

Case Report

## Laparoscopic Common Bile Duct Exploration for Multiple Large Common Bile Duct Stones: A Case Report with Review of Literature

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**Abstract:** Endoscopic retrograde cholangio pancreatography (ERCP) followed by laparoscopic cholecystectomy (LC) in 2 different sessions, is the widely followed standard sequence of surgical procedures for concurrent gall bladder and common bile duct (CBD) stone disease, across the world. However, being highly technical, skillful and technology dependant, ERCP, sometimes, does not succeed even in the best of hands. This can happen due to abnormal local anatomy (eg. Previous Billroth II gastrectomy, previous surgical scars which distort the duodenum etc.) and unfriendly stone morphology such as a very large stone or a large number of stones. Failure to extract/retrieve bile duct stones at ERCP is an indication for CBD exploration (open or laparoscopic) at surgery. Herein, we present one such case of a 67 year old woman who had previously undergone surgery – laparoscopic cholecystectomy for gall stone disease 3 years back. She presented to us with a common bile duct loaded with multiple large stones. In spite of undergoing ERCP (2 attempts over 48 hours), a common bile duct access could not be achieved endoscopically, thereby rendering endotherapy unsuccessful. She then underwent a successful totally laparoscopic CBD exploration, using standard laparoscopy instruments, some endoscopy accessories like endo-balloon & dormia basket and intraoperative fluoroscopy.

**Keywords:** Common bile duct stones, CBD exploration, ERCP, laparoscopic

## INTRODUCTION

Bile duct stone/s is a common complication of gall stone disease. Most of the times, these are formed in the gall bladder and then migrate down through the cystic duct into the CBD. Rarely, primary bile duct stones are noted. Therapy for CBD stones poses a unique challenge to the treating specialists – an additional procedure over and above the LC, namely ERCP or CBD exploration (open / laparoscopic / robotic).

