci system integrates advanced robotic manipulators with high-definition endoscopic cameras, allowing surgeons to perform complex procedures with unparalleled accuracy and dexterity.

The system's design incorporates a master console, which provides the surgeon with a three-dimensional (3D) view of the surgical field through high-resolution cameras. These cameras are equipped with articulated lenses that offer a wide field of view and magnification, enabling surgeons to visualize minute anatomical details with exceptional clarity. The robotic arms, driven by the surgeon's hand movements, replicate the surgeon's motions with high fidelity, compensating for the inherent limitations of human hand-eye coordination and fine motor skills.

The Da Vinci system's advanced algorithms and sensors enable real-time feedback and correction, further enhancing the surgeon's ability to perform intricate procedures. The system also incorporates features such as haptic feedback, which provides tactile information to the surgeon, allowing for a more intuitive and precise control of the instruments. This combination of technological innovations has led to improved patient outcomes, reduced postoperative complications, and shorter hospital stays.

Furthermore, the Da Vinci system has been instrumental in expanding the scope of minimally invasive surgery, enabling the performance of procedures that were previously considered too complex or risky for traditional open surgery. The system's ability to access small incisions and manipulate instruments with high precision has facilitated the development of new surgical techniques and the refinement of existing ones.

In summary, the introduction of the Da Vinci robotic system has had a profound

impact on the field of surgery, ushering in a new era of precision and efficiency in minimally invasive procedures. By leveraging advanced robotic technology, high-definition imaging, and real-time feedback, the Da Vinci system has transformed the way surgeons approach complex surgical interventions, ultimately benefiting patients through improved outcomes and reduced recovery times. [26; 76; 97;120].

Summary. Thus, to this day, all clinics in the world widely use ChE from mini-approaches and LChE, where the latter are reasonably considered the "gold standard". Nevertheless, surgeons in certain clinical situations continue to perform ChE using the traditional approach. In our opinion, many surgeons undeservedly limit the use of ChE from mini-access due to the lack of experience. advantages. In this regard, the present study is devoted to determining the role and place of ChE from the mini-access in the surgical treatment of chronic calculous cholecystitis.

CHAPTER II. CHARACTERISTICS OF CLINICAL MATERIAL AND RESEARCH METHODS

§*2.1. Clinical characteristics*

This study analyzed data from 1929 patients with chronic cholecystitis (CCCh) who underwent planned surgical interventions between 2016 and 2021 at the 3rd surgical department of the AndGosMI clinic's Surgery and Urology department. For the purposes of this investigation, the patients were divided into two groups based on the study's objectives.

* Comparison group: 776 patients (40.3%) who underwent surgery between 2016 and 2018 and were retrospectively analyzed.

* Main group: 1153 patients (59.7%) who underwent surgery between 2019 and 2021. This group benefited from enhanced surgical techniques and improved surgical tactics.

The nature of surgical interventions depending on the access used in the groups of patients is presented in Table 2.1.

Table 2.1

Distribution of patients depending on the methods of operations

Type of intervention	**Comparison group (n=776)**		**p**	**Main group (n=1153)**		**Total (n=1929)**	
	abs.	**%**		**abs.**	**%**	**abs.**	**%**
Traditional	75	9,66	0,972	76	6,59	151	7,8
Laparoscopic	536	69,07		715	62,01	1251	64,8
ChE from Mini-Access	165*	21,26		362*	31,40	527	27,3
Total	776	100		1153	100	1929	100

In the comparison group, which included 776 patients, traditional cholecystectomy (TCE) was performed in 75 patients (9.6%), laparoscopic cholecystectomy (LCE) in 536 patients (69.1%), and mini-access cholecystectomy in 165 patients (21.3%). These data

demonstrate various approaches to the surgical treatment of cholecystitis, each with its own advantages and disadvantages depending on the clinical situation and the surgeon's preferences.

In the main study group, which included 1,153 patients, 76 (6.6%) conventional cholecystectomies (TCE), 715 (62.0%) laparoscopic cholecystectomies (LCE), and 362 (31.4%) cholecystectomies via a mini-approach were performed. Of these, 362 operations (31.4%) were performed using a modified mini-approach, which is an optimized technique aimed at minimizing surgical trauma and improving visual control.

When conducting the clinical analysis of the study patients, we used the age group classification recommended by the World Health Organization (WHO, 2021). This classification includes the following categories: adolescence (18 to 24 years), young adulthood (25 to 45 years), middle age (46 to 59 years), old age (60 to 74 years), and geriatric age (75 years and older). Each of these age groups is characterized by specific physiological and biochemical changes, which must be taken into account when interpreting study results and developing therapeutic strategies.

Centenarians (over 90 years old) were not observed in our studies [24].

The distribution of patients by sex and age in the compared groups is presented in Table 2.2. and 2.3.

Table 2.2

Distribution of patients by sex and age in the comparison group

Age (in years)	Comparison group (n=776)						
	Men		R	women		Total	
	Abs	%		ABS	%	ABS	%
18-24	3	2,10	0,9996	35	5,53	38	4,9
25-44	68	47,55		273	43,13	341	43,9
45-59	42	29,37		169	26,70	211	27,2
60-74	17	11,89		111	17,54	128	16,5
from 75 and older	13	9,09		45	7,11	58	7,5
Total	143	18,4		633	81,6	776	100

Table 2.3

Distribution of patients by sex and age in the study group

Age (in years)	Main group (n=1153)						
	Men		R	women		Total	
	ABS	%		ABS	%	ABS	%
18-24	7	3,47	0,9999	66	6,94	73	6,3
25-44	85	42,08		377	39,64	462	40,1
45-59	67	33,17		289	30,39	356	30,9
60-74	28	13,86		154	16,19	182	15,8
from 75 and older	15	7,43		65	6,83	80	6,9
Total	202	17,5		951	82,5	1153	100

Analysis of the data presented in Tables 2.2 and 2.3 demonstrates a significant proportion of young patients (18-44 years) in both study groups. In the comparison group, this age category comprised 379 patients (48.8%), while in the main group, it was 535 patients (46.4%). In the comparison group, the proportion of middle-aged patients (45-59 years) was 211 patients (27.2%), while in the main group this figure was higher and amounted to 356 patients (30.9%). These data indicate a predominance of young patients in both groups, which may indicate specific epidemiological features of the disease under study.

In the comparison group, patients were distributed by age category as follows: 38 patients (4.9%) aged 18-24, 341 (43.9%) aged 25-44, 211 (27.2%) aged 45-59, 128 (16.5%) aged 60-74, and 58 (7.5%) aged over 75. In the main group, the distribution by age category was as follows: 73 patients (6.3%) aged 18-24, 462 (40.1%) aged 25-44, 356 (30.9%) aged 45-59, 182 (15.8%) aged 60-74, and 80 (6.9%) aged over 75.

The data indicate a tendency toward a more uniform distribution of patients across age categories in the primary sample compared to the control group. In both samples, individuals aged 25-44 and 45-59 years constitute the largest demographic segment, which aligns with the general population structure. Notably, the primary group exhibits a higher

proportion of younger patients (18-24 years; 6.3% compared to 4.9% in the control group) and a lower proportion of older patients (≥75 years; 6.9% compared to 7.5% in the control group).

This distribution may indicate a more active inclusion of younger and older patients in the main group compared to the comparison group, which may be due to different selection criteria or the specific nature of the phenomenon being studied. A more detailed analysis requires consideration of additional factors, such as socioeconomic status, lifestyle, and the presence of comorbidities.

Age-related features such as polymorbidity, comorbidity, and sarcopenia significantly complicate the surgical treatment of patients with cholelithiasis (ChL). Polymorbidity, or the presence of several chronic diseases in one patient, leads to an increase in the number of potential complications and increases the risk of an adverse outcome of the operation. Comorbidity, in turn, means a combination of different diseases that can interact and reinforce each other, creating a additional difficulties in diagnosis and treatment. Sarcopenia, characterized by a loss of muscle mass and strength, also plays an important role in worsening surgical outcomes, as it reduces the patient's physical endurance and increases the risk of postoperative complications such as hypotension, pneumonia, and pressure ulcers. It was also found that women are more likely to get sick (in the comparison group - 81.6%; in the main group - 82.5%, with a ratio of 4:1).

The duration of the history in this group of patients had a significant impact on the assessment of risk factors. The duration of cholelithiasis correlated with an increase in the frequency of unfavorable conditions for the body's adaptation to the progressive increase in the number of complications in both the pre- and postoperative periods. This is due to the fact that the chronic course of the disease leads to structural and functional changes in the liver, biliary tract and other organs, which reduces their compensatory capabilities and increases the likelihood of postoperative complications. In addition, long-term cholecystitis contributes to the development of concomitant diseases, such as chronic pancreatitis, cholecystitis and dysfunction of the sphincter of Oddi, which further complicates the rehabilitation process of patients.

The distribution of patients in the compared groups by the duration of anamnesis is

presented in Table 2.4.

Table 2.4

Distribution of patients in the compared groups by duration of the disease

	Prescription of the disease				**Total**	
Groups	**Up to 1 year**		**1-5 years**		**(n=1929)**	
	ABS	%	ABS	%	ABS	%
Comparisons	274	35,3	502	64,7	776	40,2
p	p<0.05		p<0.05			
Main	439	38,1	714	61,9	1153	59,8

R	CI 95%		Hi2	R
	Bottom	Top		
0.93	0.77	1.13	1.34967	0.245336

The distribution of disease duration was analyzed in the two study cohorts, as shown in Table 2.4. In the comparison group of 776 patients, 274 (35.3%) had disease duration of less than one year, while 502 (64.7%) had disease duration between one and five years. In the main group of 1,153 patients, 439 (38.1%) had disease duration of less than one year, and 714 (61.9%) had disease duration of one to five years.

Statistical analysis revealed no significant differences in disease duration distribution between the two groups ($p > 0.05$). This finding indicates that the study cohorts are comparable regarding disease duration, which is crucial for an accurate comparative analysis of treatment efficacy.

For a more detailed statistical analysis, a series of tests were conducted, including the chi-square test for categorical data and the Mann-Whitney test for continuous variables. The results of these tests further confirmed the absence of statistically significant differences between groups ($p > 0.05$), further confirming the comparability of the samples and the validity of further comparison of therapeutic approaches. The study described in detail the nature and frequency of concomitant therapeutic and combined surgical pathologies. Various types of therapeutic diseases were analyzed, such as chronic

inflammatory processes, autoimmune disorders, endocrine disorders and cardiovascular pathologies. Particular attention is paid to concomitant surgical interventions, including operations on the organs of the abdominal cavity, chest, musculoskeletal system and nervous system. This data allows for a more accurate assessment of the risk of complications, optimization of the treatment plan, and improvement of the prognosis for patients. Table 2.5., 2.6.

Table 2.5

Nature and frequency of therapeutic pathology in the compared groups

Concomitant pathology	**Gr. Comparisons (n=776)**		**The main group. (n=1153)**		**Hi2**	**R**
	ABS	**%**	**ABS**	**%**		
coronary heart disease.: Stable stenocardy. Atherosclerosis	73	25,3	191	33,4	742	0,99966296
Hypertension	75	26,0	138	24,1		
Bronchopulmonary diseases	35	12,2	62	10,8		
Diseases of the urinary system	50	17,4	66	11,5		
Anemia	55	19,1	115	20,1		
Total	288	36,8	572	49,6		

As can be seen from Table 2.5., cardiovascular diseases are the leading concomitant therapeutic pathologies in the comparison group. Thus, coronary artery disease in the form of angina pectoris and atherosclerosis was diagnosed in 73 (9.4%) patients of the comparison group and in 191 (16.5%) of the study group, and hypertension was diagnosed in 75 (9.7%) patients of the control group and in 138 (12.0%) of the study group. It should

be noted that the rate of anemia is relatively high, which was diagnosed in 55 (7.1%) patients of the comparison group and in 115 (10.0%) of the main group of patients.

Various forms of bronchopulmonary inflammatory diseases were diagnosed in 35 (4.5%) patients of the comparison group and in 62 (5.4%) patients of the study group, as well as inflammatory diseases of the genitourinary system were diagnosed in 50 (6.4%) and 66 (5.7%) patients, respectively.

Various types of gynecological operations in the form of uterine amputation were performed in 3 (0.4%) and 5 (0.4%) patients, as well as cystectomy in 9 (1.1%) and 10 (0.8%) patients, respectively.

The frequency of concomitant surgical diseases in the groups of patients is presented in Table 2.6.

Table 2.6

Nature and frequency of surgical pathology in the compared groups

Combined pathology	Comparison group (n=776)		Main group (n=1153)		Hi2	R
	abs.	%	abs.	%		
Echinococcosis of the liver	5	0,6	9	0,7	71,5	0,99976
duodenal ulcer	1	0,1	2	0,2		
Ovarian cyst	9	1,1	10	0,8		
Uterine fibroids	3	0,4	5	0,4		
Umbilical hernia	5	0,6	3	0,3		
Inguinal hernia	3	0,4	2	0,2		
Total	25	3,2	31	2,7		

As evidenced by Table 2.6, a significant proportion of patients in both the comparison and study groups presented with concomitant surgical pathologies necessitating simultaneous operations. Specifically, 25 (3.2%) patients in the comparison group and 31 (2.7%) patients in the study group were identified with such conditions. In the comparison group, the most frequently encountered simultaneous surgical procedure was traditional echinococcectomy, which was performed in 5 (0.6%) patients. Conversely, in the study group, echinococcectomy was also performed in 9 (0.7%) patients. Additionally, hernioplasty was conducted in 8 (1.0%) patients, while a more specialized procedure,

laparoscopy-assisted hernioplasty, was performed in 5 (0.4%) patients. These findings highlight the diverse nature of surgical interventions required in these patient populations, underscoring the importance of a multidisciplinary approach to surgical management.

When developing a surgical treatment strategy, it is necessary to take into account the complex of clinical symptoms that characterize this pathological condition. A thorough analysis of clinical manifestations makes it possible to determine the pathophysiological mechanisms of the disease, identify key diagnostic criteria and develop an optimal surgical intervention plan. In the process of making a tactical decision, both subjective complaints of the patient and objective data obtained during physical examination, laboratory tests and instrumental studies should be taken into account. An integrated approach to the analysis of clinical symptoms provides a more accurate diagnosis, minimizes the risks of complications and increases the effectiveness of surgical treatment. (Table 2.8).

In the comparison group, pain in the right hypochondrium was detected in 662 patients (85.3%), and in the study group – in 975 (84.6%). In the epigastric region, pain was observed in 114 patients (14.8%) in the comparison group and in 178 (15.4%) in the study group. These data indicate a high incidence of pain syndrome in the right hypochondrium in both groups, which may indicate the presence of common pathological processes. At the same time, a slight difference in the frequency of pain in the epigastric region between the groups may indicate a different degree of involvement of the gastric and duodenal parts of the digestive tract. For a more detailed analysis, it is necessary to conduct additional studies, including morphological, functional and laboratory diagnostic methods. This will make it possible to establish the exact mechanisms of the development of pain syndrome and determine the most effective methods of treatment.

Radiation of pain to the right shoulder blade and shoulder in 348 (45.4%) and 564 (48.9%) patients, to the back and lumbar region in 212 (27.7%) and 289 (25.1%) patients, without radiation in 125 (16.1%) and 168 (14.6%) patients, and in the heart area in 91 (11.8%) and 132 (11.4%) patients, respectively.

Table 2.8

Clinical symptoms of cholelithiasis

Symptoms	groups of patients				
	comparisons (n=776)		R	Main (n=1153)	
	ABS	%		ABS	%
1. Pain syndrome:					
a) moderate	694	89,4	0,97	977	84,7
b) intensive	82	10,6		176	15,3
2. Localization of pain:					
a) in the right hypochondrium	662	85,3	0,97	975	84,6
b) epigastria	114	14,7		178	15,4
3. Radiation of pain in:					
a) the right shoulder blade and shoulder	348	44,8	0,99	564	48,9
b) back and lumbar region	212	27,3		289	25,1
c) without radiation	125	16,1		168	14,6
d) heart area	91	11,7		132	11,4
4. Dyspeptic disorders:					
3. Nausea	86	11,1	0,99	163	14,1
4. Vomiting	63	8,1		102	8,8

As can be seen from Table 2.8., the clinical symptom complex in cholelithiasis consisted of painful, general, and local symptoms. At the same time, we revealed the following picture: in the comparison group, pain syndrome with moderate pain was established in 694 (89.4%) patients, in the main group - in 977 (84.7%), while intense pain was revealed in 82 (10.6%) and 176 (15.3%) patients, respectively.

