



## Ultrasonic Diagnosis Methods for Choledocholithiasis

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**Abstract:** The problem of diagnostics and treatment of choledocholithiasis as one of the most frequent complications of cholelithiasis (GSD) is urgent. According to a number of authors, choledocholithiasis occurs in 15-25% of patients with cholelithiasis. Laboratory and clinical symptoms are neither sensitive enough nor specific enough. The disadvantages of transabdominal ultrasound (TAUS) and computed tomography (CT) as non-invasive methods for diagnosing choledocholithiasis are now well known.

**Keywords:** ultrasound, choledocholithiasis, choledochus, cholangitis.

**Introduction.** Developed in the 70s of the last century, endoscopic transepapillary manipulations revolutionized biliary surgery and today have become the gold standard in the diagnosis and treatment of complicated forms of gallstone disease. However, despite the vast experience of their use accumulated over 30 years, for a number of reasons the percentage of failures and complications in their use remains quite high. Thus, the incidence of unsuccessful endoscopic retrograde cholangiopancreatography (ERCP) reaches 16-24%. Retrograde cholangiography (without sphincterotomy) in 3-6% of patients is accompanied by complications (pancreatitis and infection of the biliary tract), and this figure doubles if sphincterotomy is performed.

The cannulation method, which is considered classic when performing endoscopic papillosphincterotomy (EPST), succeeds only in 75-95% of cases. The incidence of early complications after EPST ranges from 6-18%, and the mortality rate is 1-4%. The use of atypical methods of papillotomy increases the complication rate by up to 30%. The most common and formidable complication is pancreatitis, the frequency of which is also very variable: from 0 to 39.5%. The question of performing the so-called "diagnostic" EPST remains controversial;

but widely used for failed cannulations of the large duodenal papilla in ERCP. In addition to the obvious invasiveness of the methods used, it is necessary to take into account the radiation exposure of the patient and medical personnel.

Recurrent choledocholithiasis, observed in 3-20%, is potentially an even more serious problem, since the diagnosis of this pathology is difficult for objective reasons, which significantly increases the risk of severe complications. In practice, this pathology can be suspected in pain syndrome characteristic of biliary tract pathology, short-term changes in hepatic or pancreatic tests, combined with pain, or persistent hyperbilirubinemia, accompanied by dilatation of the common bile duct with TAUS or other research methods. It should be noted that the diagnostic signs obtained using TAUS are not reliable

enough, because, for example, after cholecystectomy, moderate dilatation of the common bile duct (up to 10 mm) is considered acceptable, in addition, in patients who have had a history of intervention on the biliary tract or OBD, aerobilia is often diagnosed, which significantly complicates the detection of calculi in the common bile duct. This is a fairly common situation in daily practice. The complexity of the situation lies in the need for differential diagnosis of choledocholithiasis. In particular, sphincter of Oddi dysfunction or OBD adenoma cannot be distinguished from choledocholithiasis based on clinical or biochemical criteria. It is also impossible to exclude the tumor nature of the obstruction.

Today, it is EPST with subsequent RCP that is the method of choice in the diagnosis and treatment of residual and recurrent choledocholithiasis, at the same time it is an effective, but rather dangerous (in case of sphincter of Oddi dysfunction) intervention in about 20% is complicated by acute pancreatitis. Thus, it is obvious that EPST and ERCP can be widely used only in cases of confirmed residual or recurrent choledocholithiasis for exclusively therapeutic purposes and should be used with extreme caution when choledocholithiasis and dysfunction of the sphincter of Oddi are suspected.

**Material and methods.** Today in the arsenal of clinicians there is a minimally invasive high-precision method for diagnosing patients with pathology of the pancreatobiliary zone. Recent studies have shown that endoscopic ultrasound sonography (EUS, endo-ultrasound) is one of the most accurate methods for diagnosing choledocholithiasis.

L. Palazzo (2002) analyzed data from 11 independent studies on endosonographic diagnosis of choledocholithiasis, covering 1250 patients. The author has shown that the technique has a high level of sensitivity (over 88%) and specificity (over 95%), and the diagnostic accuracy of the method averaged 95%.

It is important to note that the results of endosonography did not depend on the size of the stones and the diameter of the common bile duct. In other words, the diagnostic accuracy of the method was quite high for stones less than 4 mm and a narrow common bile duct.