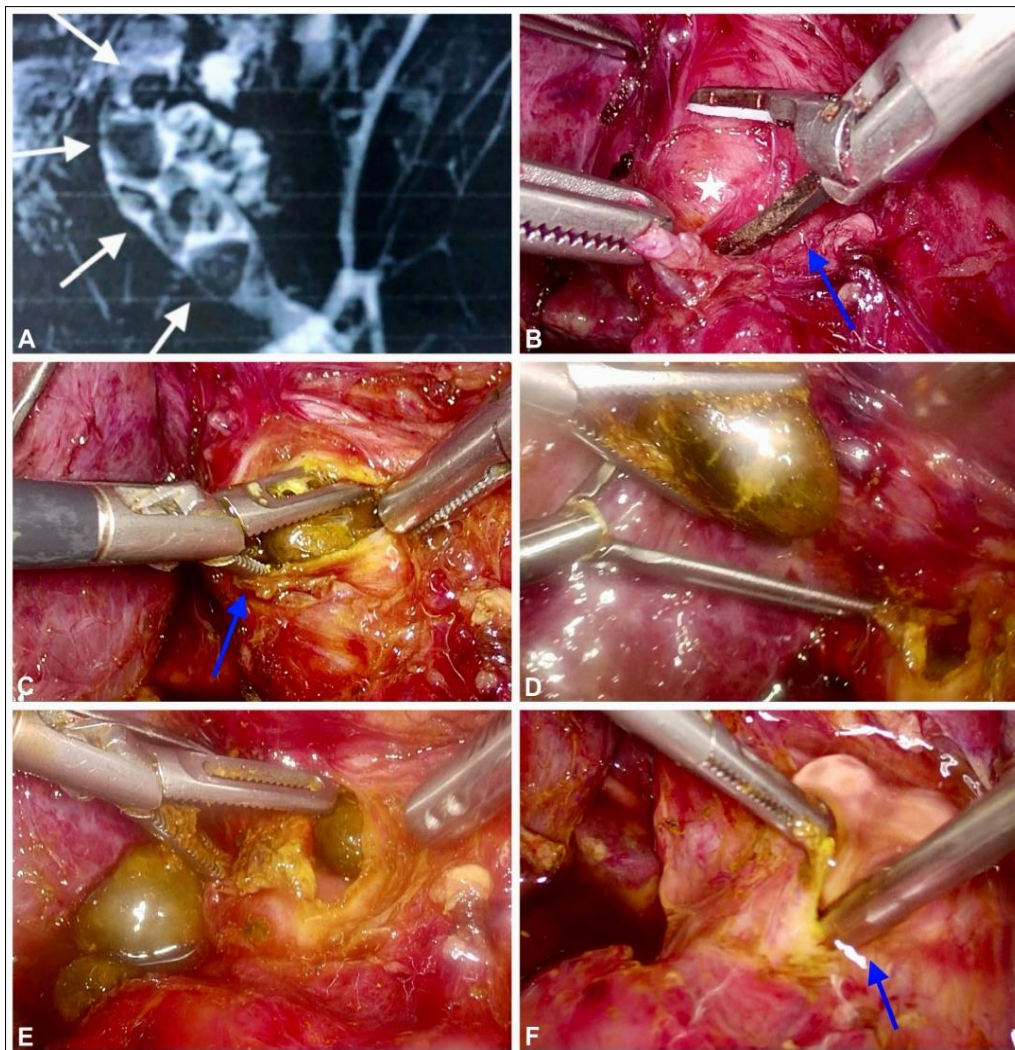
## CASE REPORT

A 67 year old female patient presented to the surgical outpatient department (OPD) with chief complaint of acute pain in the epigastrium radiating to the midline back since 5 days and fever since 2 days. The pain had worsened since the day of onset. There were no specific aggravating factors. It was temporarily relieved by antispasmodic medicine (Tab Buscopan) prescribed by the patient's general practitioner. She gave a history of having undergone an uneventful surgery – laparoscopic cholecystectomy for gall stone disease 3 years back. She had a pulse rate of 96 beats per minute. Her blood pressure was 150/90 mms of Hg and respiratory rate was 16 cycles / minute. She was icteric but had no external lymphadenopathy. A per abdomen examination revealed tenderness in the epigastric region. Laboratory investigations revealed a WBC count of 18500 cells per high power field. Her Total Bilirubin was 4 mg/dl with a predominant direct hyperbilirubinemia, Serum Alkaline Phosphatase was 350 IU/L, SGOT was 70 U/L and SGPT was 68 U/L. Her coagulation profile was within normal limits. An Ultrasound scan (USG) of the abdomen showed multiple large common bile duct (CBD) stones in its visualized part. The CBD was dilated. We then got a Magnetic Resonance Cholangio-Pancreatography (MRCP) scan done (Fig 1A). It confirmed the USG findings and ruled out any extrinsically compressing mass in and