In the study of dyspeptic disorders, in the comparison group, nausea was diagnosed in 86 (11.1%) patients, while in the study group this symptom was observed in 163 (14.2%) participants. Vomiting was detected in 63 (8.1%) patients in the comparison group and in 102 (8.8%) in the study group.

These results indicate a higher incidence of dyspeptic manifestations in the study group, which may be due to various factors, including pharmacological exposures, comorbidities, or lifestyle. Further analysis of the data will allow us to more accurately determine the etiological mechanisms and develop effective strategies for the prevention

and treatment of these symptoms.

§2.2. INVESTIGATIONS

The inherent human inclination to obtain comprehensive information about gallbladder and biliary tract pathologies has resulted in the development of numerous diagnostic techniques of varying complexity. Consequently, diagnostic protocols often incorporate multiple methods, including those that may be redundant, which do not always yield fundamentally new insights but significantly prolong the preoperative assessment period, leading to patient fatigue and occasionally resulting in refusal of urgently required surgical intervention.

This has created a tension between the deontological aspects of diagnostic practice and the practical efficiency of employing multiple diagnostic modalities.

The diagnostic process encompassed standard and specialized radiological techniques: ultrasonography of the hepatobiliary region, and X-ray procedures (selected based on clinical indications, such as oral cholecystography, intravenous cholangiography, and endoscopic retrograde pancreaticocholangiography), as well as fibroscopic esophagogastroduodenoscopy and magnetic resonance imaging.

§2.2.1. Ultrasound examination (USE)

An ultrasound examination of the hepatobiliary system was performed using a high-precision ALLOKA SSD-620 diagnostic system with a linear transducer operating at 3.5 MHz. The study included a comprehensive multiparametric assessment of the morphological and functional characteristics of the gallbladder (GB).

During the ultrasound, special attention was paid to the following key parameters:

1. Linear dimensions of the GB: The parameters of length, width, and anteroposterior diameter were analyzed, taking into account anatomical standards and individual patient characteristics.

2. Thickness and echogenicity of the GB walls: Hyperechoic and hypoechoic changes, as well as the presence of structural heterogeneity, were assessed in detail.

3. GB wall structure: Deformations, thickenings, and signs of infiltration, including the presence of calcifications and fibrous changes, were examined. 4. Presence of calculi (stones): The size, number, and location of stones were analyzed, taking into account their

echogenicity and acoustic shadowing.

5. Bile duct diameter: The intrahepatic and extrahepatic bile ducts were assessed in detail, taking into account possible signs of biliary hypertension.

6. Liver size and structure: The echogenic and echostructural characteristics of the liver, as well as the organ contours, were studied, taking into account possible signs of pathological changes.

Additional studies were also conducted to identify signs of cholestasis, biliary hypertension, and inflammatory changes. Particular attention was paid to the presence of bile stasis, which may indicate biliary dysfunction.

Computer-assisted ultrasound (US)

Ultrasound examination of the gallbladder and biliary tract is an important diagnostic method, allowing for detailed imaging of these structures. The ultrasound image creation process involves several key steps.

1. Data acquisition: Ultrasound waves emitted by the transducer penetrate body tissue and reflect off the boundaries of various structures. These reflected waves are recorded by the transducer and converted into analog signals.

2. Analog-to-digital conversion (ADC): Analog signals received from the transducer are transmitted to the central processing unit (CPU) via a high-performance analog-to-digital converter (ADC). Modern ADCs feature high resolution and accuracy, minimizing information loss during conversion.

3. Graphics processing: The converted digital data is transferred to a graphics card equipped with at least 8 MB of video memory. This configuration provides sufficient bandwidth for efficient processing of large volumes of data, which is critical for complex diagnostic tasks. 4. Digital Image Processing: The resulting digital images are processed using specialized software, such as ATI Video Player. This software utilizes digital image processing algorithms, including filtering, contrasting, and segmentation methods. These algorithms improve the visualization of structures, increasing their clarity and detail, which is critical for accurate diagnosis.

5. Automatic Measurement: The software features automatic measurement of the linear and volumetric parameters of the examined objects. This significantly improves

diagnostic accuracy and minimizes the risk of erroneous data interpretation, which is especially important in complex clinical cases.

6. Integration with Medical Databases: Modern ultrasound diagnostic systems are integrated with medical databases, allowing physicians to quickly access the patient's medical history and compare current results with previous data.

Thus, the use of computer support in ultrasound examinations significantly increases the level of diagnostic information and reliability, facilitating more accurate and timely diagnosis and the selection of optimal treatment strategies.

§2.2.2. Fibrogastroduodenoscopy (FGDS) was performed using a high-resolution, advanced-generation fibrogastroduodenoscope manufactured by the Japanese company Olympus. This state-of-the-art endoscopic technique was utilized to achieve a precise and comprehensive diagnosis of the combined pathology affecting the gastrointestinal tract, specifically the stomach and duodenopancreatic complex (DPC), in patients with cholelithiasis. The application of this sophisticated medical device enabled detailed visualization and histological examination of the gastrointestinal mucosa at a microscopic level, facilitating accurate identification, characterization, and quantification of the pathological changes associated with gallstone disease. The high-resolution imaging capabilities of the Olympus FGDS system, combined with advanced endoscopic imaging techniques such as chromoendoscopy and narrow-band imaging, significantly enhanced the diagnostic accuracy and sensitivity of the procedure. Additionally, the use of advanced endoscopic tools, such as biopsy forceps and endoscopic ultrasound (EUS), allowed for the acquisition of histopathological samples and the assessment of the surrounding tissues, providing a more complete understanding of the underlying pathophysiology of the disease.

§2.2.3. Magnetic resonance imaging (MRI). The study was conducted using a high-field magnetic resonance imaging (MRI) system, the Magnetom OPEN viva, manufactured by Siemens, a leading German medical equipment manufacturer. This advanced diagnostic tool offers a high spatial resolution of up to 1 mm and exceptional sensitivity to changes in tissue magnetic susceptibility, making it particularly valuable for solving complex diagnostic problems.

Magnetic resonance imaging (MRI) is based on the phenomenon of nuclear magnetic resonance (NMR). During MRI, hydrogen protons in biological tissue are exposed to a strong magnetic field and radiofrequency (RF) pulses. As a result of this exposure, the hydrogen protons change their spatial orientation relative to the direction of the magnetic field. When the RF pulses are removed, the protons return to their original state, emitting excess energy in the form of electromagnetic waves with a characteristic frequency. These waves are recorded by special sensors, converted into electrical signals, and processed using mathematical algorithms, creating detailed three-dimensional images of the body's internal structures.

One of the key advantages of MRI is its ability to visualize soft tissue with high contrast, making it indispensable for diagnosing diseases of the nervous system, musculoskeletal system, internal organs, and blood vessels. Furthermore, MRI allows for functional magnetic resonance imaging (fMRI), which is used to study brain activity and metabolic processes in real time.

It should be noted that MRI does not use ionizing radiation, making it safe for repeated use and the preferred diagnostic method in pediatrics and obstetrics.

Statistical processing of the data obtained during the study was performed using specialized software tools such as Epi Info, R Commander, and Microsoft Excel 2021. Various statistical methods, including parametric and nonparametric tests, were employed in analyzing and interpreting the data. Specifically, the chi-square (χ^2) test, calculated using the Pearson formula, and the Student's t-test for independent and paired samples were used to assess the statistical significance of differences between groups and identify relationships.

For a more detailed analysis and visualization of the data, descriptive statistics were used, such as determining the mean, median, mode, standard deviation, and coefficient of variation. In addition, multivariate analysis methods, including factor analysis and clustering, were employed to identify latent patterns and structure in the data.

Regression analysis methods were also used to model relationships between variables and predict results. In particular, linear and logistic regressions were used to analyze quantitative and qualitative data, respectively. Hypothesis testing and bootstrapping were

used to assess the reliability and validity of the results.

Thus, comprehensive statistical processing of the data allowed us to obtain objective and valid conclusions that can be used for further research and the development of practical recommendations.

Summary of the chapter. Summary of the chapter. The meticulous analysis of the clinical material presented herein provides a robust foundation for a comprehensive assessment of the clinical groups involved. By employing traditional research methodologies, the diagnostic accuracy is significantly enhanced, allowing for the selection of the most efficacious access strategy tailored to the unique characteristics of each individual case.

The application of high-energy focused ultrasound (HEFU) from a mini-access approach necessitates continuous scientific investigation and refinement of tactical and technical protocols to facilitate broader implementation in clinical practice. This iterative process of research and optimization is paramount for maximizing the efficacy and safety of HEFU procedures. Through rigorous scientific inquiry and iterative improvements, the potential of HEFU to enhance patient outcomes and therapeutic efficacy can be fully realized.

The integration of advanced imaging techniques, such as magnetic resonance imaging (MRI) and computed tomography (CT), further enhances the precision and reliability of the mini-access approach. These imaging modalities provide detailed anatomical and functional information, allowing for more accurate preoperative planning and real-time guidance during the procedure. This synergistic combination of advanced imaging and focused ultrasound technology represents a significant advancement in minimally invasive medical practice.

Furthermore, the development of novel ablation techniques, such as high-intensity focused ultrasound (HIFU), offers promising avenues for the treatment of various medical conditions. HIFU utilizes focused ultrasound energy to induce thermal ablation in targeted tissues, providing a non-invasive alternative to traditional surgical interventions. The ability to selectively ablate tissues with precise spatial and temporal control opens up new possibilities for the treatment of tumors, vascular malformations, and other pathological

conditions.

In conclusion, the comprehensive analysis of clinical material, coupled with the application of advanced research methodologies and technologies, underscores the potential of mini-access procedures, including HIFU, to revolutionize medical practice. By continually refining these techniques through rigorous scientific inquiry, the field of minimally invasive medicine can achieve unprecedented levels of precision, efficacy, and safety, ultimately leading to improved patient outcomes and enhanced therapeutic efficacy.

CHAPTER III. SURGICAL TACTICS IN CHRONIC CALCULOUS CHOLECYSTITIS IN THE COMPARISON GROUP

§3.1. The character of the operations performed in chronic calculous cholecystitis in the comparison group

This chapter is devoted to the nature of the operations performed and its results *in chronic cholelithiasis and choledocholithiasis in the comparison group.*

§3.1.1. character and analysis of cholecystectomy in "traditional" methods

The distribution of patients depending on the "traditional" access is presented in Table 3.1.

Table 3.1

Distribution of patients with "traditional" access

Access	Number of patients (n=75)	
	Abs	%
Upper-middle	23	30,7
According to Fedorov	52	69,3
Total	75	100

As can be seen from Table 3.1., in the comparison group, traditional ChE was performed in 75 patients. Upper median laparotomy was used as an access in 23 (30.7%) patients. Traditional ChE with the right subcostal approach was performed in 52 (69.3%) patients.

The nature of the operations performed using "traditional" access is presented in Table 3.2.

As can be seen from Table 3.2., TChE was performed only in 57 (76.0%) patients, and resection of the gallbladder was performed in 4 (5.3%) patients. It should be noted that resection of the gallbladder was performed with a shrunken and intrahepatic location

of the gallbladder. Along with TChE, 14 (18.7%) patients underwent simultaneous operations.

Table 3.2

The character of the operations performed in the comparison group

Type of operation	Number of patients (n=75)	
	Abs	**%**
Cholecystectomy	57	76,0
Resection of the bladder	4	5,3
ChE + echinococcectomy	4	5,4
ChE + hernia repair	6	8,0
ChE + gastric resection	1	1,3
ChE + uterine amputation	3	4,0
Total	75	100

3.1.2. Character and analysis of laparoscopic cholecystectomy

In our clinical trials, in the absence of complications, laparoscopic cholecystectomy (LChE) was performed in 536 patients. Intraoperative iatrogenic injuries, including bleeding from the gallbladder bed (GB), choledochus, and intestinal wall, required conversion in 76 patients (14.2%). In 40 cases (7.5%), conversion to open cholecystectomy was performed, which was due to the need to control and stop bleeding, as well as to eliminate damage to the walls of organs.

Analysis of the causes of iatrogenic injuries showed the need for complete differentiation of atypical tubular structures and the need to observe the previewedness of surgical technique.

The nature of surgical interventions in the performance of LChE is presented in Table 3.3.

As can be seen from Table 3.3, in the comparison group, in 450 (83.9%) cases, LChE was performed. In 1 (0.2%) case, ChE was resected by laparoscopy, and in 9 (1.7%) cases, ChE was performed by ovarian cystectomy.

In the analysis in the comparison group, a number of tactical and technical omissions were identified. Thus, in 11 patients, TChE was performed against the background of severe concomitant diseases, which in the postoperative period led to death in 4 (5.3%) patients.

Table 3.3

The character of surgical interventions in LChE

Types of operations	Number of patients (n=536)	
	ABS	%
Cholecystectomy	450	83,9
resection of the stomach	1	0,2
LChE + ovarian cystectomy	9	1,7
iatrogenic injuries	76 (40)	14,2
Total	536	100

Note: in () the number of patients with conversion.

In 76 (14.2%) patients, the desire for the mandatory use of minimally invasive access led to iatrogenic injuries, of which 4 (0.7%) cases were fatal. In 7 cases, insufficient preoperative preparation against the background of cirrhotic liver damage led to bleeding from the gallbladder bed, which was successfully stopped during surgery. In addition, during the period of mastering the cholecystectomy (ChE) technique, the patient's anthropometric parameters were not assessed from the mini-access, which could also contribute to the development of complications.

In general, the postoperative period in 23 patients (3.0%) was complicated by the failure of the anastomosis of the stump of the cystic duct, which led to the development of biliary fistula in 11 patients (1.42%). In one case (0.13%), the patient was diagnosed with a subhepatic abscess and 5 patients (0.64%) developed intestinal paresis. These complications may be associated with technical errors in the performance of surgery, inflammatory processes in the area of the surgical wound, as well as with the presence of concomitant diseases in patients. Failure of the anastomosis of the stump of the cystic duct can be caused by insufficient hemostasis, impaired microcirculation in the area of the anastomosis or infectious complications. A biliary fistula can form due to incompetence

of sutures or infiltrative changes in the anastomosis. A subhepatic abscess is a serious complication that requires immediate surgical intervention. Intestinal paresis can be caused by various factors, including injury to nerve endings, ischemia of the intestinal wall, or infectious processes. To prevent and timely treat postoperative complications, it is necessary to carefully monitor patients, diagnose and treat emerging complications in a timely manner, as well as prevent infectious and inflammatory processes.

In 8 (1.03%) patients, the postoperative period was complicated by thromboembolic complications, including 4 acute thrombophlebitis of the veins of the lower extremity. 1 (0.1%) patient developed a fatal PE on day 5. The analysis showed that the prevention of thromboembolic complications was not carried out at the proper level.

A retrospective analysis of the results of surgical treatment in the control group revealed a number of tactical and technical errors that significantly affected the outcome of the operations. These errors include:

1. Frequent use of the right-sided subcostal approach, accompanied by crossing of the right rectus abdominis muscle, which led to an increase in the risk of developing incisional hernias due to disruption of anatomical and functional connections and potential weakening of muscular-aponeurotic structures.

2. Insufficient consideration of morphological changes in the gallbladder (GB), such as the degree of its deformation, the presence of pericholecystitis, as well as the size and location of concrements. This led to the choice of inadequate surgical tactics and an increase in the risk of complications.

3. The use of nylon thread in ligation and mobilization of the stump of the biliary stump, which increased the likelihood of the development of a biliary fistula in the postoperative period due to biological inertia and a tendency to ligature abscess.

4. The desire for low-traumatic access in laparoscopic cholecystectomy (LChE) often led to conversion to open cholecystectomy (ChE) due to technical difficulties, such as pronounced inflammation, cicatricial changes or anatomical features.

5. Performing LChE in patients with shrunken gallbladder, which increased the risk of bleeding from the liver bed due to damage to small vessels and capillaries, as well as due to the risk of liver perforation during trocar insertion.

6. Use of cholecystectomy from a mini-access without prior assessment of the patient's constitutional features, which could lead to insufficient visualization of the surgical field and an increase in the risk of complications due to limited working space.

7. The use of reusable needles when suturing the skin, which increased the risk of purulent-septic complications, such as ligature fistulas, due to possible contamination of the needles and infection of the wound.

