

# CHOLELITHIASIS - MODERN POSSIBILITIES OF SURGICAL TREATMENT (LITERATURE REVIEW)

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**Abstract:** the article describes modern methods of diagnosis and treatment of acute cholecystitis and its complications in cholelithiasis. In the literature, data on the problem of treating choledocholithiasis are contradictory. The question of evaluating the effectiveness of various treatment technologies remains open and requires further in-depth study. The introduction of new methods and technologies in the treatment of patients with choledocholithiasis not only did not bring clarity to the solution of issues related to the tactics of treating such patients, but, on the contrary, increased the contradictions.

**Keywords:** cholelithiasis, cholecystitis, cholecystectomy, endoscopic methods.

## ЖЕЛЧНОКАМЕННАЯ БОЛЕЗНЬ – СОВРЕМЕННЫЕ ВОЗМОЖНОСТИ ХИРУРГИЧЕСКОГО ЛЕЧЕНИЯ (ОБЗОР ЛИТЕРАТУРЫ)

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**Аннотация:** в статье описаны современные методы диагностики и лечения острого холецистита и его осложнений при желчнокаменной болезни. В литературе данные, посвященные проблеме лечения холедохолитиаза, разноречивы. Вопрос оценки эффективности различных технологий лечения остается открытым и требует дальнейшего более углубленного изучения. Внедрение новых методик и технологий в лечение пациентов с холедохолитиазом не только не принесло ясности в решение вопросов, касающихся тактики лечения таких пациентов, но, и наоборот, усилило противоречия.

**Ключевые слова:** желчнокаменная болезнь, холецистит, холецистэктомия, эндоскопические методы.

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Currently, gallstone disease (GSD) occupies a leading position in the structure of diseases of the organs of the hepatobiliary system. It has not only great medical, but also social significance, since the number of patients of young and working age is steadily increasing from year to year. In recent years, there has been a tendency towards an increase in the incidence of cholelithiasis throughout the world, including in Uzbekistan. Thus, the problem of treatment of gallstone disease and its ductal complications is one of the most urgent for modern surgery of the biliary tract [5, 17].

Today GSD occurs in more than 10% of the world's population. According to a number of authors, the prevalence of cholelithiasis in certain regions of the world can reach 10-40%, and over the past decades, the number of patients with cholelithiasis has doubled [28]. So, in the countries of Europe and North America, cholelithiasis is detected in 10-15% of the population under the age of 40, over 40 - already in 15-20%, and after 70 years in almost 50% [16].

With an increase in life expectancy, the number of elderly and senile patients who, in addition to gallstone disease, also have no less dangerous concomitant diseases, also increases. Thus, in 73-76% of such patients, the course of cholelithiasis is complicated by various severe concomitant diseases, which sharply worsen the results of treatment [13].

Simultaneously with the increase in the overall incidence of cholelithiasis, the number of its complicated forms also increases. Among all complications of gallstone disease, special attention should be paid to choledocholithiasis, stenosing duodenal papillitis and their combination. Success in the treatment of patients with various complicated forms of cholelithiasis is also largely due to the determination of the optimal timing of treatment, the nature of therapeutic measures and a tactical approach [5, 22].

However, at present this problem remains unresolved, as evidenced by the huge variety of approaches used using combinations of conservative and surgical methods of treatment. For the first time open choledochotomy was successfully performed in 1889 by J. Thomston. From the end of the 19th century until the 70s of the last century, open choledocholithotomy remained the only surgical method for treating choledocholithiasis [21].

Even today, despite the extensive introduction of minimally invasive technologies and methods of treating choledocholithiasis, traditional laparotomic choledocholithiotomy remains relevant. Many surgeons still prefer this technique today. The wide surgical access provides comfortable conditions for performing absolutely all types of interventions on the gallbladder and bile ducts in case of cholelithiasis, choledocholithiasis, stricture of the terminal section of the common bile duct and other pathology of the biliary tract and provides the possibility of one-step resolution of this pathology. Open choledocholithotomy is characterized by a lower percentage of iatrogenic injuries of the bile ducts and vascular structures compared to minilaparotomic and laparoscopic interventions [15, 23].