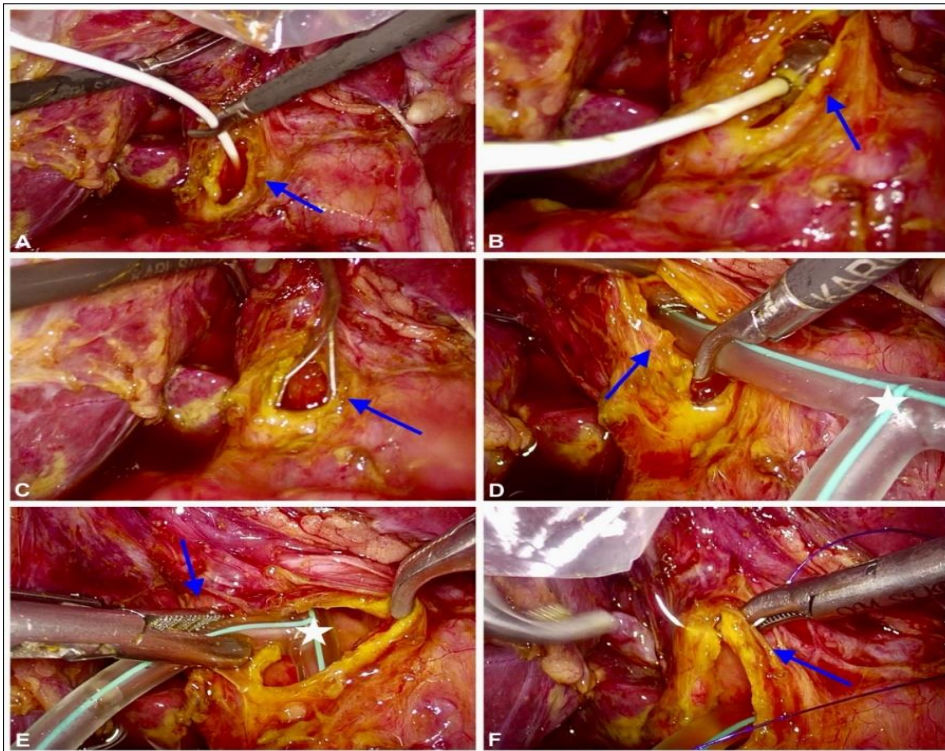
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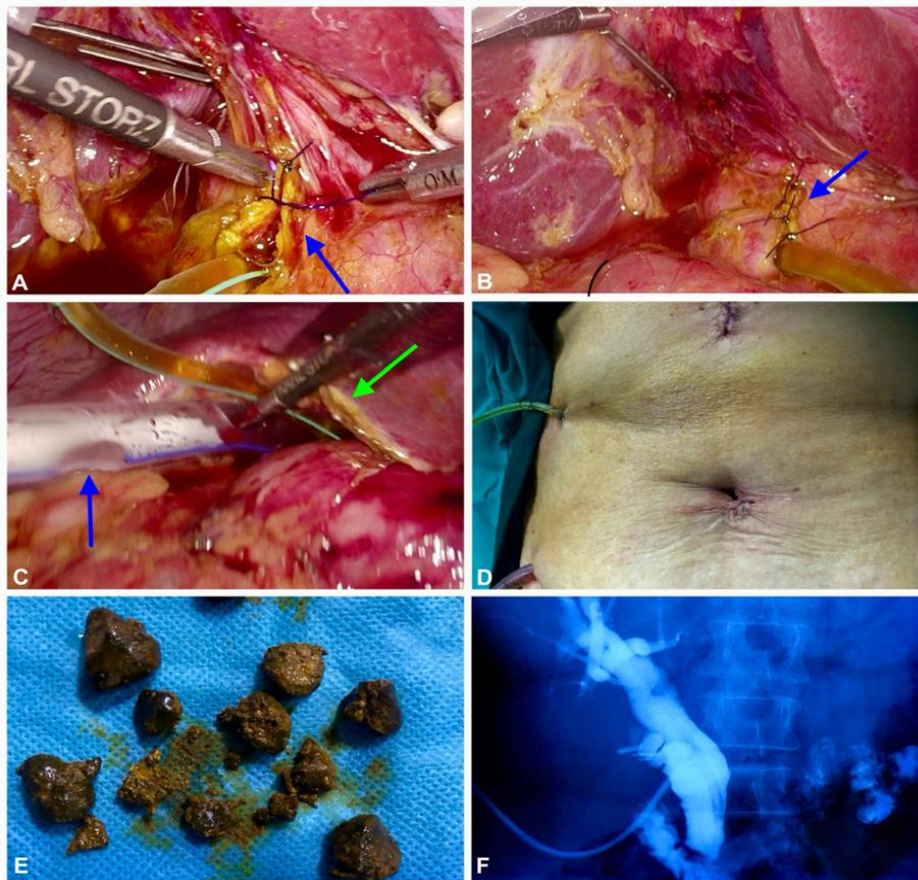
around the distal CBD. Thus a diagnosis of choledocholithiasis causing obstructive jaundice and cholangitis was reached. She was then planned for endoscopic therapy. She was referred to the specialist consultant in gastroenterology for endoscopic retrograde cholangio – pancreatography (ERCP) with retrieval/ removal of the CBD stones. Unfortunately, inspite of attempting the same in 2 different sessions, which were 48 hours apart, a CBD access could not be obtained due to technical reasons. Due to this, it was decided to take her up for laparoscopy and perform a CBD exploration and retrieval of stones. The standard 4 trocar technique was adopted. At laparoscopy, she was found to have a hugely dilated CBD, as expected. A choledochotomy was then performed and the CBD was found to be loaded with multiple large stones (Fig 1B). All the stones were patiently retrieved, some under direct vision and the others by milking the CBD both proximally and distally (Fig 1 C,D,E & 3E). Then thorough low pressure washes were given proximally & distally to flush out the sludge and tiny particulate stone bits (Fig 1F). After this multiple proximal and distal endoscopic balloon as well as dormia basket swipes were performed to retrieve any residual calculi/sludge/particles (Fig 2 A,B,C). Upon its conclusion, proximal and distal occlusion cholangiograms were performed using the endoscopic balloon catheter to rule out any residual stones. This invaluable step was performed in place of intraoperative choledochoscopy. After this, a local peritoneal toilet was given and a number 12 ‘T’ tube was inserted in the CBD (Fig 2 D,E). The choledochotomy was then suture closed over it, using 3-0 Polydioxanone (Fig 2F & 3A,B). A 32 French tube drain was kept in situ in the Morrison’s pouch (Fig 3C). The tube drain and the ‘T’ tube were exteriorized through each of the 2 right lateral 5 mm trocar sites (Fig 3D). She had an uneventful postoperative recovery. The drain was removed on postoperative day (POD) 3. The ‘T’ tube was clamped and she was discharged from the hospital on POD 4 with the ‘T’ tube in situ. On POD 14, a ‘T’ tube cholangiogram was performed and it revealed a clean CBD with no residual calculi (Fig 3F). The ‘T’ tube was then removed in the OPD. All her operative wounds healed well. At the time of writing this paper, the patient was interviewed telephonically, 16 months after her surgery. She continues to be asymptomatic.