8. The implementation of multiple preoperative diagnostic procedures, which often yield redundant or non-novel information, results in inefficient resource utilization and extended preoperative preparation times. These extensive diagnostic protocols significantly prolong the preoperative evaluation period, leading to patient fatigue and, in some cases, prompting patients to decline urgently required surgical interventions. Consequently, there is a tension between the patient-centered approach to diagnosis and the practical necessity of employing numerous diagnostic methods.

Retrospective analysis of the identified omissions in the comparison group allowed us to significantly improve the therapeutic and diagnostic algorithm and modify the surgical technique of cholecystectomy (ChE) from a mini-access. As a result, more effective imaging techniques have been introduced, minimizing injuries and reducing the risk of postoperative complications. These changes have made it possible to optimize surgical tactics, improve surgical outcomes, and improve the quality of life of patients.

§3.1.3. Character and analysis of cholecystectomy for mini-access

The nature of surgical interventions for cholecystectomy from the improved mini-access is presented in Table 3.4.

As can be seen from Table 3.4, out of 165 cases of ICE from the mini-access, 147 (89.1%) patients performed in isolation, and in sclerosis and shrunken VP - in 4 (2.4%) patients resection of the PEP was performed, in 4 (2.4%) patients simultaneous operations were performed. Access conversion was performed in 10 (6.1%) patients.

Table 3.4

The nature of surgical interventions for ChE from mini-access

Types of surgery	Number of patients (n=165)	
	ABS	**%**
Cholecystectomy	147	89,1
Resection of the bladder	4	2,4
ChE + echinococcectomy	1	0,6
ChE + hernia repair	2	1,2
ChE + removal of the ovary	1	0,6
Conversion to "traditional" access	10	6,1
Total	165	100

Thus, in the group of comparison of ChE from the mini-approach, 165 (21.3%) patients were performed, where the frequency of simultaneous operations was only 4 (2.4%) cases.

It should be noted that prior to the introduction of the developed method of ChE from a modified mini-access into clinical practice, we in the comparison group used a mini-approach according to the clinic's methodology, which differed in the use of the original design in the main group of instruments (the clinic's method of incision 7-8 cm, modified mini-access of 4 cm).

§3.1.4. Modified method of cholecystectomy from mini-access (Patent of the PV of the Republic of Uzbekistan - IAP 07410 dated 17.05.2023).

The invention relates to medicine, namely in the surgical treatment of chronic calculous cholecystitis (ChCCh). It is well known that the results of surgical treatment depend on surgical access.

"Traditional" ChE is accompanied by a postoperative scar, often 15-20-25 cm long, dissection of the right rectus abdominis muscle, which has a certain frame function (back – spine, front – rectus abdominis muscles) and along a significant length of the lateral muscles, which is accompanied by significant tissue trauma and innervation disorders.

Significant tissue injury appears with a more pronounced pain syndrome in the postoperative period, violation of the frame function, and is often the reason for longer rehabilitation. In addition, a higher frequency of wound suppuration and the occurrence of incisional hernias are diagnosed.

Based on a detailed analysis of the shortcomings of traditional methods of cholecystectomy, an innovative method of surgical intervention through mini-access was developed and implemented. This approach, based on the principles of minimally invasive surgery, has significantly improved the visualization of the surgical field, reduced trauma and shortened the recovery period of patients. In the course of further research, specialized surgical instruments, such as ultrasonic scissors and laparoscopic staplers, were developed and introduced, which significantly increased the effectiveness and safety of surgical interventions for cholelithiasis. The introduction of these technologies has minimized the risk of complications, accelerated postoperative recovery and improved the quality of life of patients. The modified method of cholecystectomy was used in 362 (31.40%) cases of cholelithiasis.

The method of ChE by transrectal mini-access is known - see Prudkov M.I. [72].

A method for performing cholecystectomy (ChE) using a transrectal mini-approach is well-known and has been described in detail in the scientific literature, including the works of M.I. Prudkov. This technique is characterized by minimally invasive interventions, which significantly reduces tissue trauma and accelerates the patient's recovery.

The transrectal mini-approach is based on the use of specialized instruments and surgical techniques to access the gallbladder through the rectum. This approach minimizes the need for large incisions in the anterior abdominal wall, significantly reducing the risk of infectious complications, cosmetic defects, and postoperative pain.

This technique utilizes videoendoscopic technology, providing high-quality visualization of the surgical field. This allows the surgeon to perform manipulations with a high degree of precision, especially when working in hard-to-reach areas such as the retroperitoneal space.

The use of a mini-approach in cholecystectomy helps reduce the incidence of

postoperative complications, including postoperative hernias and adhesions, due to less tissue trauma. This results in a shorter hospital stay and reduced need for analgesics.

Furthermore, this method is preferred for patients with high surgical risk, including the elderly with comorbidities. This is due to the reduced invasiveness of the procedure, making transrectal mini-cholecystectomy attractive to a wide range of patients and medical institutions.

The transrectal mini-access technique also includes the use of specialized instruments, such as trocars and endoscopes, allowing access to the gallbladder with minimal damage to surrounding tissue. This reduces the risk of bleeding and other complications associated with trauma.

Videoendoscopic technology facilitates real-time intraoperative visualization, enhancing procedural accuracy and mitigating the risk of organ and vascular injury. This is particularly significant in intricate anatomical regions, such as the subhepatic space.

Minimized tissue trauma and reduced hospital stay contribute to accelerated patient recovery post-surgery. This is attributable to decreased physiological stress and a lower incidence of postoperative complications.

Thus, the transrectal mini-approach is a modern and effective method for performing cholecystectomy, combining minimally invasive interventions, high precision, and a significant improvement in patients' quality of life after surgery.

The disadvantages of transrectal access are nerve damage when the fibers of the rectus muscle are spread, which leads to atrophy of the medial part of the rectus muscle. This mini-access causes difficulty in patients with an asthenic physique.

The prototype is the method of mini-access in cholecystectomy, which is the closest in terms of technical implementation and results (see patent RU No 2188584, 2002).

The disadvantages of this method are:

Rectus abdominis muscle (RAM) dissection is a mandatory surgical procedure for lateral gallbladder (GB). This anatomical variation, characterized by a GB displacement away from the midline, is most often observed in patients with a hypersthenic body type. Hypersthenic body type is determined by an elevated body mass index (BMI), increased abdominal volume, and altered organ topography. These anatomical features are caused

by excess fat deposition and structural changes in connective tissue.

With lateral gallbladder dissection, standard surgical approaches such as laparotomy and mini-laparotomy may be difficult due to anatomical changes. This is especially true in the presence of a subhepatic infiltrate. A subhepatic infiltrate is a pathological accumulation of biological materials, such as exudate, inflammatory cells, proteins, and other components, in the hepatoduodenal ligament and subhepatic space. It can be caused by chronic inflammatory processes, such as chronic cholecystitis, or infectious diseases, including cholangitis.

A subhepatic infiltrate significantly complicates surgical intervention. It requires more thorough preoperative preparation, including imaging using ultrasound (US) and computed tomography (CT). These methods allow assessment of the volume and structure of the infiltrate, which is important for planning the surgical approach and minimizing the risk of complications. The presence of a subhepatic infiltrate increases the risk of bleeding and infection during surgery. This requires a high level of professionalism and experience in laparoscopic surgery, as well as knowledge of anatomy and pathophysiology.

Furthermore, the infiltrate can cause adhesions, which complicates manipulation of abdominal organs and increases operative time. In such cases, the use of additional surgical instruments, such as electrocautery and ultrasonic scissors, may be necessary for safe tissue dissection.

A hypersthenic physique can also affect surgical approaches. Patients with this body type often have a thicker layer of subcutaneous fat and denser muscle tissue, which requires more aggressive surgical techniques to ensure adequate access to the abdominal organs. In such cases, dissection of the PMA allows you to expand the surgical field, improve visualization, and provide safer and more effective access to the abdominal tissue.

The purpose of the invention is to increase the efficacy of cholecystectomy (ChE) from the mini-access in patients with different body types while reducing trauma, improving the cosmetic effect of the scar and reducing the time of surgery. The technical result is the versatility of the incision for patients with different body types and gallbladder locations.

The method of performing ChE from mini-access includes the following stages:

The patient is placed on the operating table in a supine position with the upper torso raised by 35-40 degrees relative to the table.

The operating table is tilted 20-30 degrees to the left, which contributes to the displacement of internal organs from the area of projection of the gallbladder.

Course of the operation.

When using this mini-approach, the skin incision is made parallel and 1.5 cm below the right costal arch, its length is up to 4 cm, which corresponds to the projection of the cystic sinus. (*the width of the generally accepted hepatic wound dilators is 5 cm, an incision of at least 7-8 cm is required for the operation)* (Fig. 3.1).

In the obliquely transverse direction, 1/2 part of the anterior vaginal leaf of the rectus abdominis muscle is dissected, which is pushed back medial by the short edge of the Farabef hook and 1/2 part of its posterior leaflet is dissected *(in traditional cholecystectomy, the right rectus muscle is crossed, which disrupts the frame function of the anterior abdominal wall, and is also the cause of the formation of postoperative hernias, which are excluded with a mini-access with the preservation of the right rectus abdominis muscle)*. Aponeurosis of the external oblique muscle and the transverse abdominal muscle are separated by blunt method, using fingers or special instruments to minimize damage to the surrounding tissues. The peritoneum is grasped with Mikulich's clamps on both sides of the wound, providing reliable fixation and preventing bleeding. Then a longitudinal dissection of the peritoneum is made in the direction of both lateral corners of the wound, providing access to the internal organs and structures of the abdominal cavity. (Fig. 3.2).

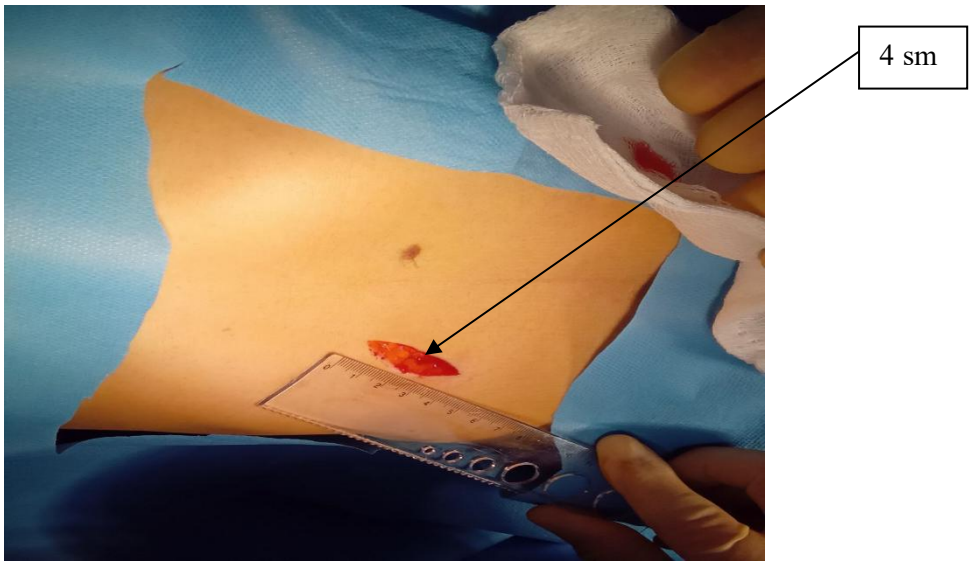


Fig. 3.1. Skin incision with subcutaneous fat.

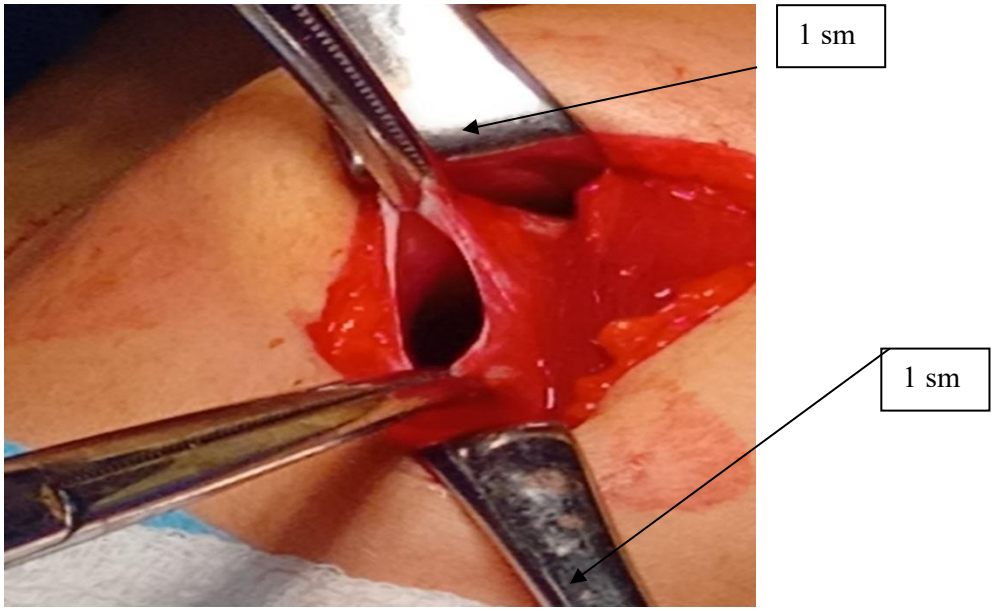


Fig. 3.2. Opening of the peritoneum.

The bottom of the gallbladder is taken into the Luer clamp and slightly pulled into the wound. Alternately, 2-3 Cooper napkins are inserted into the wound cavity. 2 instruments *(which are used for the first time in our Republic) are placed above them in the medial corner of the wound and from the side of the lower edge. and the length is 25 cm (the width of conventional retractors is 5 cm, and the length is 22 cm).*

The small diameter of the instruments made it possible to eliminate compression of the surrounding tissues. The edge of the liver is pushed back by the long end of the Farabef hook (Fig. 3.3).

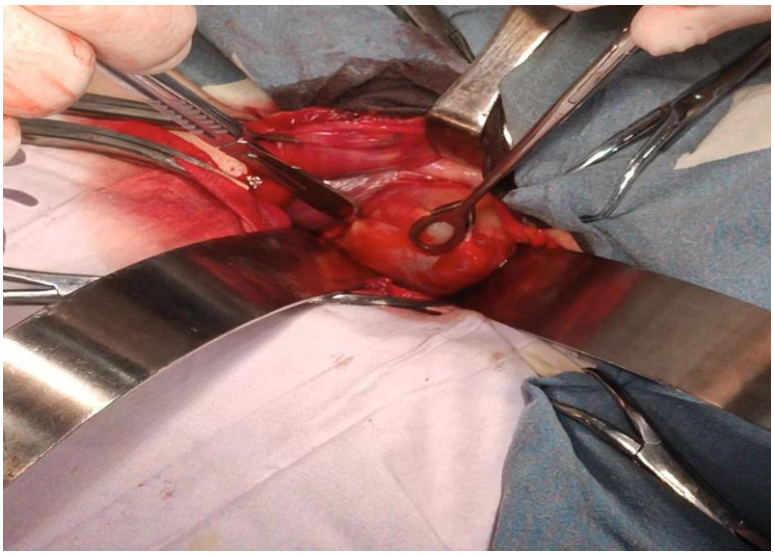


Fig. 3.3 Capture of the bottom of the stomach after the introduction of Cooper wipes.

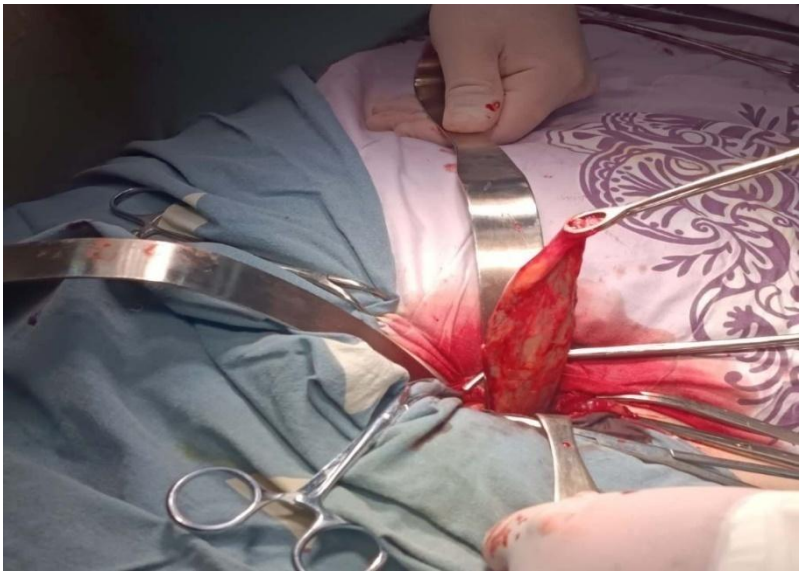


Fig. 3.4. Type of the stomach after mobilization, before ligation of its neck.