Despite all its advantages, at the present time, surgical choledocholithotomy all over the world is recognized by most surgeons as a reserve operation [8]. The fact is that surgical intervention on hepaticoholedochus in conditions of pronounced peripubular infiltrate, or with a narrow common bile duct, is a technically very difficult operation and often ends unfavorably. In 19-37.7% of cases, a number of complications develop, both in the immediate and late postoperative periods [18]. According to many authors, mortality after open cholecystectomy in combination with choledocholithotomy is 2 to 13 times higher than with laparotomic cholecystectomy performed without intervention on the biliary tract [9].

A large number of unsatisfactory results of the treatment of cholecystocholedocholithiasis in elderly and senile patients deserves special attention. In persons of this age group, the postoperative mortality rate is 7.8%, and the mortality rate in the case of repeated operations for choledocholithiasis reaches 11-18%. Obstructive jaundice and acute cholangitis increase the percentage of unfavorable outcomes to 16-65% [6]. Postoperative stricture of the common bile duct develops in 0.6-9% of cases after traditional laparotomic choledocholithotomy with external drainage of the common bile duct. This is comparable to the number of strictures of iatrogenic origin. Quite often, in 0.4-7.5% of cases after such interventions there is a recurrence of choledocholithiasis [11]. Its causes are foreign bodies of the bile duct, ligatures, drains, their fragments, uncorrected large duodenal papilla (LDP) stenosis [15]. The increase in the number of complications after open choledocholithotomy is also associated with the fact that today this operation is performed less and less frequently [8, 20].

The current trend in medicine, and in surgery, in particular, is the desire to use minimally invasive interventions, which allows you to get the maximum result with minimal surgical trauma. So, in the early 90s of the last century, minilaparotomic and video laparoscopic methods of treating gallstone disease were developed and introduced into clinical practice.

In 1994 M.I. Prudkov developed and for the first time in the world performed cholecystectomy from a mini-access using a set of instruments of the original development "Mini-Assistent". A little later, choledocholithotomy was performed using a mini access, which compares favorably with the traditional laparotomy intervention in its low trauma. The undoubted advantages of this technique are the similarity of the technique and surgical techniques of choledocholithotomy from a mini access with traditional open choledocholithotomy and full visual control over all stages of the operation [4, 19].

Some surgeons suggest combining mini-access choledocholithotomy with intraoperative cholangioscopy. It is also possible to perform an intervention on the gallbladder and bile ducts from a mini access while maintaining the integrity of the sphincter of Oddi [9]. In many clinics of the world, including in many medical institutions of our country, choledocholithotomy from the mini access has replaced the open method of surgical intervention [4, 21].

Many leading foreign and domestic experts consider laparoscopic choledocholithotomy as an alternative to traditional and mini-laparotomic choledocholithotomy [23]. So, thanks to the emergence and development of video laparoscopic surgery, it was finally possible to solve one of the important surgical problems - the discrepancy between an extensive, rather traumatic approach and a rather small intervention in volume and duration. Laparoscopic interventions are low-traumatic. This is evidenced by the lighter course of the early postoperative period in comparison with open operations, and the low severity of the postoperative pain syndrome. Often, after laparoscopic interventions, the intensity of the pain syndrome is so low that the need for the appointment of narcotic analgesics is completely absent [6, 15].

Currently, thanks to technological progress, a large number of not only foreign, but also domestic clinics have the ability to perform video laparoscopic operations on the extrahepatic bile ducts. Today it is possible to perform laparoscopic choledocholithotomy, choledochoraphy and external drainage of the bile ducts, the formation of biliodigestive anastomoses [14].

