



## Research Article

# The “Ideal” Treatment of Cholecysto-Choledocholithiasis Remains Unsolved after more than 30 years of Experience?

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### Abstract

The advent of endoscopic techniques changed surgery in many regards. In the management of cholelithiasis the Laparoscopic Cholecystectomy (LC) is today the treatment of choice. This has created a dilemma in the management of choledocholithiasis. Today a number of options exist including Laparoscopic Common Bile Duct Exploration (LCBDE) by the transcystic approach or laparoscopic choledocotomy, open CBDE and postoperative Endoscopic Retrograde Cholangiopancreatography (ERCP) associated with endoscopic sphincterotomy (ES) in case of residual stones. However, whenever feasible, the one-stage approach through the Laparoendoscopic Technique, Rendezvous (LERV) offers some advantages which induced us to prefer it as our first choice.

**Materials and Methods:** This study was carried out on 10,980 patients with gall bladder stones and with suspected or confirmed CBD stones. In 10,698 (97,4%) of them Intraoperative Cholangiography (IOC) was carried out. A preoperative diagnosis was obtained in 1638 (89,5%) patients while in 193 (10,5) the choledocholithiasis occurred occasionally during the operation due to CIO being performed. The treatment over the years has included Laparoscopic Cholecystectomy (LC) preceded or followed by ERCP with ES, subsequently LCBDE, and in the last ten years a single-stage LERV.

**Conclusions:** Our experience gained over all these years has allowed us to conclude that the treatment of cholecysto-choledochal stones in a single-stage by LERV technique is a safe procedure with a high success rate like other methods but with some major advantages such as a shorter hospital stay and complications and the need for multiple anesthesia sessions and hospital admissions within a short interval.

**Keywords:** Cholecystectomy; Choledochal Stones; Common Bile Duct

### Introduction

Choledocholithiasis is a frequent complication of gallstone disease, occurring in 10 – 20% of patients undergoing cholecystectomy [1,2]. The risk of CBDS increases with the age of patient, especially those above age 70 [3]. In a review of cholecystectomies performed at the Cleveland Clinic during the years 1962 to 1979, they found an overall 18% incidence of bile duct stones when routine cholangiography was performed [4]. Gallstone migration has been prospectively shown to occur in 60% of patient with

choledocholithiasis [5]. Thus, it remains as important to remove bile duct stones in patients who can tolerate an operation. More than one third of all cases of choledocholithiasis that are identified during cholecystectomy are unsuspected because preoperative history, clinical signs, and laboratory data are equivocal or normal [6]. These observations are consistent with the general belief that most common duct stones remain asymptomatic for variable periods of time and many actually pass undetected through the normal papillary sphincter and into the duodenum. The aims of this retrospective study is 1) to provide an update on the incidence of choledocholithiasis and an assessment of the frequency and prevalence of CBDS during almost thirty years of experience with

laparoscopic biliary surgery; 2) to review the therapeutic surgical procedures used during this period in relation to the entity and extend of the disease; and 3) to review the health status of patients during a 5-year follow-up.

## Materials and Methods

From August 1993 to August 2024 we were collected the data of 10.980 patients undergoing LC for symptomatic lithiasis in three different Institutions. Routine IOC was successful performed in 10.698 patients (97.4%). In the remaining 282 patients (2,6%) the failure of procedure was due to the technical difficulties. The preoperative suspicion of CBDS was based on the patient's clinical history, on the possible appearance of jaundice or pancreatitis considering the high blood values of bilirubin (> 1.0 mg/dl), alkaline phosphate (>147 U/dl), amylase (>115 U/dl) or the ultrasound documentation of CBDS or his diameter greater than 7mm. If none of these elements is present, we consider IOC routine. The common bile stones were found in 1831 patients (16,6%) with a preoperative diagnosis of 1638 cases (89,5%). The diagnosis was based on unequivocal clinical and radiological feature which included the presence of altered liver function tests and positive ultrasound. We used the intravenous cholangiography in the early years and subsequently cholangio magnetic resonance (CRM) to confirm the diagnosis. 193 cases (10,5%) discovered during the LC due to perioperative cholangiography. At the beginning of our experience the treatment of choice was to perform an ERCP with ES followed by LC for 475 patients (25,9%) in which the diagnosis was made preoperatively. In this group the procedure failed in 42 patients (8,8%) for whom the removal of the stones from the biliary tract was performed with LCBDE as we did not have the availability of a 24-hour endoscopy service. Operative cholangiography was attempted in all patients using a 4-Fr catheter and a choledochoscopy was performed using a 7-Fr size fiberscope introduced through the cystic duct or choledochotomy to confirm the complete bile duct clearance. This group of patients had follow-up at 6-12-24 months and was not found a residual or recurrence stones. The postoperative complications reported two cases of bilioma after removal of the T-tube and these patients were treated conservatively. No mortality was found. The therapeutic approach changed for the remaining 1314 patients with the possibility of using ERCP at any time. Therefore our attitude remained unchanged for patients with a preoperative diagnosis of biliary tract stones. In other cases with intraoperative diagnosis of choledochal stones we used the LERV with ES and LC at the same time also for cases where there was preoperative ERCP failure. The 31 patients (2,3%) presenting with complex or large biliary tract stones underwent endoscopic mechanical lithotripsy and transcystic choledochoscopy using a 7-FR size fiberscope as described above. Where a choledochotomy was necessary, the reconstruction of the biliary tract was always performed using the T-tube drainage.