Then, stepping back 4-5 mm from the edge of the liver, a subserous detachment of the stomach from the bed is performed, capturing the bottom of the stomach with a Luer clamp. In the course of mobilization, the gallbladder is raised above the level of the skin incision, which facilitates manipulations in its distal part (i.e. in the area of the neck of the cystic duct and, if necessary, on the choledochus). This achieves the versatility of the incision for different body types of the patient and the location of the gallbladder, and in case of subhepatic infiltrate, there is no need to make a conversion (transition to laparotomy) (Fig. 3.4).

An important point in the mobilization of the stomach from the bottom is an indentation of 0.5 cm from the edge of the liver along the medial edge, where, after partial mobilization, its neck is taken in a single block on clamps by a. cystica and the neck of the stomach, stepping back from the total BGr by 0.5-0.7 cm (Fig. 3.5).

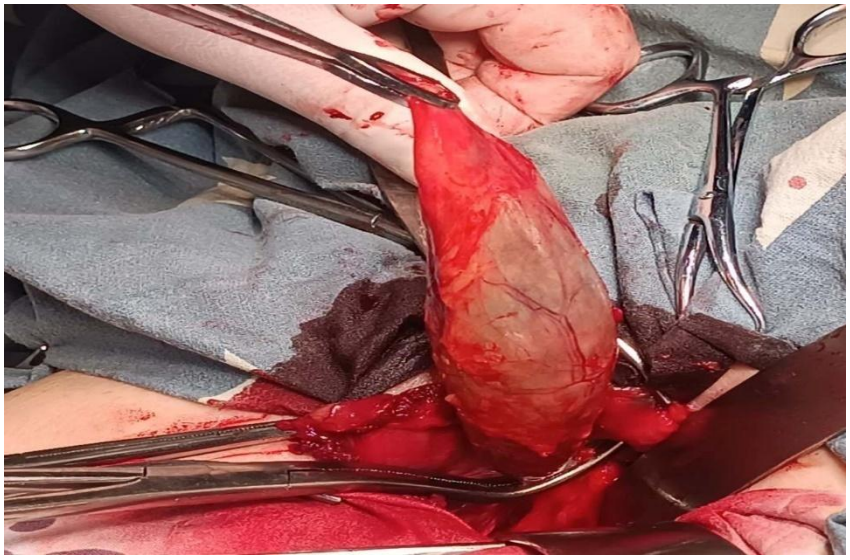


Fig. 3.5. Mobilization of the gallbladder neck.

After dissection and removal of the biliary fistula, the stump together with a. cystica are ligated (tied) in a single block of vicrylNo1, which reduced the development of biliary fistula in the postoperative period from 2.6% to 0% (see Chapter 5). This manipulation makes it possible to exclude the performance of the same manipulation twice, reduces the trauma and duration of the operation (Fig. 3.6).

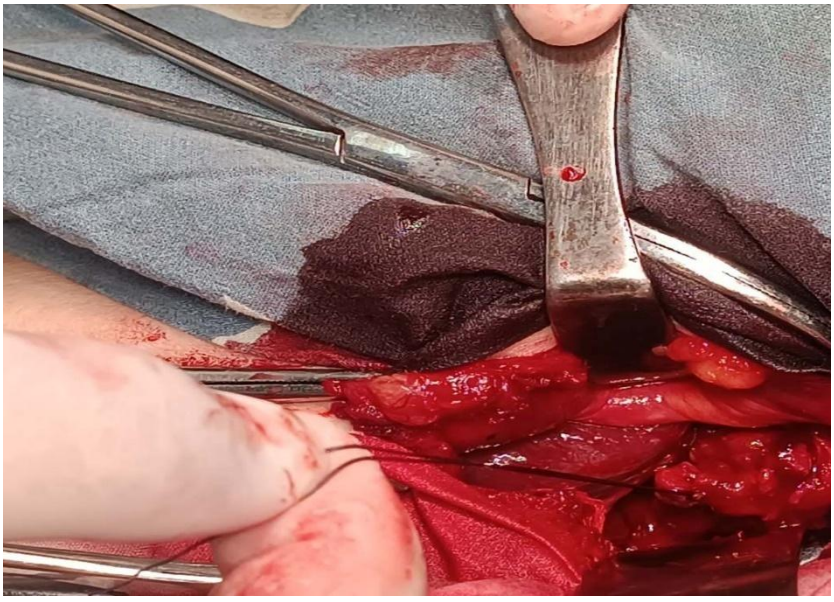


Fig. 3.6. Ligation of the gallbladder neck with vicryl.

After drainage of the Windword space, the surgical wound is sutured tightly in layers. A cosmetic suture is applied to the skin with atraumatic needles (Fig. 3.7), which made it

possible to reduce the development of purulent-septic complications from 4.0% to 0.35% (see Chapter 5).

Fig. 3.7. A cosmetic suture is applied to the skin

he surgical intervention for chronic cholecystitis typically lasts between 18 and 25 minutes. This technique offers adaptability to accommodate various body types and stomach positions, thereby minimizing trauma, enhancing the cosmetic appearance of the scar, and reducing the risk of purulent-septic complications. Notably, this approach utilizes specialized surgical instruments, including retractors measuring 2 cm in width and 25 cm in length, which offers a cost-effective alternative to both laparoscopic and traditional surgical methods. By preserving the integrity of nerve endings, the rectus abdominis, and oblique abdominal muscles, as well as employing a small, oblique incision (up to 4 cm) and plastic sutures, the method provides superior cosmetic outcomes and shorter operative times.

Clinical example 1.

Patient S.A.V., 47 years old, was hospitalized in the surgical department on April 20, 2021 with an established diagnosis: chronic calculous cholecystitis. Ultrasound revealed the following parameters: the size of the gallbladder is 7 cm long and 3.5 cm wide. In the area of the neck of the gallbladder, a concrement (stones) up to 1.5 cm in size was found, the wall of the gallbladder was thickened to 4 mm, which indicates an inflammatory process and possible fibrotic changes. Preoperative preparation.

On 22.04.2021, the patient was taken for a planned operation, after appropriate preparation.

The operation is cholecystectomy from a mini-access. Course of the operation. Access in the proposed way. On examination, the diameter of the gallbladder is 7x3.5 cm, in the lumen there is a concrement with a diameter of 1.5 cm, the walls are compacted. Separation of the gallbladder from the bed from the bottom to the level of the neck. The cystic artery and the neck of the gallbladder, stepping back 0.5-0.7 cm from the common bile duct, are clamped in a single block and crossed with subsequent ligation with vicryl No1. A drainage tube is brought to the bed through a counter-aperture. Layered sutures on the wound. Cosmetic suture on the skin. Aseptic dressing.

The postoperative period proceeded without complications, which indicates a favorable outcome of the surgical intervention. During the first three days, all the necessary postoperative measures were carried out, including monitoring of vital functions, antibiotic therapy, as well as local treatment of the wound surface. On the fourth day, the patient was discharged from the hospital in a satisfactory condition, which confirms the effectiveness of the treatment and the good regenerative ability of tissues.

Clinical example 2.

Patient H.D.S., 55 years old, was admitted to the surgical department on September 17, 2021 with complaints of pain in the right hypochondrium, nausea, vomiting and jaundice of the skin. After physical examination and laboratory tests, a preliminary diagnosis was established: chronic calculous cholecystitis, complicated by choledocholithiasis and obstructive jaundice.

Ultrasound examination of the abdominal cavity revealed a significant increase in the size of the gallbladder up to 8×3.5 cm. The wall of the gallbladder is thickened to 3 mm, which may indicate a chronic inflammatory process and fibrosis.

Based on the data obtained, a preoperative preparation plan was drawn up, including infusion therapy, antibiotic prophylaxis, correction of water-electrolyte balance and acid-base state. Preoperative preparation was also carried out in accordance with the therapeutic and diagnostic algorithm, including the assessment of the functional state of the liver and pancreas, as well as laboratory and instrumental research methods.

The goal of surgery is to remove the gallbladder (cholecystectomy) and eliminate the obstruction of the biliary tract (choledocholithotomy). After the operation, a follow-up

ultrasound is planned to assess the condition of the bile ducts and exclude postoperative complications.

On 19.09.2021, the patient was operated on in a planned manner, after appropriate preparation.

The operation is cholecystectomy from a mini-access. Course of the operation. Access in the proposed way. On examination, the diameter of the gallbladder is 8x3.5 cm, there are many concrements in the gallbladder cavity, the wall of the gallbladder is thickened to 3 mm. The cystic artery and the neck of the gallbladder, stepping back 0.5-0.7 cm from the common bile duct, are taken on clamps in a single block and crossed with subsequent ligation with vicryl No1. A drainage tube is brought to the bed through a counter-aperture. Layered sutures on the wound. Cosmetic suture on the skin. Aseptic dressing.

Postoperative period without complications. Within 3 days, postoperative measures. He was discharged on the 4th day after surgery in a satisfactory condition.

Summary of the chapter. Thus, a detailed analysis of the shortcomings and omissions in the surgical practice of the comparison group allowed us to develop and successfully introduce a modified method of cholecystectomy (ChE) from a mini-approach into clinical medicine. This innovative approach has significantly optimized surgical tactics, increasing its efficiency and safety. The proposed surgical strategy based on the use of a modified method of ChE from a mini-approach in chronic calculous cholecystitis (ChCCh), provides high versatility of the incision, adapted to different body types and anatomical features of the gallbladder (GB). This is achieved through the use of modern technologies and techniques aimed at minimizing surgical trauma. The introduction of this technique made it possible to significantly reduce the frequency of iatrogenic injuries of the abdominal cavity organs in comparison with the comparison group. The incidence of such complications decreased from 14.4% to 2.3%. In addition, postoperative complications associated with surgery decreased from 6.3% to 0.6%. The incidence of wound complications decreased from 4.0% to 0.35%. These improvements also led to a significant increase in the proportion of patients who do not experience postoperative complications, from 89.7% to 99%. This fact is reflected in the comparative

analysis of clinical results presented in Chapter 5.

Thus, the use of a modified ChE method from a mini-access not only increases the safety and efficiency of surgical treatment of chronic CCh, but also improves the quality of life of patients by reducing the frequency of postoperative complications and improving the aesthetic results of surgical intervention.

CHAPTER IV. OPTIMIZATION OF SURGICAL TACTICS IN CHRONIC CALCULOUS CHOLECYSTITIS IN THE MAIN GROUP

§4.1. Preoperative preparation and postoperative management

When selecting a surgical treatment method for chronic calculous cholecystitis, a personalized approach was used, based on a multidisciplinary analysis of clinical, laboratory, and instrumental data. The results of preoperative ultrasound (US), computed tomography (CT), magnetic resonance imaging (MRI), and endoscopic ultrasonography (EUS) were used. These imaging modalities provided detailed information on the morphological and functional characteristics of the gallbladder and biliary tract, as well as the location and size of stones.

Intraoperative imaging was performed using advanced technologies, such as intraoperative ultrasound navigation (IUSN), optical coherence tomography (OCT), and fluorescence diagnostics. IUSN enabled dynamic monitoring of the surgical procedure, minimizing the risk of damage to surrounding tissues and vessels. OCT provided high-resolution images of the internal tissue structure in real time, facilitating precise localization and removal of gallstones. Fluorescence diagnostics using contrast agents allowed for the visualization of even small stones and assessment of the gallbladder mucosa.

This comprehensive and individualized approach, based on modern diagnostic and imaging methods, optimized treatment strategies, minimized the risk of intra- and postoperative complications, and improved patients' quality of life. Specifically, a high degree of restoration of gallbladder function was achieved thanks to precise stone removal. This resulted in a reduction in postoperative pain and limitations, as well as a significant improvement in the overall condition of patients, as confirmed by objective data and subjective patient reports.

The application of contemporary medical technologies and advanced diagnostic techniques significantly enhanced the precision and safety of surgical procedures. The utilization of intraoperative ultrasound (IUSN), optical coherence tomography (OCT), and fluorescence diagnostics markedly reduced the incidence of intraoperative complications, including hemorrhage and bile duct injury. Additionally, these methodologies facilitated

a more accurate assessment of the extent of surgical interventions, thereby minimizing the necessity for subsequent procedures and improving long-term treatment outcomes.

Consequently, a personalized treatment strategy for chronic calculous cholecystitis, grounded in multidisciplinary analysis and state-of-the-art technology, represents an effective and secure approach that yields superior therapeutic results for this condition.

It is recommended that surgical interventions in this patient population be conducted by highly qualified specialists with extensive experience in general surgery, particularly in hepatobiliary surgery. It is crucial to meticulously identify and evaluate organic alterations in the gallbladder and biliary system, taking into account their anatomical and morphological parameters such as diameter, length, width, and volume.

It is essential to thoroughly identify gallbladder structures, including the neck, cystic duct, and bile ducts, and to assess the condition of the ampulla of Vater and common bile duct. Particular attention should be paid to potential complications, such as choledocholithiasis (the presence of stones in the common bile duct), biliary strictures (narrowing of the duct lumen), and concomitant surgical pathologies, including diseases of the pancreas, liver, gallbladder, and other abdominal organs.

Contemporary diagnostic techniques, including ultrasonography, magnetic resonance imaging (MRI), computed tomography (CT), and endoscopic retrograde cholangiopancreatography (ERCP), are employed to evaluate the state of the biliary system. These methodologies yield detailed visualizations and functional parameters of the biliary anatomy, thereby enhancing the precision of diagnostic assessment and treatment strategy formulation.

Concomitant medical conditions, including cardiovascular disease, diabetes, chronic lung disease, and other chronic conditions, must also be considered. This requires a multidisciplinary approach and comprehensive preoperative preparation, including laboratory tests (complete blood count, biochemistry profile, coagulation profile, inflammatory markers, etc.), instrumental diagnostic methods (ultrasound, CT, MRI), and consultations with related specialists, such as a cardiologist, endocrinologist, pulmonologist, and others.

In some cases, additional tests, such as cholangiography, hepatobiliary scintigraphy,

or liver biopsy, may be required to confirm the diagnosis and determine the optimal treatment strategy. These methods provide more detailed information about the condition of the biliary tract and liver, facilitating more effective surgical planning and postoperative patient care.

Therefore, a comprehensive approach to the diagnosis and treatment of patients with biliary tract pathology requires highly qualified specialists, the use of modern diagnostic methods, and multidisciplinary collaboration to ensure the best treatment outcomes.

To facilitate the operation and improve its outcomes, we carried out a targeted comprehensive preoperative preparation in the main group of patients. Along with psycho-emotional preparation, 2-3 days before surgery, the intestines are cleansed by cleansing enemas, and on the eve of the operation, the stomach is washed.

Pharmacotherapy and dietary therapy aimed at inhibiting inflammatory processes and activating regenerative mechanisms at the cellular and molecular levels demonstrate high clinical efficacy in reducing pain and dyspeptic symptoms. The use of drugs with antisecretory and anti-inflammatory activity, such as proton pump inhibitors (PPIs) and nonsteroidal anti-inflammatory drugs (NSAIDs), combined with a carefully balanced diet enriched with easily digestible proteins, B vitamins, antioxidants, and micronutrients, including zinc and selenium, significantly improves patients' quality of life. A comprehensive approach, including pharmacological interventions and nutritional support, provides a synergistic effect, promoting the restoration of the gastrointestinal (GI) mucosa and reducing pathological processes.

The mechanism of action of PPIs is by blocking the H+/K+-ATPase enzyme in gastric parietal cells, which suppresses hydrochloric acid secretion. NSAIDs inhibit cyclooxygenase-2 (COX-2), which reduces the synthesis of prostaglandins, inflammatory mediators. These medications effectively reduce gastric acidity and inflammation, promoting the healing of erosions and ulcers.

Nutrition support plays a key role in restoring the gastrointestinal mucosa. Easily digestible proteins, such as whey protein, promote the synthesis of new cells and maintain the structural integrity of tissues. B vitamins, especially B6 and B12, are involved in metabolic processes and cell regeneration. Antioxidants, such as vitamins C and E, as well

as selenium, neutralize free radicals, reducing oxidative stress and inflammation. Zinc is important for cellular growth and tissue repair.