According to a number of authors, the laparoscopic method of treating choledocholithiasis is comparable in efficiency and the number of complications with preoperative endoscopic papillosphincterotomy, but differs from it in the shorter duration of inpatient treatment. Surprisingly, in modern foreign sources, the authors note a greater number of complications and the percentage of deaths during EPST with subsequent laparoscopic cholecystectomy compared to laparoscopic choledocholithotomy or litextraction, which is most likely due to the summation of complications as a result of two-stage treatment of choledocholithiasis [20].

Today, the indications for video laparoscopic operations on the organs of the biliary tract have been significantly expanded. Laparoscopic interventions are performed for various forms of gallstone disease, including its complicated forms [7].

Laparoscopic extraction of calculi from the lumen of the common bile duct is possible in two ways: through the cystic duct and through laparoscopic choledocholithotomy.

Transcystic extraction. This method of laparoscopic removal of calculi is attractive due to its low invasiveness and technical simplicity [15]. An important condition for the successful implementation of this technique is the location of calculi below the confluence of the cystic duct. At the same time, the proximal part of the common bile duct in this case is not available for sanitation of hepaticoholedochus. In addition, the anatomical features of the fusion of the cystic and common bile ducts, as well as the diameter of the gallbladder duct, are of great importance [14]. In this case, the success of transcystic extraction depends on the size of calculi, their number and options for the flow of the cystic duct into the common bile duct. A pronounced cicatricial-infiltrative process in the hepatoduodenal zone can also be an obstacle [12].

In the literature, there are data on successful dilatation of the cystic duct to 6-8 mm, which in most cases makes it possible to easily pass modern cholangioscopes into the lumen of the common bile duct and successfully sanitize hepaticocholedochus. Thus, in the presence of single stones with a diameter of up to 8 mm in the common bile duct, the preference is given to the transvesical method of lithoextraction, which is successful in 61-80% of cases. According to a number of authors, the incidence of residual choledocholithiasis with transcystic extraction is 1.8%. The number of successful laparoscopic literal extractions for 7 years has progressively increased from 22% to 86% [20].

Early postoperative complications occur with a frequency of 3.7 to 15.7%. Most often, after laparoscopic choledocholithotomy, bile leakage into the free abdominal cavity can be observed, which occurs as a result of dislocation of the endoclips from the cystic duct stump, or as a result of the prolapse of the drainage tube from the hepatic choledochus. Other complications are also possible: bleeding from the gallbladder bed, trocar wound of the anterior abdominal wall or from a dissected adhesion, acute pancreatitis, abdominal abscesses, suppuration of the postoperative wound. Residual choledocholithiasis is observed in 1.9-5% of patients. Mortality after such an intervention is about 0.6-0.9% [9, 18].

Laparoscopic choledocholithotomy is used when transcystic extraction is impossible [7]. Recently, it has been used as an alternative to preoperative EPST. Indications for laparoscopic choledocholithotomy are: intraoperatively diagnosed choledocholithiasis, large (more than 10 mm in diameter) concretions, failure to remove concretions by the transcystic method.

In the literature, there is a fairly high efficiency of laparoscopic choledocholithotomy, especially in patients after unsuccessful attempts at endoscopic transpapillary removal of common bile duct calculi [6]. Complications develop in 3.7-15.8% of cases. Mortality is 0.6-1% [7].

However, laparoscopic choledocholithotomy remains a less preferred method of debridement of the bile ducts and is not as widespread as transcystic laparoscopic extraction.

A cicatricial-inflammatory or infiltrative process in the area of the hepatoduodenal ligament can significantly complicate laparoscopic interventions on hepaticocholedochus. Certain difficulties are presented by the extraction of small stones from a sharply expanded common bile duct, as well as large calculi of the common bile duct. An important factor is the high cost of endovideoscopic equipment and special instruments. Also, the question of controlling the completeness of the common bile duct sanitation and the possible option of completing the surgical intervention, which may result in choledochoraphy, the formation of internal biliodigestive anastomoses or external drainage of the extrahepatic bile ducts, remains unresolved [5].

