Case Report

Laparoscopic common bile duct exploration with antegrade stenting – A case report with review of literature

Ravneet Kaur[1], Abhijit Sharadchandra Joshi[2]

From, [1]DNB Resident, Department of General Surgery, [2]Consultant General and Advanced Laparoscopic Surgeon, Department of General Surgery, Dr. L. H. Hiranandani Hospital, Powai, Mumbai, Maharashtra, India

ABSTRACT

Endoscopic retrograde cholangiopancreatography (ERCP) is the preferred therapeutic modality for treating common bile duct (CBD) stone/s. It has since evolved significantly with the progressive refinement of endoscopes, endoscopic accessories, and endoscopic techniques, becoming a standardized effective procedure that has benefited many patients with choledocholithiasis. Many international surgical publications have also underscored the important, effective, and pragmatic role played by common bile duct exploration surgery as a valid alternative to endo-therapy; from time to time. These papers pitch surgery as the first therapeutic option over endoscopy for bile duct stones. But in the majority of the health care institutions around the world, endo-therapy is the preferred first step. However, it is a highly advanced procedure which can sometimes fail due to various reasons – technical, logistical, or anatomical. In such cases, a redo is usually attempted after 48 hours. If this also does not succeed, a surgical exploration of the common bile duct (open, laparoscopic, or robotic) may be required for choledocholithiasis. Herein, the authors describe one such case of a 75-year- old gentleman who presented with cholelithiasis and choledocholithiasis. During the initial two attempts at ERCP made by the gastroenterologist, deep selective cannulation of the CBD could not be achieved. It was then decided to perform a laparoscopic CBD exploration and cholecystectomy. The surgery and postoperative recovery was uneventful, and over a 1-year postoperative period, the patient remains asymptomatic.

Key words: Choledocholithiasis, endoscopic, endo-therapy, exploration, laparoscopic, surgical

The management of choledocholithiasis has evolved, with two primary approaches: the traditional two-stage method involving Endoscopic Retrograde Cholangio-Pancreatography (ERCP) followed by Laparoscopic Cholecystectomy (LC), and the single-stage Laparoscopic Common Bile Duct Exploration (LCBDE) combined with LC. Each approach has its own advantages and limitations, which are very important to consider when determining the most appropriate treatment strategy. ERCP is a well-known and widely practiced technique with a high success rate in the hands of experts. Being endoscopic, this technique is less invasive compared to surgical exploration. The success of endoscopic procedures is significantly influenced by the skill and experience of the endoscopist. However, LCBDE + LC is a single-stage approach wherein stone extraction and cholecystectomy are combined in one operation, reducing the need for multiple hospitalizations. Research indicates that the one-stage approach is associated with a reduced occurrence of postoperative pancreatitis and cholangitis when compared to the two-stage method [1].

Access this article online

Quick Response code

Received – 05th August 2025
Initial Review – 08th August 2025
Accepted – 22nd August 2025

DOI: ***

It may also result in lower overall treatment costs due to fewer procedures. LCBDE may offer cost advantages and reduced procedure times, though this can vary, depending on institutional factors. Patients undergoing LCBDE often report higher satisfaction due to the single-procedure approach. However, ERCP followed by LC is still preferred over LCBDE + LC in most health care setups. The purpose of this paper is not to present LCBDE + LC as an alternative option to ERCP followed by LC, but to highlight its important role as and when ERCP fails. In fact, even in the authors' institution, ERCP followed by LC is the norm. But since ERCP failed even after 2 attempts, the authors had to resort to LCBDE + LC as the backup, albeit an effective option.

CASE REPORT

A 75-year-old male patient presented to the surgery outpatient's department (OPD) with pain in the right hypochondriac and epigastric regions, nausea, and jaundice for 2 days. His epigastric pain was intermittent, severe, and radiated to the back. It diminished in severity temporarily after consumption

Correspondence to: Ravneet Kaur, Dept of General and Laparoscopic Surgery, Dr. L. H. Hiranandani Hospital, Powai, Mumbai, Maharashtra, India.
Email: rkbbsb@gmail.com

of anti-spasmodic medicine [Tabet Cyclopam (content - Dicyclomine and Paracetamol)], but would increase in intensity again after 4-5 hours. He had no comorbidities. He did not give any history of similar complaints in the past and was not on any medications. His pulse was 92 beats per minute, blood pressure was 140/90 mms of Hg, and respiratory rate was 12 per minute. He was admitted to the hospital for further investigations and needful. An ultrasound scan (USG) of the abdomen was then done and revealed multiple gallstones and a dilated common bile duct (CBD), 1.5 cms in diameter. His laboratory investigations revealed leucocytosis (12000 per microliter of blood) and a deranged liver profile (Total bilirubin – 4.5 mg/dL, Direct – 3.5 mg/dL, Alkaline phosphatase – 250 IU/L, gamma-glutamyl transpeptidase – 300 units/L, Aspartate transaminase – 225 units/L, Alanine transaminase – 200 units/L) and a normal coagulation profile. A urine routine exam was positive for bilirubin.