The synergistic effect of pharmacological and nutritional interventions results in the combined enhancement of regenerative processes and the reduction of inflammatory reactions. Pharmacological preparations provide a rapid reduction in acidity and inflammation, and nutritional support promotes long-term restoration and maintenance of mucosal health.

The presence of concomitant diseases required additional therapeutic measures, together with specialists in the relevant field.

For the prevention of thromboembolic conditions, low-molecular heparins were used, such as enoxaparin sodium (Clexane) and calcium nadroparin (Fraxiparin) at a dosage of 0.4-0.6 IU. These drugs block the activity of factor Xa and thrombin, which prevents the formation of blood clots. As part of the complex therapy, cardiac glycosides such as digoxin and digitoxin were used, which improve myocardial contractile function and reduce heart rate. Protease inhibitors such as aprotinin, which block the activity of proteolytic enzymes and prevent tissue damage, have also been used. H2 blockers, such as ranitidine and famotidine, inhibit the secretion of hydrochloric acid in the stomach, which promotes the healing of ulcers and erosions.

To improve metabolic processes in hepatocytes (liver cells), cocarboxylase (vitamin B1) at a dose of 150 mg per day, riboxin (inosine) 2% solution of 10 ml, thiotriazolin (2.5% solution of 4 ml), as well as B vitamins (B1, B6, B12) and ascorbic acid (vitamin C) were prescribed. Cocarboxylase is involved in redox processes and improves the metabolism of carbohydrates, riboxin stimulates the synthesis of ATP, and thiotriazolin has antioxidant and membrane-stabilizing properties.

The main emphasis in therapy was placed on the fight against infection. For this purpose, broad-spectrum antibiotics were used, such as fluoroquinolones (ciprofloxacin, levofloxacin), cephalosporins (ceftriaxone, cefepime) and macrolides (azithromycin, clarithromycin). In some cases, sulfonamides such as co-trimoxazole (sulfamethoxazole + trimethoprim) have been used. Immune-boosting therapy included the use of interferons, such as interferon-alpha, as well as immunomodulators, such as tilorone and sodium

deoxyribonucleate.

The comprehensive treatment regimen of the pre- and postoperative periods included analgesics (baralgin 5.0; ketonal 2.0). Various infusion agents were used, giving a detoxification effect, correcting disorders of carbohydrate, protein and electrolyte metabolism, acid-base balance. The amount of injected solutions (on average 2000-4000 ml per day) and their qualitative composition were determined by individual indications.

The scope and content of therapeutic measures are determined depending on the form of the disease, the age of patients and the presence of concomitant therapeutic pathology.

The management of the postoperative phase should be viewed as a continuation of a cohesive therapeutic strategy initiated during preoperative preparation and the surgical procedure.

In this phase, in addition to rational fluid administration, antibiotic therapy, and analgesic use, emphasis was placed on early stimulation of intestinal motility, nutritional support, early patient mobilization, and prevention of thromboembolic events. Restoration of gastrointestinal motility was achieved through the administration of bisacodyl suppositories rectally three times daily from the second postoperative day, along with the use of metoclopramide, neostigmine, and domperidone, in combination with therapeutic enemas and gastric decompression.

Antibiotic therapy, started in the preoperative period, continued in the postoperative period in combination with drugs that improve the rheological properties of the blood.

For the prevention of thromboembolism, specific prophylaxis was carried out under the control of the blood coagulation system for 4-5 days (clexan or fraxiparin). Then, for 4-5 days, phenyline was prescribed, and from 6-7 days – nicotinic acid, papaverine.

At the same time, bandaging of the lower extremities with elastic bandages was carried out, as well as early activation by special exercises in bed and subsequently, in the patient's room.

§4.2. Improved Treatment and Diagnostic Algorithm

The analysis of unsatisfactory results of surgical treatment of chronic calculous cholecystitis (ChCCh) led to the development of new diagnostic and surgical tactics. This made it possible to optimize the surgical strategy, which is presented in the schematic

image (Ministry of Justice of the Republic of Uzbekistan №22525 from 24.02.2023).

Upon admission of patients to the admission department of the clinic, a thorough collection of clinical and anamnestic data was carried out, including a detailed analysis of complaints, medical history and life. Particular attention was paid to the evaluation of previous surgical interventions, especially in the upper abdominal cavity, where organs such as the liver, gallbladder, stomach and duodenum are located. The presence of concomitant surgical pathology, including echinococcosis of the liver and spleen, which is a parasitic disease caused by echinococcus larvae, as well as hernias of the white line of the abdomen (diastasis recti abdominis muscles) and incisional hernias resulting from scar failure after surgical interventions were also assessed.

After a preliminary clinical examination and anamnesis, comprehensive clinical and laboratory tests were performed. These included electrocardiography (ECG) to assess the electrical activity of the heart, chest and abdominal X-rays to visualize structural changes in organs, and ultrasound (ultrasound) to examine in detail the morphology and functional characteristics of internal organs.

Further, a detailed analysis of concomitant therapeutic pathologies was carried out, taking into account their presence, severity and potential impact on the underlying disease. In case of detection of compensated forms of chronic diseases, such as cardiovascular insufficiency, diabetes mellitus or chronic diseases of the respiratory system, they were corrected in the Department of Surgery. This multidisciplinary strategy involved working with internists, cardiologists, and endocrinologists who individually selected the best treatment and prevention of complications. Particular attention was paid to the assessment of metabolic and hemodynamic parameters, which made it possible to more accurately predict risks and minimize possible complications during surgery. After the treatment, the indications for surgical treatment were determined.

Although many methods of research are known and used in ChCCh, among all of them, the diagnostic program should begin with ultrasound, which today, along with general availability and minimally invasiveness, has a high level of efficiency in connection with the improvement of the equipment itself and the possibility of conducting research at the level of 3D and 4D.

During ultrasound, the determination of stones in the stomach is a direct indication for hospitalization in the surgical department, where the next stage is to determine the indications for surgery and for preoperative preparation. In these patients, there is no need for additional studies, since ultrasound allows you to accurately determine the size, shape, location, walls of the gallbladder, as well as the features of the cystic and total stomach (diameter, size and shape). It is important during this period to take measures to reduce intrapancreatic pressure (contracal, somatostatin), aspiration of gastric contents, suppression of gastric secretion by prescribing antisecretory drugs and H2 blockers; antibiotic therapy; analgesics and antispasmodics.

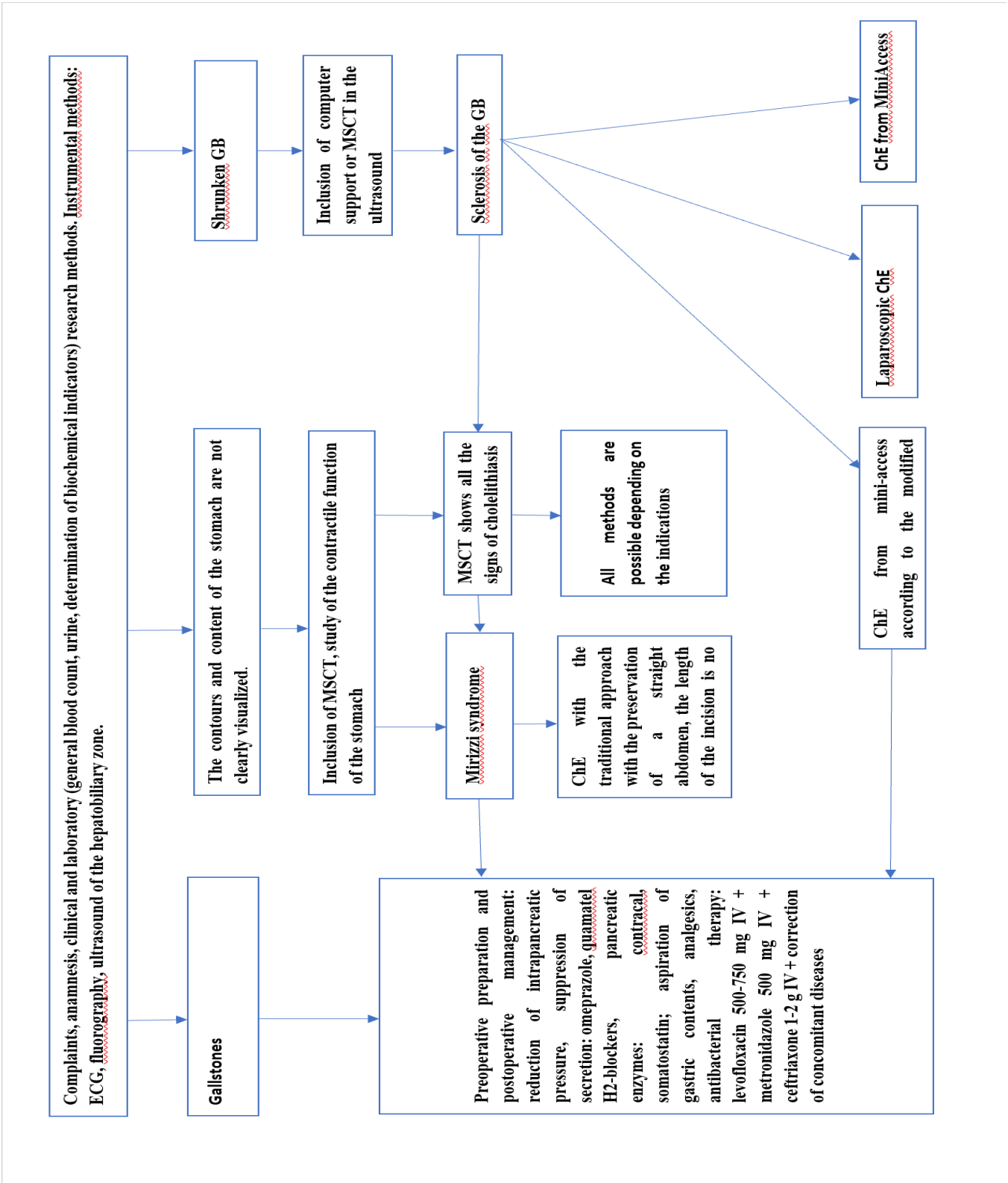
In some cases, ultrasound of the gallbladder makes it difficult to visualize certain parameters, such as the size, diameter, and width of the walls. These parameters may be fuzzy or poorly defined due to various factors, including acoustic artifacts, anatomical arrangement of the organ, or structural changes. In such situations, multispiral computed tomography (MSCT) is used to obtain more accurate and detailed information about the condition of the gallbladder. This method allows you to obtain high-resolution images with three-dimensional reconstruction, which significantly improves the visualization of even complex anatomical structures. MSCT also helps in identifying minor pathological changes that may not be visible on ultrasound. Thus, the use of MSCT is an important step in the refined diagnosis of gallbladder diseases, providing a more complete and accurate understanding of its condition.

This study (MSCT) in such cases, although accompanied by a pronounced radiation load, allows you to accurately determine the necessary characteristics of the gallbladder and extrahepatic bile ducts. In case of confirmation of the diagnosis of cholelithiasis without choledocholithiasis, the operation of choice is ChE from the mini-approach and laparoscopic ChE.

When conducting an ultrasound diagnosis of a shrunken gallbladder and its intrahepatic location, there is a need for an ultrasound with computer support or MSCT. When clarifying the data on the presence of a shrunken gallbladder (sclerosis) and its intrahepatic location, the operation of choice is ChE from the mini-approach, although it is possible to perform ChE from the traditional approach with an incision length of no

more than 10 cm while maintaining the integrity of the right rectus abdominis muscle. In the case of Mirizzi syndrome, it is preferable to use a traditional ChE with an incision length of no more than and preservation of the integrity of the right rectus abdominis muscle.10 см

Fig. 4.1. Improved treatment and diagnostic algorithm for cholelithiasis



Preoperative preparation, in addition to standard procedures, included a set of measures aimed at preventing thromboembolic and purulent-septic complications associated with the surgical wound. These measures included anticoagulant therapy to prevent blood clots, the use of compression stockings and elastic bandages to improve venous outflow, and antibacterial prophylaxis to reduce the risk of infectious complications. In addition, laboratory tests were carried out to assess the coagulation status of the patient and the state of the immune system, which made it possible to individualize the approach to each patient and minimize the risks of postoperative complications. The duration and intensity of preoperative preparation of patients with ChCCh depended on age, the time from the onset of the disease to admission to the hospital, the initial state of the patient, as well as the presence of concomitant therapeutic and combined surgical pathology. Only comprehensive preoperative preparation, even in conditions of limited time, can provide favorable conditions for the successful surgical intervention and minimize the risks of complications in the postoperative period.

§4.3. Surgical tactics in the main group

Analyzing the above, in the comparison group, there were disagreements in the choice of surgical access, the volume of surgical aid and ChE, which affected the initial results of surgical treatment.

Unsatisfactory results of surgical intervention in the control group led to a revision of the surgical strategy, including diagnosis, selection of optimal surgical access and determination of the scope of surgical intervention. Deficiencies and errors were identified in preoperative preparation and postoperative management of patients, as well as in choledocholithotomy (removal of stones from the common bile duct) and drainage of the common bile duct (CBD). The analysis showed that inadequate preoperative assessment of the functional state of the biliary system, insufficient use of modern diagnostic methods (such as magnetic resonance cholangiopancreatography) and the lack of an individual approach to each patient could contribute to the development of complications. In the postoperative period, errors in monitoring and correction of water and electrolyte balance, insufficient attention to the prevention of infectious complications and lack of a systematic

approach to the rehabilitation of patients were revealed. It was also found that ineffective drainage of the common bile duct after choledocholithotomy can lead to the development of biliary hypertension and other complications. As a result of the analysis, recommendations were developed to improve preoperative preparation, optimize surgical tactics and increase the effectiveness of postoperative management of patients with choledocholithiasis.

§4.3.1. Character and Analysis in the "Traditional" Method

In the main group of patients, we adhered to the following principle to the choice of the CE method in the traditional method: the successful operation depends on the correctly chosen surgical approach.

At the same time, we took into account the patient's physique, paid attention to the angle of the costal arch, as well as the identification of the structures of the gallbladder and the gallbladder neck area, the presence of complications and combined surgical and concomitant therapeutic pathology, which allowed us to choose one or another type of "traditional" access to the gallbladder (Table 4.1)..

Table 4.1

Distribution of the main group in "traditional" access

Access	Number of patients (n=76)	
	Abs	%
Upper-median	28	36,8
According to Fedorov	48	63,2
Total	76	100

As can be seen from Table 4.1, in the study group, ChE with upper median laparotomy was performed in 28 (36.8%) patients. At the same time, the ratio of men and women turned out to be equal - 14 (18.4%) each. ChE from the right of subcostal access was performed in 48 (63.2%) patients.

When analyzing the nature of surgical interventions in the "traditional" approach, the following picture emerged (Table 4.2.).

Table 4.2

Nature of operations with "traditional" access in the main group

Types of operations	Number of patients (n=76)	
	ABS	%
Cholecystectomy	58	76,4
Gallbladder resection	4	5,3
ChE + echinococcectomy	3	3,9
ChE + hernia repair	5	6,6
ChE + gastric resection	2	2,6
ChE + removal of the ovary	3	3,9
ChE + uterine amputation	1	1,3
Total	76	100

As can be seen from Table 4.2., TChE was performed in 58 (76.4%) patients, and resection of the gallbladder was performed in 4 (5.3%) patients. In 14 (18.7%) patients, ChE was accompanied by simultaneous operations.

§4.3.2. Character and Analysis of Laparoscopic Cholecystectomy

In the study group, laparoscopic access was performed in 715 patients with conversion in 2 cases. It was caused by marginal liver injury with bleeding (2).

In the study group, the nature of surgical interventions in LChE is presented in Table 4.3.

As can be seen from Table 4.3., LChE in isolation was performed in 695 (97.2%) patients, and resection of the gallbladder by laparoscopy was performed in 3 (0.5%) patients. In 19 (2.7%) patients, LChE was accompanied by simultaneous operations: liver echinococcectomy in 3 (0.5%), appendectomy in 1 (0.1%), uterine extirpation in 4 (0.6%), and removal of ovarian cysts in 7 (0.9%). At the same time, conversion to the "traditional" access was made in 2 (0.2%) patients.