The widespread introduction of endovideoscopic technologies into clinical practice, often insufficient level of professional training of surgeons, peculiarities and limitations of laparoscopy (limited possibilities of palpation control in the area of surgical intervention), can cause severe complications arising after laparoscopic operations. The most severe complications of laparoscopic treatment of cholecystocholedocholithiasis are damage to tubular structures (extrahepatic bile ducts, large vessels of the abdominal cavity, parenchymal and hollow organs. Similar complications occur in 0.4-5.3% of cases [22]. In laparoscopic surgery, the likelihood of iatrogenic damage vessels or ductal structures are an order of magnitude higher than during open intervention [21].

It is with laparoscopic interventions that intraoperative damage to the bile ducts tends to be more severe than with laparotomic interventions, the course and prognosis, since in this case the mechanism of damage to the bile ducts is most often caused by electrical trauma, and with a significantly high frequency there is high damage to the hepatic choledochus [16]. In addition, a number of authors have convincingly proved that laparoscopic choledocholithotomy is often accompanied by the development of hepaticocholedochus strictures and recurrent choledocholithiasis [4, 17].

Contraindications for laparoscopic interventions on the extrahepatic bile ducts traditionally include: severe coagulopathy, long term pregnancy, gallbladder cancer, the presence of pronounced inflammatory-infiltrative changes in the gallbladder and hepatoduodenal ligament, as well as external and internal bile fistulas that impede differentiation elements of the hepatoduodenal ligament. Today, with the accumulation of experience in performing laparoscopic interventions, the range of absolute and relative contraindications for laparoscopic interventions on the extrahepatic bile ducts is gradually decreasing [9].

The widespread use of laparoscopic interventions on the biliary tract has determined the technical possibility of performing intraoperative antegrade papillosphincterotomy (APST) during laparoscopic choledocholithotomy. The desire to simultaneously resolve the pathology of the gallbladder and bile ducts has led to the development and introduction into practice of antegrade intraoperative papillotomy [3]. For the first time, APST during laparoscopic cholecystectomy was proposed by A.L. De Paula in 1993. He also identified the main indications for this method of treatment: LDP stenosis, multiple choledocholithiasis, the need to perform intraoperative lithotripsy and the expansion of the common bile duct by more than 20 mm. According to a number of authors, indications for APST are only unsuccessful attempts to eliminate choledocholithiasis under choledochoscopic control [18].

Antegrade papillosphincterotomy can be performed in two ways: through the gallbladder duct and through the choledochotomy opening. Performing APST through the cystic duct is preferable because it is technically a simpler intervention and does not oblige the surgeon to complete the operation with external drainage of hepaticocholedochus or the formation of a biliodigestive anastomosis [8, 20].

Antegrade papillosphincterotomy, not being a complex manipulation, has a number of undeniable advantages over retrograde interventions on LDP. Antegrade papillosphincterotomy is feasible in cases where EPST is unsuccessful, for example, in the case when the large duodenal nipple is located in the parafaterial diverticulum, pronounced deformity of the duodenum and the LDP zone, or with papillitis. Antegrade papillosphincterotomy completely excludes the

development of post-manipulative acute pancreatitis. This is due to the antegrade insertion of the papillotome and the exclusion of accidental cannulation of the main pancreatic duct, which often occurs during retrograde endoscopic manipulations, especially in cases of so-called "difficult" cannulations [23].

Some authors believe that a lower percentage of complications after antegrade papillosphincterotomy is associated with good relaxation against the background of mechanical ventilation [17]. A number of difficulties in performing APST during laparoscopic choledocholithotomy have been described. First, when performing intraoperative fibrogastroduodenoscopy, a large amount of air is introduced into the lumen of the stomach and duodenum, which impairs the view through the video laparoscope. Secondly, large calculi, and especially multiple choledocholithiasis, completely exclude the possibility of antegrade papillotome conduction. Difficulties also arise when conducting a papillotome through a scar-altered LDP. Also, great difficulties arise in the implementation of the papillosphincterotomy itself, since it is very difficult to fix the cutting string of the papillotome at the 11-12 o'clock position, and this requires sufficient skill and time [14].