In view of the above, it is obvious that endosonography is a key procedure, the method of choice in all problem cases. The indications for endosonography are the wider, the higher the risk of predicted complications with the use of transapillary interventions or the likelihood of the presence of dysfunction of the sphincter of Oddi, for example, in young patients with narrow common bile duct (according to TAUS) without clinical signs of cholangitis.

Indications for endosonography. In fact, any highly qualified surgeon can say that the emergence and development of laparoscopic cholecystectomy (LCE) changed the diagnosis and treatment of choledocholithiasis, and it should be recognized that the preoperative minimally invasive research method, which has high diagnostic accuracy, is useful in the current circumstances to determine the optimal tactics for treating patients with gallstone disease. High sensitivity in the diagnosis of calculi in the bile ducts proves the need for endoscopic ultrasonography before laparoscopic cholecystectomy, as well as after cholecystectomy with suspected extrahepatic biliary tract pathology.

The presence of stones in the common bile duct in patients with cholelithiasis can be suspected based on a number of clinical, biochemical and morphological criteria.

On this basis, three groups of patients with suspected choledocholithiasis can be identified.

Group 1 - patients at low risk, without predictive criteria.

Group 2 - patients with an average risk, with unclear prognostic criteria.

Group 3 - patients with a high risk of choledocholithiasis.

Patients of the first group can undergo laparoscopic cholecystectomy without preliminary examination of the ducts (taking into account the results of TAUSI). In this group of patients, according to the literature, choledocholithiasis occurs in 2% of cases.

Patients of the third group, with a high risk of choledocholithiasis, are shown to perform preliminary (before LCE) therapeutic and diagnostic ERCP. However, if several days have passed between the onset of the disease and the beginning of treatment, EUS is necessary to clarify the possible spontaneous migration of stones from the common bile duct. If choledocholithiasis persists, endosonography can clarify the size, location and number of stones, determine the mobility of calculi, the diameter of the common bile duct and cystic duct, the type of inflow (normal or low) of the cystic duct and, finally, the state of the gallbladder (infiltrative changes in the walls and surrounding tissues, the presence of choledochoduodenal fistula). All this information is very useful for surgeons when choosing the best treatment algorithm.

For patients of the second group, the best approach is to perform endosonography followed by EPST + RCH + MBE in case of detection of choledocholithiasis or laparoscopic litho-extraction, if the surgeon knows its technique and there are no factors dictating the need for laparotomy.

The indications for endosonography described above are offered solely for the benefit of the patient. This purely medical approach to the problem definitely requires research in the light of medical and economic considerations. In other words, is a strategy based on purely medical criteria the best when considering financial issues? When investigating this issue, the cost of equipment, the cost of examination, the cost of hospitalization and the cost of complications should be taken into account.

Despite the complex technical aspects of the method, the high cost of equipment, in foreign literature there are references to the economic feasibility of using this method.

EUS has been used in our clinic since 2004. This year, the technique was used in more than 30 patients with suspected choledocholithiasis. The method has established itself as a highly accurate minimally invasive diagnostic technique that influences the choice of treatment tactics for patients. It is hoped that in the long term, the widespread use of the method will improve the quality of medical care, reduce the number of medical complications by reducing the number of diagnostic RCPH and EPT, and, as a result, reduce the length of hospital stay.

**Conclusion.** Despite the development and improvement of TAUS, MRCP, ERCP, endoscopic and laparoscopic extraction of calculi from the common bile duct, endosonography plays an important role in the diagnosis of choledocholithiasis. This research method combines high diagnostic accuracy with a small number of complications.

In conclusion, I would like to note that endosonography should be used in all complex diagnostic cases. It is indicated in the group of patients with an average risk of having choledocholithiasis, as well as in the group of young patients with narrow choledochus and small stones. It is the last group that is the most difficult both in diagnostic and therapeutic terms (the ratio of clinical necessity and the risk of potential complications during the use of EPST and transapillary interventions).

In the group of patients with a minimal risk of choledocholithiasis, preoperative examination (endosonography and especially RCPH) should be minimized.

In the group with a high risk of choledocholithiasis in the presence of symptoms of cholangitis, pancreatitis or in patients with a high operational risk, urgent ERCP is the method of choice.

After cholecystectomy, endosonography is the leading method for diagnosing residual choledocholithiasis (with the exception of patients with cholangitis clinic).

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