His X-ray chest was normal. A Magnetic resonance cholangio pancreatography (MRCP) was then done, confirming the USG findings. It revealed the presence of multiple irregularly shaped stones in the CBD. He was then referred to the gastroenterologist for an ERCP. During the procedure, in spite of best efforts, a deep selective cannulation of the CBD could not be achieved. A repeat attempt at ERCP was made after 48 hours, but it failed again. At this point, a decision was made to perform a laparoscopic CBD exploration (LCBDE) along with the cholecystectomy. After due investigational workup and pre-operative evaluation of fitness, he was taken up for surgery. At laparoscopy, the CBD was bared and an anterior mid-CBD choledochotomy was performed using laparoscopic scissors (Figure 1A, B). After gentle external proximal and distal 'milking' attempts, multiple (7) stones were delivered out of the choledochotomy (Figure 1C-F). Then gentle low pressure CBD irrigation of normal saline was performed proximally and distally (Figure 2A). This manoeuvre further brought out 3 more stones (Figure 2 B-E). After this, multiple proximal and distal CBD sweeps were performed using the Dormia basket and endoscopic balloon (Figure 2F, 3A-C).

Post what seemed like a complete CBD clearance, it was checked and confirmed by performing proximal and distal check occlusion cholangiograms on fluoroscopy (Figure 3D). An endoscopic guide wire was then passed distally through the choledochotomy into the duodenum (Figure 3E). A 10 French endoscopic stent was then threaded over the guide wire and pushed distally with a pusher, into the bile duct (Figure 3F, 4A). Once deployed completely, its optimum position was checked and confirmed on fluoroscopy (Figure 4B). The choledochotomy was then sutured closed using 3-0 Polydiaxanone (Figure 4C-E). The cholecystectomy was then completed (Figure 4F). Local peritoneal toilet was given and a 32 French tube drain was introduced through the lateral-most trocar, placed in the Morrison's pouch. The patient has an uneventful postoperative recovery. The drain was removed on postoperative day (POD) 2, and he was discharged on POD 4. On his POD 10 OPD visit, all his wounds had healed well, and he was asymptomatic. Six weeks after this surgery, his CBD stent was removed endoscopically, uneventfully. At the time of writing this paper, a telephonic interview was held with the patient. Twelve months post his surgery, he continues to be asymptomatic.

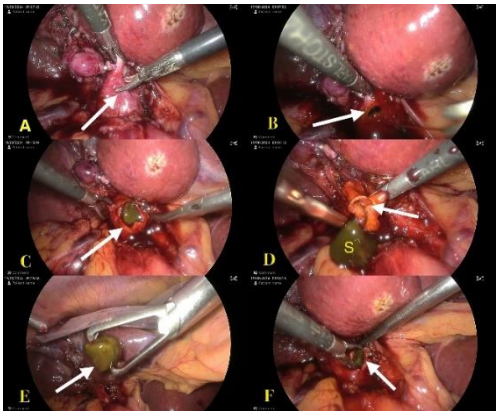

Figure 1: A,B-Choledochotomy being performed (white arrows), C,D,E,F-Multiple CBD stones being retrieved (white arrows)

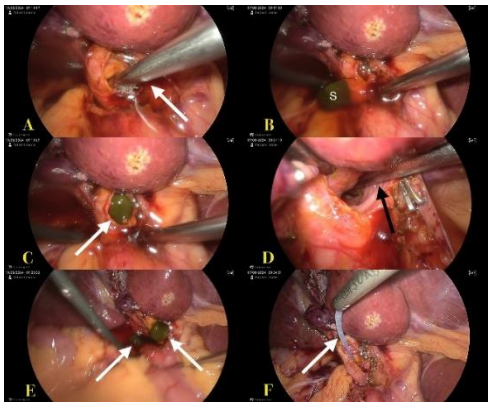

Figure 2: A,B,C,D,E-CBD being carefully irrigated proximally & distally (white arrows) to resulting in retrieval of more stones, F-Distal & proximal sweeps performed in the CBD using Dormia basket for further stone clearance (white arrow)