In 14.1% of cases, it is completely impossible to pass papillotomas through the stenotic LDP into the duodenum. In 2.2%, there are difficulties with the extraction of calculi using the Dormia basket due to their large size [16].

Indications for antegrade papillosphincterotomy are interventions for cholecystocholedocholithiasis in the absence of purulent cholangitis, fixed or restrained calculus LDP, as well as the so-called "large" choledocholithiasis.

The advantages of antegrade papillosphincterotomy should be considered: the ability to minimize the number of post-manipulation complications [5], the possibility of performing laparoscopic interventions on the bile ducts with the possibility of resolving cholecystocholedocholithiasis and stricture of the terminal section of the common bile duct within a single surgical intervention.

Disadvantages of the method: the need for expensive equipment, a high level of complexity of intervention on the biliary tract, limited possibilities of laparoscopic intervention in severe cicatricial and inflammatory changes in the hepatoduodenal ligament zone, a combination of "large" and multiple choledocholithiasis, Mirizzi's syndrome. Also, the disadvantages of antegrade papillosphincterotomy include the technical inconveniences of duodenoscopy during the operation, and the negative aspects associated with the conduct of the laparoscopy itself [10, 13].

The conditions that are necessary for performing antegrade papillosphincterotomy are: equipping with equipment for interventions on the extrahepatic bile ducts, as well as possession of the technique of endovideoscopic interventions on the extrahepatic bile ducts, coordination of the actions of the surgeon and the endoscopist. These are the main reasons why antegrade papillosphincterotomy is currently not widely used in clinical practice [23].

Thus, summarizing all of the above, we can say that the problem of treating cholelithiasis and its complicated forms has almost a century and a half history, but many questions remain unresolved to this day. There are no unambiguous recommendations on the choice of a method for the treatment of cholecystocholedocholithiasis so far. For each patient, depending on his specific condition, the presence of concomitant pathology and the duration of the disease, it is necessary to choose the most optimal treatment option. Back in 1934 S.P. Fedorov wrote: "In no area does a surgeon have to be in such a difficult situation as during operations on the biliary tract, and nowhere can a patient be injured by the slightest mistake made during the operation." These words remain very relevant today, despite the variety of therapeutic and diagnostic methods [2].

The emergence and development of endoscopic surgery has been regarded as a major breakthrough in the treatment of choledocholithiasis. Numerous studies of the results of the use of X-ray endoscopic therapeutic and diagnostic interventions both in the immediate and long-term periods indicate that it is precisely endoscopic transpapillary interventions that are the "gold standard" for the treatment of choledocholithiasis [6]. However, in a number of cases, the implementation of retrograde manipulations becomes very difficult, accompanied by a number of severe complications, intervention, and sometimes completely impossible. That is why it seems quite obvious that it is necessary to reassess the possibilities of endoscopic interventions in favor of endovideoscopic technologies [10].

With the accumulation of experience in laparoscopic operations, the advantages of the endovideoscopic method for resolving choledocholithiasis and correcting the pathology of the biliary tract are increasingly convincingly proved [3]. However, the problem of using endovideoscopic technologies in choledocholithiasis surgery is still poorly covered in modern literature.

Thus, today there is no such method for the treatment of choledocholithiasis, which would combine the advantages of minimally invasive endoscopic transpapillary interventions and traditional laparotomic choledocholithotomies. Dissatisfaction with the results of treatment with any methods requires an integrated approach to the treatment of patients with cholecystocholedocholithiasis using combinations of endoscopic, endobiliary and video laparoscopic interventions.

A promising development in the treatment of choledocholithiasis is the development and improvement of combined methods of treating the disease. Obviously, such an approach will significantly improve the immediate results of treatment of patients with cholelithiasis complicated by choledocholithiasis.

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