Table 4.3

The nature of surgical interventions in LChE

Types of operations	Number of patients (n=715)	
	ABS	%
Cholecystectomy	695	97,2
GB resection	3	0,5
ChE + ovarian cystectomy	7	0,9
ChE + echinococcectomy	3	0,5
ChE + extirpation of the uterus	4	0,6
ChE + Appendectomy	1	0,1
Conversion through ChE from MMA	2	0,2
Total	715	100

Thus, the range of nosological forms of cholelithiasis in patients operated on using video endoscopic technique is wide and diverse.

§4.3.3. Character and Analysis of Modified Mini-Access

At the present stage of the development of surgery, the experience of using laparotomy operations has shown that in ChCCh there is a need to use such incisions, which, not being so traumatic, would create a wide and convenient access for the surgeon to all parts of the liver. In domestic and foreign literature, various ways of accessing the stomach are described.

The nature of surgical interventions in ChE from the modified mini-access is presented in Table 4.4.

As can be seen from Table 4.4., out of 362 patients, 354 (97.8%) patients underwent ChE from the modified mini-access, and 4 (1.1%) patients underwent resection of the PEP. When performing ChE from a modified mini-access, simultaneous operations were performed in 3 (0.8%) patients.

Table 4.4 Resource requirements by component

Character of the ChE from the modified mini-access

Types of operations	Number of patients (n=362)		
	Abs	%	P
Cholecystectomy	354	97,8	<0.05
Resection of the bladder	4	1,1	<0.05
ChE + echinococcectomy	3	0,8	<0.05
conversion to traditional access	1	0,3	<0.05
Total	362	100	<0.05

The ChE from the modified mini-access required conversion to the "traditional" access in 1 (0.3%) case, which was due to technical difficulties due to the intrahepatic location of the EBI and obesity of the 3rd degree.

§4.4. Advantages, disadvantages and contraindications to the methods of surgical interventions

When determining the indications for known methods of surgical interventions, researchers do not distinguish between acute and chronic forms of cholelithiasis. In this regard, in the process of the work carried out, we clarified the advantages, disadvantages and contraindications to TChE, LChE and ChE from the mini-access in ChCCh.

Advantages, disadvantages and contraindications to the methods of surgical interventions. In determining the indications for existing methods of surgical interventions, researchers do not differentiate between acute and chronic forms of cholelithiasis (ChL). This leads to insufficient accuracy in choosing the optimal treatment method for patients with various clinical manifestations of the disease. Within the framework of the study, we clarified the advantages, disadvantages and contraindications to transcholedochal (TCh), laparoscopic cholecystectomy (LChE) and cholecystectomy from mini-access (HE) in chronic calculous cholecystitis (ChCCh). During the analysis of the data, key factors affecting the effectiveness and safety of each of the methods were identified. Laparoscopic cholecystectomy has shown the least invasiveness and trauma, which contributes to a faster recovery of patients and reduces the risk of postoperative complications. However, in the presence of complications, such as large stones in the gallbladder or concomitant diseases of the liver and bile ducts, LChE may be

contraindicated.

Transcholedochal cholecystectomy, despite its technical complexity, avoids an incision in the abdominal wall, which reduces the risk of infection and minimizes postoperative pain. However, this method requires a highly qualified surgeon and may be associated with the risk of damage to the bile ducts.

Cholecystectomy from a mini-access is a compromise between laparoscopic and open techniques, providing access to the gallbladder through a small incision (about 3-5 cm). This method reduces the trauma of the intervention compared to traditional open cholecystectomy, but at the same time retains the possibility of direct visual control, which reduces the risk of complications. The selection of an appropriate surgical technique for chronic cholecystitis should be guided by a thorough evaluation of the patient's clinical profile, encompassing the etiology, severity, and manifestations of the disease, as well as the presence of any concomitant medical conditions and individual physiological characteristics. This comprehensive approach is essential for optimizing treatment outcomes and mitigating the risk of postoperative complications.

Advantages of traditional ChE.

1) Traditional ChE is performed from the upper median or oblique subcostal incisions according to Kocher and Fedorov, which provide wide access to the stomach, extrahepatic gallbladders, liver, pancreas and duodenum.

2) At present, TChE is used in cholelithiasis complicated by peritonitis, with a pronounced adhesion process, intrahepatic location of the gallbladder, as well as large stones at the neck, partially wedged into the lumen of the general gallbladder.

Disadvantages of traditional ChE.

1) Substantial trauma to the anterior abdominal wall structures, characterized by moderate surgical injury, resulted in the development of postoperative ileus. A significant proportion of early and late wound complications were observed, encompassing iatrogenic factors (14.7%), surgical-related issues (14.7%), and wound-specific complications (10.7%);

2) increased risk of TEC development (TEC - 6.6%, mortality - 1.3%) and adhesions; significant cosmetic defect; a longer period of post-anesthesia and postoperative rehabilitation (4 to 6 weeks required) (see Chapter 5).

There are no contraindications to "traditional" ChE, although it should be avoided in patients with high surgical risk, when the time factor limits the performance of traumatic surgery.

Advantages of endosurgical operations: instead of a wide incision in the abdominal wall (from 7 to 30 cm in length), three to five trocar punctures of 0.5 are performed. As a result: -1 см

1) there is no severe pain in the postoperative period;

2) excellent cosmetic;

3) after recovering from anesthesia on the same day, the patient can be activated (you can get out of bed and walk);

4) the duration of hospital stay after surgery is up to 3-4 days; 5) 14-15 days after the operation, you can start normal work and household activities;

5) purulent-septic complications, as well as incisional hernias, occur extremely rarely;

6) Multiple optical magnification achieved with the help of modern endoscopes and microscopes, combined with the high mobility of surgical instruments, allows for accurate diagnosis and surgical intervention in concomitant surgical pathology localized at various levels of the abdominal cavity. This is achieved by minimizing trauma to surrounding tissues and organs, which contributes to a faster recovery of patients and reduces the risk of postoperative complications. The use of robotic systems and automated instruments makes it possible to further increase the accuracy and safety of surgical procedures, while ensuring the maximum preservation of functional structures.

Disadvantages of the endosurgical technique.

1) Cost. Expensive equipment, fragility of instruments, disposable imported consumables, the need for special training, the uniqueness of the technique - all this leads to a relatively high cost of endosurgical operations;

2) Anesthesia. To perform LChE, it is necessary to fill the abdominal cavity with gas

at a pressure of 10-14 mm Hg. st.;

3) Duration. Due to some loss in the freedom of manipulation, the inability to use the hand directly, and for a number of other reasons, LChE can take longer than from a mini-access;

4) Two-dimensional image of the surgical field. Comparative analysis showed that in the comparison group, the frequency *of iatrogenic was* noted in 14.2, up to 7.5%, which contributed to the choice of differentiated tactics in the study group (see Chapter 5).

Contraindications to LChE include.

1) Risk of anesthesia of the 3rd and 4th degrees with an unstable course of concomitant diseases;

2) Obesity of 2-3 degrees, which does not allow the surgeon to confidently navigate in the surgical field;

3) Previous open major surgical procedures involving the organs of the upper abdominal cavity significantly increase the risk of abdominal organ damage during trocar insertion. Additionally, these procedures reduce the likelihood of successful stomach access due to adhesion formation between the organs and the anterior abdominal wall, as well as the adhesive process in the subhepatic space;

4) Uncorrectable blood clotting disorders;

5) The level of intra-abdominal pressure is more than 15 mm Hg. st.; 6) III trimester of pregnancy;

7) In conditions of a sufficiently tense pneumoperitoneum;

8) concrements of the stomach more than 30 mm, fixed at its neck with localization at the entrance to the choledochus;

9) intrahepatic location of the gallbladder with wrinkling and sclerosis;

10) bilio-biliary or bilio-digestive fistulas;

11) Cancer of the stomach; pustular diseases of the skin of the abdominal wall;

Cholecystectomy through a modified mini-access is performed in patients with a high anesthetic risk and concomitant diseases in which the laparoscopic technique is contraindicated. This allows the use of a mini-accessible approach in the following clinical situations: cardiovascular failure, coronary artery disease, hypertension, history of

myocardial infarction, heart defects and obstructive pulmonary diseases, including bronchial asthma.

Advantages of ChE from mini-access.

1) Laparoscopic cholecystectomy (LChE) is a minimally invasive surgical technique that can be applied to patients of various body types. The procedure results in minimal trauma to the anterior abdominal wall, as the muscles are not incised but rather separated along their fibers. This approach reduces postoperative pain and accelerates wound healing, as the incisions heal quickly and with minimal scarring. The postoperative course following LChE is generally comparable to that of conventional cholecystectomy;

2) Reducing the risk of postoperative complications; the ability to operate on patients who have previously undergone operations on the anterior abdominal wall;

3) the surgeon observes his actions not on a video screen, but directly with his own eyes (due to this, the risk of damage to the surrounding abdominal organs is reduced);

4) minimal use of anesthesia;

5) there is no need to use narcotic analgesics; the technique can be used in the 2nd and 3rd trimester of pregnancy; the possibility of applying cosmetic skin sutures;

6) intestinal paresis does not occur. ChE from the mini-access is indicated in the presence of contraindications to LChE.

7) When switching to LChE conversions, you first need to switch to mini-access. If difficulties arise with ChE from the mini-access, then the incision should be expanded to the size of the traditional one, but not more than 10 cm and with the obligatory preservation of the integrity of the right rectus abdominis muscle.

Comparative analysis showed that in the study group in relation to the comparison group, the incidence of postoperative complications associated with surgery decreased by 3.9% (from 4.2 to 0.3%), with a decrease in the number of relaparotomies by 2.4% (from 2.4% to 0) (see Chapter 5).

Disadvantages of the ChE from mini-access.

1) there may be difficulties in the need for surgical interventions on the extrahepatic bile ducts, especially in obese patients;

2) atrophic changes in the liver with a high location from the edge of the costal arch.

Contraindications to ChE from mini-access.

1) the presence of diffuse and general biliary peritonitis, all generally accepted conditions when there are contraindications to endotracheal anesthesia.

Thus, by making adjustments to the program of preoperative preparation, by developing and implementing an improved therapeutic and diagnostic algorithm and a modified method of ChE from a mini-access, as well as by specifying the advantages, disadvantages and contraindications to TChE, LChE and ChE from a mini-approach in CHCCH, we managed to optimize surgical tactics for this disease. In the presence of contraindications to LChE, the method of choice was a modified method of ChE from the mini-access.

Summary.

Modifications to the preoperative preparation protocol, the development and implementation of an enhanced therapeutic and diagnostic algorithm, and the adaptation of a modified cholecystectomy (CHE) technique through a mini-access approach were employed. These interventions, alongside the delineation of the advantages, disadvantages, and contraindications of transcystic, laparoscopic, and mini-access cholecystectomy in chronic cholecystitis (ChCCh), facilitated the optimization of surgical strategy for this condition. In cases where laparoscopic cholecystectomy is contraindicated, a modified mini-access cholecystectomy method is recommended. This approach utilizes a restricted surgical incision and specialized instruments to minimize procedural invasiveness. The technique mitigates the risk of complications, reduces postoperative pain, expedites recovery, and enhances cosmetic outcomes compared to conventional open cholecystectomy.

The developed algorithm makes it possible to optimize the method of ChE and choose the most optimal method with a complex of preoperative preparation, as well as to improve the results of operations: the frequency of iatrogenic injuries decreased by 12.1%, postoperative complications associated with surgical intervention - by 5.7%, purulent-septic - by 3.65%, mortality by 6.5 times, the number of reoperations by 1.9% (Chapter5).

CHAPTER V. IMMEDIATE RESULTS OF SURGICAL TREATMENT

§5.1. Characteristics of Immediate Results

For the evaluation of immediate outcomes, the study participants were categorized into three subgroups based on the type of postoperative complications.

1. Complications directly attributable to the surgical technique (iatrogenic injuries and postoperative complications specific to cholecystectomy and general gallbladder surgery).

2. Purulent-septic (wound) complications.

3. General postoperative complications (occurring across all types of surgical procedures): cardiovascular complications, bronchopulmonary complications, and others.

The nature of iatrogenic injuries in the compared groups is carried out depending on the access used, which is presented in Tables 5.1., 5.2. and 5.3.

Table 5.1

Nature and Frequency of Iatrogenic Injuries in "Traditional" Surgical Interventions

Nature of complications	Groups				Total (n=151)	
	Comparisons (n=75)		Main (n=76)			
	ABS	%	Abs	%	ABS	%
Damage:	Iatrogenic injuries:					
Choledochal	3	4,0	1	1,3	4	2,6
intestinal walls	3	4,0	-	-	3	1,9
Bleeding from:						
Cystic artery	2	2,6	1	1,3	3	1,9
The bed of the gallbladder	3	4,0	1	1,3	4	2,6
Total	11	14,7	3	3,9	14	9,3

As can be seen from Table 5.1, in the comparison group in TChE, iatrogenic lesions were diagnosed in 11 (14.7%) patients. Of these, choledochal injury in 3 (4.0%), bleeding from the cystic artery in 2 (2.6%), from the stomach bed in 3 (4.0%) and damage to the

intestinal wall in 3 (4.0%).

In the study group, iatrogenic injuries were diagnosed in 3 (3.9%) patients. Of these, choledochal injuries were observed in 1 (1.3%), bleeding from the cystic artery in 1 (1.3%) patient, and abdominal bed in 1 (1.3%) patient.

Comparative analysis showed that in the study group, the frequency of iatrogenic injuries decreased by 10.8% (from 14.7 to 3.9%) in the study group.

The nature of complications of minimally invasive surgical interventions is presented in Table 5.2.

As can be seen from Table 5.2, in the comparison group in LChE, iatrogenic lesions were diagnosed in 76 (14.2%) patients with a conversion rate of 40 (7.5%) cases.

Of these, damage to the choledochal artery in 25 (4.7%), damage to the intestinal wall in 11 (2.0%), bleeding from the cystic artery in 6 (1.1%), from the bed of the stomach in 23 (4.3%) and from the abdominal wall in 11 (2.0%).

In the study group, *iatrogenic lesions* were diagnosed in 20 (2.8%) patients with conversion in 4 (0.5%) cases. Of these, choledochal lesions were observed in 9 (1.3%), intestinal wall injury in 2 (0.3%), bleeding from the stomach bed in 5 (0.7%), from the cystic artery, and from the abdominal wall in 4 (0.5%) patients, which was stopped during surgery

Comparative analysis showed that in the study group in relation to the comparison group, the frequency *of iatrogenic injuries* decreased by 11.4% (from 14.2 to 2.8%), with a decrease in the number of conversions by 7% (from 7.5 to 0.5%).

As can be seen from Table 5.2., *iatrogenic lesions were found in 25 (15.2%) patients in the comparison group for ChE from mini-accesses*, and it was necessary to expand the mini-laparotomy incision into a "traditional" one in 10 (6.1%) cases. Of these, choledochal lesions were observed in 7 (4.2%), intestinal wall injury in 1 (0.6%), bleeding from the cystic artery in 7 (4.2%) patients, and bleeding from the gallbladder bed in 5 (3.0%) patients. from the anterior abdominal wall, it was noted only in 5 (3.0%) patients.

In the study group, *iatrogenic lesions* were observed in 4 (1.1%) patients with a conversion of the access to the "traditional" one in 2 (0.5%) cases, but the integrity of the right rectus abdominis muscle was preserved, and the length of the incision did not exceed

10 cm. It should be noted that that in the study group, bleeding from the anterior abdominal wall, as well as from the cystic artery, was not observed.

Table 5.2

Characterization *of iatrogenic lesions* in LChE and ChE from a modified mini-access

Character of complications	Distribution by access							
	LChE n=536 n = 715		Conversion		ChE from Mini-Access n=165 n=362		Conversion	
	ABS	%	ABS	%	ABS	%	ABS	%
Damage:	Iatrogenic injuries:							
choledochal	25	4,7	17	3,2	7	4,2	3	1,8
	9	1,3	3	0,4	2	0,5	1	0,3
intestinal walls	11	2,0	5	0,93	1	0,6	1	0,6
	2	0,3	1	0,2	1	0,2	1	0,3
Bleeding from:								
Cystic artery	6	1,1	4	0,75	7	4,2	3	1,8
	-	-	-	-	-	-	-	-
The bed of the gallbladder	23	4,3	9	1,7	5	3,0	3	1,8
	5	0,7	-	-	1	0,2	-	-
abdominal wall	11	2,0	5	0,93	5	3,0	-	-
	4	0,5	-	-	-	-	-	-
Total	76	14,2	40	7,5	25	15,2	10	6,1
	20	2,8	4	0,5	4	1,1	2	0,5
*Note	- Comparison group				- Core Group			

A comparative analysis demonstrated a significant reduction in the incidence of iatrogenic injuries and conversions with the use of mini-access for the treatment of chronic

endometritis (ChE) in the study group compared to the control group. The frequency of iatrogenic injuries decreased by 14.1% (from 15.2% to 1.1%), and the number of conversions decreased by 5.6% (from 6.1% to 0.5%).