**Fig. 1: A) MRCP showing multiple large stones in the bile duct (white arrows), B) Choledochotomy being done by harmonic scalpel (blue arrow) on dilated CBD (white asterisk), C) Large stone being retrieved through the choledochotomy (blue arrow), D&E) Retrieval of multiple large stones, F) Irrigation of bile duct (blue arrow)**



**Fig. 2:** A) Endo-balloon swipe of distal CBD (blue arrow), B) Swipe of proximal bile duct (blue arrow), C) Dormia basket swipe of the bile duct (blue arrow), D&E) T-tube insertion into bile duct (blue arrow), F) Initiation of Bile duct suture closure (blue arrow)



**Fig. 3:** A) Bile duct suture-closure in progress (blue arrow), B) Completed suture line (blue arrow), C) T-tube (green arrow) & tube drain (blue arrow) in situ, D) Trocar sites, E) The 'culprits', F) Postop T-tube cholangiogram ruled out any residual stone/s

## DISCUSSION

Laparoscopic common bile duct exploration (LCBDE) is an effective and safe therapeutic modality for choledocholithiasis. However, in most health care setups around the world, ERCP is the preferred therapy. If ERCP is difficult / impossible (eg. patients with altered anatomy caused by prior abdominal operations, following Roux-en-Y gastric bypass surgery) &/or ERCP fails; LCBDE is indicated. It can be performed in advanced setups which are complemented by the presence of a choledochoscope (used intraoperatively to ascertain the completeness of the stone clearance) and requisite advanced laparoscopic surgical skills. It has the advantage of minimal access, early recovery, and as seen in this report (and a few other reported cases), even is feasible in setups which do not have a choledochoscope [1]. Comparative studies have been performed between ERCP vs LCBDE, to identify the best primary procedure for CBD stone/s [2]. ERCP has an 87% to 97% success rate for clearing stones, but up to 25% of patients require two or more procedures [3]. The associated morbidity and mortality rates are 5% to 11% and 0.7% to 1.2%, respectively [4]. ERCP can result in bleeding, duodenal perforation, cholangitis, pancreatitis, and bile duct injury [5]. It is also possible to remove CBD stone/s using intraoperative ERCP, particularly in the common hepatic duct or intrahepatic system. It is effective to use intraoperative ERCP, but it requires additional equipment and personnel [6]. Postoperative ERCP is useful in patients with incomplete stone clearance or retained stones [7]. Laparoscopic management of choledocholithiasis is dependent on several factors, including surgical expertise, adequate equipment, the biliary anatomy, and the number and size of stones. Stone clearance rates for LCBDE range from 85% to 95%, with a morbidity rate of 4% to 16% and a mortality rate of 0% to 2% [8]. Bile leak and CBD stricture formation are known complications [9]. A meta-analysis of LCBDE performed on 1762 patients from 19 studies worldwide, showed that the mean duct clearance was 80%, with a morbidity rate of <10% (4–16%) and mortality rate of <1% (0–2.7%) [9]. As it is a more anatomical approach, transcystic stone clearance (as against choledochotomy approach) may result in a recovery similar to LC alone [9, 10]. But this is not always possible due to technical reasons. Guruswamy K.S. and Samraj K. conducted a meta-analysis in 2007 and found that there was no statistically significant difference between T-tube and primary closure of choledochotomy except for the hospital stay, which was significantly shorter in the primary closure group [9]. In lieu of T-tubes, antegrade stents and primary CBD closure can be used [10]. Other options such as Extracorporeal Shock Wave Lithotripsy (ESWL), LASER lithotripsy and use of dissolving solutions like Urso-Deoxy-Cholic Acid (UDCA) and Methyl Tert Butyl Ether (MTBE) have not gained acceptance [3]. In order to perform LCBDE successfully, a choledochoscope is invaluable, since it enables direct intraductal vision, direct vision guided stone removal, and finally, direct visual confirmation that the duct has been completely cleared. In patients with multiple CBD stones, it is especially important. Even though it was not available in our setup, we still successfully performed a LCBDE by using the intraoperative occlusion cholangiograms, shot by the C-arm, to rule out residual stones. We do not propose LCBDE as the preferred option over ERCP, in this paper. The most common method of treating CBD stones is endoscopic. As an alternative to endoscopic treatment, LCBDE is feasible.

## CONCLUSION

As seen from this report, LCBDE is a good backup therapeutic option for patients in setups where ERCP is not available or in whom ERCP fails due to technical, anatomical or other reasons. Also, as seen here, the bare minimum requirements to perform LCBDE successfully, is the presence of intraoperative choledochoscopy or fluoroscopy in the setup and the availability of advanced laparoscopic skills.

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