## Discussion

On the base of our experience that we consider quite solid and in the belief that all laparoscopic cholecystectomy should not be considered complete if stones are left in the common bile duct, we believe that a careful preoperative evaluation of patients who have symptoms of CBD stones is crucial. There is a broad consensus that all stones present at the time of cholecystectomy should be removed, since stones that are left in the CBD may cause symptoms which include pain, jaundice, cholangitis, and biliary pancreatitis [7]. Although it was reported that approximately one third of the stones with diameter <6mm can pass spontaneously [8], there are no highly indicative prognostic factors to qualify this possibility. Therefore, as state in the European Association of Endoscopic Surgery consensus, all stones discovered during LC should be treated [9]. In this context, the use of MR cholangiography in cases of suspected CBD stones can confirm not only the presence of stones but also can provide essential information concerning the anatomic location and number of stones, their size, mobility, and the anatomy of the biliary tree. This assessment allowed us to select with confidence the most appropriate approach, laparoscopic or open, as well as the type of operation to perform. Many surgeons use a stratified approach to deal with suspicion CBD stones. Patients deemed to be at low risk on clinical grounds for choledocholithiasis may have an intraoperative cholangiogram at the time of cholecystectomy. While those deemed to be at high risk are typically managed more aggressively with preoperative ERCP or intraoperative cholangiogram with intention of proceeding to LERV or, in case of failure, CBDE if stones are detected [10]. Over the years the use of preoperative ERCP has been controversial [11] because some authors report a high percentage of useless procedures in addition to a significant number of complications some of which fatal [12]. During the first years of our experience in our patients the cystic duct was used as the principal means of access for exploration of the CBD while the laparoscopic choledochotomy was reserved for patients with large stones, cholangitis, and intrahepatic stones. In these patients to avoid complications as biliary leaks and fistulas, generally we use T-tube drainage that provides biliary decompression and prevents biloma formation. Through the T-tube we make postoperative cholangiography and if residual stones are found we use a guide wire passed through the T-tube in duodenum thus facilitating the rendez-vous technique to remove residual stones. Even if some Authors [13,14] found a 97,1% success rate for LCBDE by choledochotomy we must recognize that this procedure requires clinical experience as well as advanced laparoscopic skill [15]. Therefore it is preferable to consider open CBDE or postoperative ERCP. After all, our choice to adopt the rendez-vous technique in all cases of cholecystocholedochal stones it is due first to the possibility of the endoscopist 24hours a day and second because

the ERCP technique was already well established. It is therefore easy to implement the already familiar technique of ERCP in the operating room combining LC with intraoperative ERCP. An additional advantage is that the same technique can also be used for large stones. Since the development of operative endoscopy, choledocholithiasis has increasingly become the responsibility of the endoscopist as in cholecystectomized patients. In our experience, after several years during which we have treated CBD stones with open surgical exploration before and after laparoscopically, today it is our belief that the LERV remains the best method as reported by various authors [16-18] without excluding the possibility of adopting other procedures in case of failure.

CBD clearance during LC with help of the endoscopist also seems easier for the surgeon indeed all surgeons using LERV are satisfied and never they abandon this method [19-21]. On the basis of our considerable experience acquired over the years in the treatment of cholecysto-cholecho-lithiasis we have gone through different periods, that is, we have moved from open surgery to endoscopic procedure via LC followed or preceded by ERCP + ES, and finally LC+ERCP+ES in a single stage. This latter is the one we prefer to adopt routinely and the same idea is shared by many surgeons which they consider to be a logical procedure having some advantages when compared to other procedures. Indeed, regarding the two-step procedure, it is not so rare that even after ERCP + ES, in the waiting period for cholecystectomy, there could be new episodes of fallen stones to CBD with related complications like recurrent pancreatitis or cholangitis [22,23]. Another advantage of performing one-step operation during LC is the possibility to discover the iatrogenic complication related to ERCP. Indeed the risk of duodenal perforation has ranged from 0,37% to 0,58% in different studies [24,25]. Early diagnosis of iatrogenic perforation and the chance of managing it in the same procedure could be a valuable and life saving opportunity.

## Conclusions

The last decade improvement of the technique has changed the diagnostic and therapeutic approach of gallbladder and bile duct disease. Although the sequential treatment (ERCP + SE) remains the most widely practiced method, the single-step procedure, is currently the best cost-effectiveness approach. As part of the single-step procedure, endoscopic exploration of bile duct should be implemented as it is associated with fewer complications, less use of resources and overall cost, and a shorter hospital stay.

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