It should be emphasized that during the transition to conversion in the study group, the integrity of the right rectus abdominis muscle was preserved, and the length of the skin incision did not exceed 10 cm.

The frequency of postoperative complications in the immediate period is presented in Table 1. 5.3.

As can be seen from Table No5.3., in the comparison group in TChE, postoperative complications associated with surgical intervention were noted in 11 (14.7%) patients. Of these, external biliary fistula was observed in 2 (2.6%), which in 1 case required relaparotomy.

Incompetence of the stump of the gallbladder was noted in 3 (4.0%) patients, where relaparotomy was performed in all cases. Subhepatic abscess was noted in 1 (1.3%) and intestinal paresis with dynamic obstruction in 5 (6.6%) patients.

In the main group of patients who underwent transcholecystectomy (TCHE), postoperative complications associated with surgical intervention were diagnosed in 2 (2.6%) patients. Of these, incompetence of the gallbladder stump was detected in 1 (1.3%) patient, and intestinal paresis with signs of dynamic obstruction was detected in 1 (1.3%) patient.

The comparative analysis showed that in the study group, the frequency of postoperative complications associated with surgical intervention in TChE decreased by 12.1% (from 14.7% to 2.6%) compared to the comparison group. This improvement is due to the optimization of tactical and technical approaches to the operation.

According to Table No5.3, purulent-septic complications were diagnosed in 10.7% of patients in the comparison group in TChE. Among them, wound infiltrate was observed in 3 (4.0%) patients, and wound suppuration was observed in 5 (6.7%) patients.

Table 5.3 Resource requirements by component

Incidence of postoperative complications in the immediate period with traditional access

Nature of complications	Groups				Total (n=151)	
	Comparisons (n=75)		Main (n=76)			
	ABS	%	Abs	%	ABS	%
Postoperative complications associated with surgery:						
External biliary fistula	2 (1)	2,6	-	-	2	1,3
Inconsistent. Stump of the GB	3 (3)	4,0	1	1,3	4	2,6
Subhepatic abscess	1	1,3	-	-	1	0,7
Intestinal paresis	5	6,6	1	1,3	6	4,0
Total	11 (4)	14,7	2	2,6	13	8,6
Purulent-septic wound complications:						
Wound infiltrate	3	4,0	2	2,6	5	3,3
Suppuration of the wound	5	6,7	-	-	5	3,3
Total:	8	10,7	2	2,6	10	6,6

c () is the number of patients with relaparotomy.

In the study group, purulent-septic complications were diagnosed in only 2 (2.6%) patients, which was due to inflammatory infiltrate of the postoperative wound.

Comparative analysis showed that in TChE purulent-septic complications in the study group decreased by 8.1% (from 10.7 to 2.6%) in relation to the comparison group, which is also due to the optimization of surgical tactics.

Postoperative complications of minimally invasive surgical interventions are presented in Table 5.4.

As can be seen from Table 5.4, in the comparison group, postoperative complications associated with surgical intervention in LChE were noted in 31 (5.8%) patients, with a

total number of relaparoscopies in 10 (1.8%).

Of these, external biliary fistula was noted in 9 (6.1%), incompetence of the stump of the gallbladder in 13 (2.4%), and subcutaneous emphysema in 9 (6.1%) patients.

In the study group, postoperative complications related to surgical intervention in laparoscopic cholecystectomy (LChE) were observed in 5 patients (0.7%). Relaparoscopy was required in only 1 patient (0.1%).

A comparative analysis revealed that in the study group, compared to the control group, the incidence of postoperative complications associated with surgical interventions decreased by 5.1% (from 5.8% to 0.I7%). Additionally, the number of relaparoscopic procedures decreased by 1.7% (from 1.8% to 0.1%). (Table 5.4)

As can be seen from Table No5.4., in the comparison group after ChE from the mini-access, postoperative complications were generally established in 7 (4.2%) patients, which in 4 (2.4%) cases required relaparotomy.

In the study group, postoperative complications associated with surgical intervention were observed in 1 patient (0.3%).

Comparative analysis showed that in the study group, the incidence of postoperative complications decreased by 3.9% compared to the comparison group (from 4.2% to 0.3%), and the number of relaparotomies decreased by 2.4% (from 2.4% to 0%).

According to Table No5.4, purulent-septic complications during laparoscopic cholecystectomy (LChE) were diagnosed in 15 patients (2.8%), including postoperative wound infiltrate in 6 patients (1.2%) and wound suppuration in 9 patients (1.7%).

In the study group, such complications were observed in only 1 patient (0.1%), which was associated with inflammatory infiltrate of the postoperative wound.

Comparative analysis revealed a 2.7% decrease in the incidence of purulent-septic complications in the study group compared to the reference group in LChE (from 2.8% to 0.1%).

According to Table No5.4, purulent-septic complications after cholecystectomy (ChE) through mini-access were observed in 8 patients (4.8%) in the comparison group. Of these, 3 (1.9%) had the formation of an infiltrate in the wound area, and 5 (3.0%) had suppuration of the wound.

Table 5.4

Postoperative complications of minimally invasive surgeries

Nature of complications	**Distribution by access**							
	LChE				ChE from Mini-Access			
	n=536				n=165			
	n = 715				n=362			
	ABS	%	ABS	%	ABS	%	ABS	%
Postoperative complications associated with surgery:								
Nature of complications	LChE		Relap-ya		ChEMA		Relap-ya	
External biliary fistula	9	6,1	2	0,7	-	-	-	-
	2	0,3	-	-	-	-	-	-
failure of the stump of the stomach	13	2,4	8	1,4	7	4,2	4	2,4
	1	0,1	1	0,1	-	-	-	-
Subcutaneous emphysema	9	6,1	-	-	-	-	-	-
	2	0,3	-	-	-	-	-	-
Total:	31	5,8	10	1,8	7	4,2	4	2,4
	5	0,7	1	0,1	-	-	-	-
Purulent-septic wound complications:								
wound infiltrate	6	1,2	-	-	3	1,9	-	-
	1	0,1	-	-	1	0,3	-	-
suppuration of the wound	9	1,7	-	-	5	3,0		
	-	-	-	-	-	-		
Total:	15	2,8	-	-	8	4,8	-	-
	1	0,1	-	-	1	0,3	-	-
*Note	- Comparison group				- Main Group			

In the study group, the incidence of purulent-septic complications was 0.3%, which manifested itself in the form of an inflammatory infiltrate of the postoperative wound in

one patient. This incident indicates a low probability of infectious complications if strict asepsis and antiseptic protocols are followed. An inflammatory infiltrate that occurred in one patient indicates a local infection, which could be caused by a violation of the integrity of the skin or bacterial contamination. To prevent such complications in the future, it is recommended to strengthen sterility control and take additional measures to prevent infections, such as antibiotic prophylaxis and thorough treatment of the surgical wound.

Comparative analysis revealed a significant decrease in the incidence of purulent-septic complications during cholecystectomy (ChE) through a mini-approach in the study group. This figure decreased by 4.5%, from 4.8% to 0.3%, compared to the comparison group. The enhanced outcomes may be attributed to a decreased risk of surgical wound contamination and improved drainage of the operative site. Mini-access procedures, as a surgical technique, are associated with reduced tissue trauma and accelerated patient recovery, thereby minimizing the incidence of postoperative complications.

Thus, both methods of cholecystectomy were performed with almost the same frequency in the study and control groups. However, they should still be performed with strict consideration of the indications and contraindications, as well as the advantages and disadvantages of each method (see Chapter 4). At the same time, it is important to note that these methods are not competing, but complement each other, that is, each of them to this day has its own role and place in the surgery of the cholelithiasis and bile ducts.

Table 5.5 presents data on postoperative complications of a general nature depending on the type of access.

Analysis of Table 5.5 shows that patients have experienced general postoperative complications after surgery, which in some cases have been fatal. In the comparison group where laparoscopic cholecystectomy (LChE) was used, acute hepatic-renal failure (AHRF) was diagnosed in three patients (0.6%), of whom two (0.4%) did not survive. In the study group, where other methods of surgical intervention were used, no cases of AHRF were recorded, which indicates a more favorable outcome and fewer complications.

These findings highlight the importance of choosing a surgical intervention to minimize the risk of serious postoperative complications, such as acute hepatic-renal failure, which is a life-threatening condition that requires immediate medical attention.

Laparoscopic cholecystectomy shows a lower incidence of AHRF compared to other methods, which indicates its benefits in terms of safety and improved patient outcomes. Acute cardiovascular insufficiency (myocardial infarction, hypertensive crisis) in the comparison group was diagnosed in 2 (0.4%) patients with a lethal outcome in 1 (0.2%) case, while in the study group – in 1 (0.1%) patient with a fatal outcome.

Table 5.5.

General postoperative complications depending on access

Distribution by access												
Personality complications	LChE				ChE from Mini-Access				Traditional			
	n=536				n=165				n=75			
	n=715				n=362				n=76			
	ABS (%)		Let-y		ABS (%)		Let-y		ABS (%)		Let-y	
Acute hepatic-renal failure	3	0,6	2	0,4	2	1,2	1	0,6	2	2,6	2	2,6
	1	0,2	-	-	-	-	-	-	1	1,3	1	1,3
Acute ser-vessel deficiency (infarction, hypert. crisis)	2	0,4	1	0,2	1	0,6	1	0,6	1	1,3	1	1,3
	1	0,1	1	0,1	1	0,3	-	-	1	1,3	-	-
Feasibility study	1	0,2	-	-	2	1,2	-	-	5	6,6	1	1,3
	-	-	-	-	-	-	-	-	1	1,3	-	-
Bronchopulmonary	8	1,5	1	0,2	5	3,0	-	-	5	6,6	-	-
	1	0,2	-	-	-	-	-	-	1	1,3	-	-
Total: abs/%	14	2,6	4	0,7	10	6,1	2	1,2	13	12,0	4	5,3
	3	0,4	1	0,1	1	0,3	-	-	4	5,2	1	1,3
Note	- Comparison group											
	- Main Group											

In the comparison group, one case (0.2%) was diagnosed with TEC in the form of

acute thrombophlebitis of the great saphenous vein, which ended favorably. In the study group, this complication was absent.

Broncho-pulmonary complications in the comparison group were diagnosed in 8 (1.5%) patients with a fatal outcome in 1 (0.2%) case, while in the main group these complications were not observed.

In general, after LChE, postoperative complications of a general nature were diagnosed in 14 (2.6%) patients with a fatal outcome in 4 (0.7%) cases, while in the study group – 3 (0.4%) patients with a fatal outcome in 1 (0.1%) case (a decrease in the number of postoperative complications of a general nature - by 2.2% and mortality - by 0.6%).

As can be seen from Table 5.5, after cholecystectomy (ChE) from mini-accesses, acute hepatic-renal failure (AHRF) in the comparison group was diagnosed in 2 (1.2%) patients, of whom 1 (0.5%) patient died. Acute cardiovascular failure (ACF) manifested in the form of myocardial infarction was reported in 1 (0.1%) patient, who also died. In the study group, AHRF was not observed, and myocardial infarction was diagnosed in 1 (0.3%) patient, who subsequently recovered. Thromboembolic complications (TEC) in the comparison group were detected in 2 (1.2%) patients, and pulmonary embolism (pulmonary embolism) was detected in 5 (3.0%) patients.

After cholecystectomy (ChE) through a mini-access in the comparison group, postoperative complications of a general nature were detected in 10 patients (6.1%), of whom 2 (1.2%) were fatal. In the study group, complications of this kind were observed in only 1 patient (0.3%), who subsequently fully recovered. Thus, the use of mini-access made it possible to reduce the frequency of postoperative complications of a general nature by 5.8%, while excluding lethal outcomes. These results indicate the high efficiency and safety of this method of surgical intervention.

As can be seen from Table 5.5., after ChE by "traditional" approaches in the comparison group, acute hepatic-renal failure was diagnosed in 2 (2.6%) patients with a fatal outcome in both cases, while in the study group – in 1 (1.3%) patients with a fatal outcome.

In the comparison group, feasibility studies were diagnosed in 5 (6.6%) patients with a fatal outcome in 1 (1.3%) patient, while in the study group in 1 (1.3%) case with a

favorable outcome.

Cardiovascular insufficiency in the comparison group was noted in 1 (1.3%) with mortality in 1, and in the study group in 1 (1.3%) without mortality.

In the comparison group, BLC was diagnosed in 5 (6.6%) patients with a favorable outcome and in the study group in 1 (1.3%) patient with a favorable outcome.

In general, after ChE by the "traditional" approaches, postoperative complications of a general nature in the comparison group as a whole were diagnosed in 13 (12.0%) patients with a fatal outcome in 4 (5.3%) cases, while in the study group - in 4 (5.2%) patients with a fatal outcome in 1 (1.3%) case (a decrease in general complications by 6.8% and mortality by 4.0%).

The absence of large wounds on the anterior abdominal wall after LChE and ChE from the modified mini-access made it possible to carry out early activation of the patient (from the first day after surgery).

After LChE, the mean postoperative bed-day was 4.71±0.3 days, after ChE from the modified mini-access, the average bed-day was 3.68±0.5.

Summary.

In the course of the study, a statistically significant decrease in the frequency of iatrogenic injuries was revealed in the study group compared to the control group. This figure decreased by 12.1%, from 14.4% to 2.3%. There was also a 5.7% reduction in the incidence of surgery-related postoperative complications, from 6.3% to 0.6%, and a 3.65% reduction in wound complications (purulent-septic), from 4.0% to 0.35%. These results made it possible to increase the proportion of patients with no postoperative complications from 89.7% to 99.0%. In addition, there was a decrease in mortality from 1.3% to 0.2%, as well as a decrease in the conversion rate after laparoscopic cholecystectomy (LChE) from 7.5% to 0.5%. In addition, the number of reoperations was eliminated from 2.0% to 0.1%, which indicates the high effectiveness of the implemented methods and approaches. The statistical significance of these changes is confirmed by the value of $p=0.005$.

Summing up the work done, we would like to note that today the LChE in MMA, being the "gold standard", is rightfully the operation of choice (in our studies, LChE was performed in the comparison group in 69.1% and in the main group in 62.0%). It is

important to note that we, including all abdominal surgeons, despite the achievements of today's medicine, in certain clinical situations (see Chapter 4) are forced to use "traditional" ChE (in our studies, "traditional" ChE was performed in the comparison group in 9.6% and in the main group in 6.6%).

Thus, the conducted scientific and practical study determined the role and place of modified ChE from mini-access (in our studies, ChE from mini-access was performed in 21.3% in the comparison group and in 31.4% in the main group), which is characterized by high clinical efficacy, especially in patients with contraindications to LChE, being not competing, but mutually complementary methods of surgical treatment of ChCCh.

CONCLUSION

Cholelithiasis is a prevalent medical condition, affecting approximately 10% of the global population. It remains a significant public health and social issue due to its substantial impact on individual quality of life. This condition is often complicated by the development of potentially life-threatening complications and an increased frequency of surgical interventions. [35; 56; 84; 129].

Diagnostic errors made in 12-38% of cases are accompanied by a consistently high mortality rate (2.5%), and with increasing liver failure, the development of severe complications and in the presence of cardiovascular diseases - from 14-27% to 40% of cases [21; 60; 137].

At present, it is generally recognized that LChE is the "gold standard" in cholelithiasis surgery, but its performance is often limited due to the need to inject air into the abdominal cavity.

At the same time, the development of minimally invasive methods of ChE from mini-accesses continues. The toolkit proposed by Prudkov M.I. [2002] has not been widely used clinically due to the complexity of the design. *Despite the widespread expansion of indications for minimally invasive surgical technologies, traditional methods of ChE remain in the arsenal of surgical interventions.*

The reason for performing the ChE in the traditional way when performing LChE and ChE from the mini-access is often technical difficulties or iatrogenic complications.

The current state of surgical practice for choledocholithiasis (ChCCh) is characterized by a lack of consensus regarding surgical tactics and optimal access routes to the stomach. Additionally, there is uncertainty about the specific indications for implementing these approaches. This unresolved ambiguity underscores the ongoing relevance of this clinical problem. However, in the literature available to us, we did not find works where parallels would be drawn in the comparative aspect in establishing indications for surgery, there are no therapeutic and diagnostic algorithms, and the role and place of CHE from mini-access are not fully determined, and, accordingly, the results of surgical treatment, which was the reason for this study, are not fully studied.

The subject of this study was 1929 patients with ChCCh, who, according to the purpose of the study, were conditionally divided into a comparison group - 776 (40.3%)

patients subject to retrospective analysis and the main group - 1153 (59.7%) who used optimized surgical tactics.

In both groups, the proportion of patients at a young age (18 - 44 years) significantly prevailed, which amounted to 379 (48.8%) and 535 (46.4%), respectively. In the comparison group in the middle age (45 - 59 years), the number of patients was 211 (27.2%) and in the study group 356 (30.9%).

Patients over 60 years of age accounted for 128 (16.5%) in the comparison group, 182 (15.8%) in the study group, and 58 (7.5%) and 80 (6.9%) in the comparison group, respectively.

Such "age-related" features exacerbate the complexity of surgical treatment of patients with cholelithiasis due to the pronounced polymorbidity of this age group. It has been established that females are more likely to get sick (81.6% in the comparison group; 82.5% in the main group, with a ratio of 5:1).

The duration of the anamnesis in this group of patients played an extremely significant role in determining risk factors: the longer the cholecystitis existed, the more often unfavorable conditions were created for the body's adaptation to the increase in the number of complications in the pre- and postoperative periods. In the comparison group, the duration of the disease up to 1 year was established in 274 (35.3%) patients, in the study group in 439 (38.1%) patients. In the comparison group, the duration of the disease from 1 to 5 years was established in 502 (64.7%), while in the main group – in 714 (61.9%).

n the control group, cardiovascular diseases were the most prevalent comorbidities. Specifically, coronary artery disease, manifesting as angina pectoris and atherosclerosis, was diagnosed in 73 (9.4%) individuals in the control group and 191 (16.5%) individuals in the study group. Hypertension was also more frequently observed in the study group, with 75 (9.7%) participants in the control group and 138 (12.0%) participants in the study group receiving a diagnosis of hypertension.

A relatively high rate of anemia was diagnosed in 55 (7.1%) patients of the comparison group and in 115 (10.0%) of the main group of patients. Various forms of bronchopulmonary diseases were diagnosed in 35 (4.5%) patients and in 62 (5.4%), as

well as inflammatory diseases of the genitourinary system were diagnosed in 50 (6.4%) and 66 (5.7%), respectively.

Simultaneous operations were performed in 25 (3.2%) patients of the comparison group and 31 (2.7%) of the study group. At the same time, traditional echinococcectomy was performed more often in the comparison group - in 5 (0.6%) patients and in 9 (0.7%) patients in the main group, hernioplasty - in 8 (1.0%) and 5 (0.4%) patients, respectively. Various types of gynecological operations in the form of uterine amputation were performed in 3 (0.4%) and 5 (0.4%) patients, as well as cystectomy in 9 (1.1%) and 10 (0.8%) patients, respectively.

All studies were carried out in accordance with the protocol approved by the Ministry of Health of the Republic of Uzbekistan, and statistical studies confirmed the reliability of the results obtained.

In the comparison group, traditional ChE was performed in 75 patients. Upper median laparotomy was used as an access in 23 (30.7%) patients. Traditional ChE with the right subcostal approach according to Kocher and Fedorov was performed in 52 (69.3%) patients.

TChE was performed in 57 (76.0%) patients, and resection of the gallbladder was performed in 4 (5.3%) patients. Along with TChE, 14 (18.7%) patients underwent simultaneous operations. In our studies, in the uncomplicated course of this disease, LChE was performed in 536 patients. Of these, in 76 (14.2%) cases, conversion was performed, the causes of which were iatrogenic injuries (48) and common bile duct stones (28). Analysis of the causes of iatrogenic injuries showed the need for complete differentiation of atypical tubular structures and the need to observe the previewedness of surgical technique.

In 450 (83.9%) cases, LChE was performed in isolation. In 9 (1.7%) patients, LChE was combined with simultaneous operations.

In the analysis in the comparison group, a number of tactical and technical omissions were identified. Thus, in 11 patients, TChE was performed against the background of severe concomitant diseases, which in the postoperative period led to death in 4 (5.3%) patients.

In 76 (14.2%) patients, the desire for obligatory low-level access led to iatrogenic injuries, with mortality in 4 (0.7%) cases. In 7 patients, insufficient preparation for cirrhosis of the liver led to bleeding from the bed, which was stopped during surgery.

In general, the postoperative period in 23 (3.0%) cases was complicated by failure of the sutures of the stump of the cystic duct, biliary fistula in 11 (1.42%) cases, subhepatic abscess in 1 (0.13%), intestinal paresis in 5 (0.64%) cases.

In 8 (1.03%) patients, the postoperative period was complicated by thromboembolic complications, including acute thrombophlebitis of the veins of the lower extremity in 4 patients. 1 (0.1%) patient developed a fatal PE on day 5. The analysis showed that the prevention of feasibility studies was not carried out at the proper level.

Out of 165 cases of ICE from the mini-access, 147 (89.1%) patients performed in isolation, and in sclerosis and shrunken GB, 4 (2.4%) patients underwent resection of the gallbladder, and in 4 (2.4%) patients, simultaneous operations were performed. Access conversion was performed in 10 (6.1%) patients.

Thus, in the comparison group (776), 165 (21.3%) patients performed ChE from the mini-approach, where the frequency of simultaneous operations was only 4 (2.4%) cases.

Analysis of the results of surgical treatment in the comparison group showed that a number of tactical and technical omissions were made (see Chapter 3).

The unsatisfactory results of surgical treatment in the comparison group led to a revision of surgical tactics both in terms of diagnosis and in terms of choosing the optimal approach, as well as the extent of the operation.

Analysis of omissions in the comparison group allowed us to develop and implement in clinical practice an improved therapeutic and diagnostic algorithm (DGU 22525 – from 02/24/2023) and a modified CE from a mini-access (IAP 07410 from 05/17/2023), which in general made it possible to optimize surgical tactics.

The modified HE from the mini access provides the versatility of the incision for different physique and location of the stomach, as well as reduces the trauma of the operation by preserving the integrity of the right rectus abdominis muscle and ensuring the cosmeticity of the scar.

In the main group of patients, we carried out a purposeful comprehensive preoperative

preparation. The management of the postoperative period was considered as a continuation of the unified program of therapeutic measures initiated during the preoperative preparation and the operation itself.

According to the proposed algorithm, all patients underwent the determination of clinical and anamnestic data. After that, clinical, laboratory and instrumental studies began. Then the presence and severity of concomitant therapeutic pathology were determined.

When diagnosing compensated forms of concomitant therapeutic pathology, the Department of Surgery corrected them together with the appropriate specialists. When diagnosing subcompensated forms of concomitant therapeutic pathology, treatment with correction was carried out in specialized departments under the supervision of appropriate specialists. After the treatment, the indications for surgical treatment were determined.

The diagnostic program begins with an ultrasound examination, which is a non-invasive and affordable imaging method. However, in some cases, ultrasound may be difficult to clearly visualize certain parameters of the gallbladder (gallbladder), such as its shape, size, and contents. In such situations, multispiral computed tomography (MSCT) is used for a more accurate diagnosis, which allows you to obtain detailed three-dimensional images of the stomach and extrahepatic bile ducts.

MSCT provides an opportunity for a more accurate assessment of the morphological characteristics of the gallbladder, including the presence of stones, their size, density and location. In addition, MSCT allows visualization of extrahepatic bile ducts, such as the common bile duct (ADI) and cystic duct, which is important for the differential diagnosis of cholelithiasis (ChL) and other biliary tract diseases.

In cases where the diagnosis of cholelithiasis, excluding choledocholithiasis (gallstones without bile duct stones), is confirmed, cholecystectomy (ChE) is considered the preferred surgical treatment approach. Contemporary surgical practice favors minimally invasive techniques, such as laparoscopic cholecystectomy (LChE) or mini-access cholecystectomy, due to their ability to reduce operative trauma, postoperative pain, and patient rehabilitation time.

When an ultrasound examination (US) reveals a contracted gallbladder (BG) located within the liver, it is necessary to employ more precise diagnostic methods to ensure accurate assessment and appropriate management. This may include computer-assisted ultrasound (computed tomography ultrasound, CT) or multispiral computed tomography (MSCT). These methods allow for more detailed visualization of anatomical structures and assessment of the degree of wrinkling of the gallbladder, as well as its intrahepatic location.

After clarifying the data on the presence of a shrunken stomach, which is characterized by sclerosis and a decrease in the volume of the organ, as well as its intrahepatic position, the surgical method of choice is cholecystectomy from a mini-approach (ChE). This method involves performing the operation through a small incision (usually 3-5 cm), which minimizes the trauma of the intervention and speeds up the patient's rehabilitation process. In some cases, it is possible to perform a transvaginal cholecystectomy (TChE), in which the incision does not exceed 10 cm, and the right rectus abdominis muscle remains intact.

In the case of Mirizzi syndrome, which is characterized by obstruction of the bile ducts due to the abnormal location of the gallbladder and its neck, transvaginal cholecystectomy is also the preferred surgical method. At the same time, the length of the incision should not exceed 10 cm, and the integrity of the right rectus abdominis muscle should be preserved. This reduces the risk of postoperative complications and speeds up the patient's recovery.

In the study group, when choosing the TKE method, the principle was adhered to: the successful operation depends on the correctly chosen surgical approach. At the same time, we took into account the patient's physique, paid attention to the angle of the costal arch, as well as the identification of the structures of the gallbladder and the gallbladder neck area, the presence of complications and combined surgical and concomitant therapeutic pathology, which allowed us to choose one or another type of "traditional" access to the gallbladder.

In the study group, cholecystectomy (ChE) with upper median laparotomy was performed in 28 patients (36.8%). The distribution by sex turned out to be even: 14 men

and women (18.4%). Cholecystectomy from the right costal approach was performed in 48 patients (63.2%).

Indications for upper median laparotomy in the study group were the presence of a hernia of the white line of the abdomen, combined surgical pathology requiring surgical intervention (gastric and duodenal ulcer, echinococcosis of the liver), as well as the asthenic body type of the patient. The asthenic body type is characterized by a weak skeletal musculature, a deficit of adipose tissue and a relatively low body mass index (BMI).

TChE was performed in 58 (76.4%) patients, and resection of the gallbladder was performed in 4 (5.3%) patients. In 14 (18.7%) patients, ChE was accompanied by simultaneous operations.

In the study group, laparoscopic access was performed in 715 patients with conversion in 2 cases. It was caused by marginal liver injury with bleeding (2). Isolated ChE was performed in 695 (97.2%) patients, and resection of the gallbladder was performed in 3 (0.5%) patients. In 19 (2.7%) patients, along with LChE, simultaneous operations were performed. At the same time, conversion to the "traditional" access was made in 2 (0.2%) patients.

Out of 362 patients, 354 (97.8%) patients underwent ChE from the modified mini-access, and 4 (1.1%) patients underwent resection of the PEP. In the case of ChE from the modified mini-access, simultaneous operations were performed in 3 (0.8%) patients. ChE from the modified mini-access performed in 362 patients required conversion to the "traditional" access in 1 (0.3%) case, which was due to technical difficulties due to the intrahepatic location of the gallbladder and grade 3 obesity.

The conversion of access was due to the adhesion process, as well as in some cases, choledocholithiasis and obesity.

As a result of the study, a significant decrease in the incidence of iatrogenic injuries was observed in the study group, which amounted to 2.3% compared to the comparison group, where this figure was 14.4%. There was also a decrease in postoperative complications associated with surgery, from 6.3% to 0.6%. Wound (purulent-septic) complications also decreased significantly from 4.0% to 0.35%. These improvements

made it possible to increase the proportion of patients without postoperative complications from 89.7% to 99.0%.

The mortality rate decreased from 1.3% to 0.2%, which indicates an increase in the safety of surgery. Conversions after laparoscopic cholecystectomy (LChE) also decreased from 7.5% to 0.5%, indicating an improvement in technical skills and techniques for performing the operation. The reoperations were almost completely eliminated, decreasing from 2.0% to 0.1% (p=0.005).

These results confirm the effectiveness of the introduction of new protocols and techniques in surgical practice, which contributes to improving the outcomes of operations and reducing the risk of complications.

Summing up the work done, we would like to note that today the LChE in ChCCh, being the "gold standard", is rightfully the operation of choice (in our studies, LChE was performed in the comparison group in 69.1% and in the main group in 62.0%). It is important to note that we, including all abdominal surgeons, despite the achievements of today's medicine, in certain clinical situations (see Chapter 4) are forced to use "traditional" ChE (in our studies, "traditional" ChE was performed in the comparison group in 9.6% and in the main group in 6.6%).

Thus, the conducted comprehensive scientific and practical study made it possible to determine the significance and position of modified cholecystectomy (ChE) from a mini-access in the context of modern surgery. In our study, ChE from the mini-access was used in the comparison group in 21.3% of patients, and in the study group in 31.4%. This method has demonstrated high clinical efficacy, especially in patients with contraindications to laparoscopic cholecystectomy (LChE). It is important to note that the modified ChE from the mini-access does not compete with LChE, but is a complementary approach to the surgical treatment of chronic calculous cholecystitis (ChCCh), which is confirmed by the results of comparative analysis and statistical data processing.

CONCLUSIONS

1. The elevated incidence of postoperative complications and mortality observed following cholecystectomy for chronic calculous cholecystitis is attributed to tactical and technical errors. In the comparison group, postoperative complications related to surgical procedures occurred in 6.3% of cases, while mortality rates were 1.3%. Additionally, conversion to open cholecystectomy after initial laparoscopic approach was noted in 7.5% of cases, and reoperations were required in 2.0% of instances.
2. The modified common bile duct exploration (ChE) technique via mini-access surgery is recommended in cases where laparoscopic cholecystectomy is contraindicated due to its technical simplicity, accessibility, and adaptability to various patient body types and gallbladder positions.
3. The proposed therapeutic and diagnostic algorithms, with refined indications, contraindications and justification of the advantages and disadvantages of each of the methods of cholecystectomy, make it possible to optimize surgical tactics.
4. The study made it possible to clarify the indications, contraindications and substantiate the advantages and disadvantages of each of the three methods of cholecystectomy and to determine the role and place of the proposed method of ChE from the mini-access in the surgery of chronic calculous cholecystitis.
5. The optimization of surgical tactics and the implementation of modified choledocholithotomy via mini-access, particularly in cases where laparoscopic choledocholithotomy is contraindicated, significantly reduced the incidence of postoperative complications associated with the surgical intervention to 0.3%, the mortality rate to 0.3%, conversion rates to 0.5%, and reoperation rates to 0.1% ($p < 0.005$).

PRACTICAL RECOMMENDATIONS

1. We recommend for wide practical use the modified method of ChE from the mini access in chronic calculous cholecystitis due to the technical simplicity, ensuring the versatility of the incision for different physique and location of the gallbladder, as well as low trauma and ensuring the cosmeticity of the scar.

2. In chronic CCh, we recommend adhering to the proposed treatment and diagnostic algorithm with specified indications, contraindications, taking into account the advantages and disadvantages of each of the methods of cholecystectomy, which allows you to optimize surgical tactics.

3. The use of minimally invasive technologies by practical surgeons can reduce the frequency of iatrogenic injuries and postoperative complications, and also contributes to a more favorable course of the postoperative period and early activation of patients with chronic CCh.

4. We recommend a wider use of the modified method of cholecystectomy from a mini-access, in case of contraindications to LChE, which will improve the results of surgical treatment of chronic calculous cholecystitis.

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LIST OF ABBREVIATIONS

Abs - absolute values;

ChL - cholelithiasis;

GB - gallbladder;

BD - bile duct;

CT - computed tomography;

LChS - laparoscopic cholecystostomy;

LChE - laparoscopic cholecystectomy;

MIT - minimally invasive technologies;

MIChE - Mininvasive cholecystectomy;

ML - Minilaparotomy;

IVH - incisional ventral hernia;

ChCCh - chronic calculous cholecystitis;

AThVLE - acute thrombosis of the veins of the lower extremities;

TChE - traditional cholecystectomy;

PE - pulmonary embolism;

TEC - thromboembolic complications;

USE - Ultrasound examination;

ChHF - chronic heart failure.

ChCK - cholecystokinin

ChOPD - chronic obstructive pulmonary disease