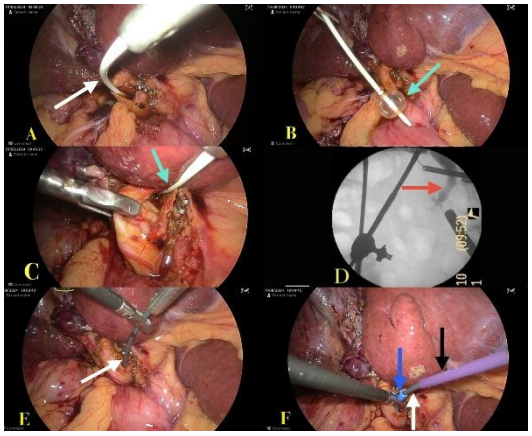

Figure 3 : A,B,C - Proximal & distal CBD sweeps performed with balloon for further stone clearance (white & blue arrow), D-Proximal & distal occlusion cholangiograms obtained using balloon catheter, to ensure complete CBD clearance (red arrow), E-Guide wire passed distally through the choledochotomy (white arrow), F-Stent (blue arrow) pushed over the guide wire (white arrow) by a pusher (black arrow)

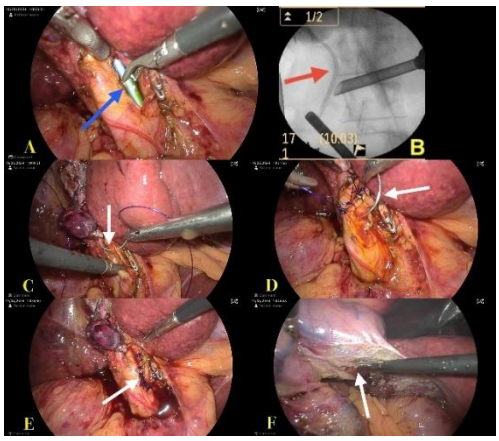

Figure 4: A-CBD stent (blue arrow) completely deployed, B-Position of stent confirmed by fluoroscopy (red arrow), C, D, E-Choledochotomy being suture closed (white arrows), F-Cholecystectomy in progress (white arrow)

DISCUSSION

CBD stones, or choledocholithiasis, are a frequent complication of gallstone disease. In the majority of cases, these stones originate in the gallbladder and migrate through the cystic duct into the CBD. Primary bile duct stones, which form de novo within the bile ducts, are relatively rare. Studies report that up to 16% of patients with gallstone disease may have concurrent choledocholithiasis. Among patients with symptomatic gallstones, the prevalence of CBD stones ranges from 10% to 20% [1].

In the early days of surgical management, a CBD dilated beyond 1.5 cm was typically managed with a choledochoenteric anastomosis, whereas T-tube drainage was favoured in cases with an undilated duct [2]. The first surgical exploration of the CBD was documented in 1889 by Swiss surgeon Ludwig Courvoisier [3]. During the 1880s, CBD stones were often milked back into the gallbladder for extraction via cholecystectomy or crushed in situ within the duct to facilitate spontaneous passage [3]. A major advancement occurred in the 1970s with the introduction of endoscopic sphincterotomy (ES), revolutionizing the non-surgical treatment of CBD stones. The subsequent global adoption of laparoscopic surgery reignited debate over the optimal management strategy for choledocholithiasis, with LCBDE emerging as a viable and often preferable alternative to endoscopic techniques.

ERCP achieves stone clearance rates of 87–97%; however, up to 25% of patients may require two or more sessions to achieve complete ductal clearance [4]. The procedure is associated with a morbidity rate of 5–11% and a mortality rate of 0.7–1.2% [4]. Reported complications include bleeding, duodenal perforation, cholangitis, pancreatitis, and bile duct injury [4]. An alternative approach is intraoperative ERCP, with or without the assistance of endoscopic ultrasound (EUS), particularly useful for retrieving stones located in the common hepatic duct or intrahepatic ducts. While ERCP remains an effective method for stone extraction, it necessitates specialized equipment and trained personnel, which may limit its availability in certain surgical settings [2].

In cases of failed ERCP, altered anatomy (e.g., post-gastric bypass), difficult ampullary access, or the presence of impacted or multiple large stones, open or laparoscopic CBD exploration may be necessary [3]. Surgical access to the CBD can be achieved either via the transcystic approach through the cystic duct or by performing a choledochotomy, a direct incision into the CBD. While the transcystic approach is less invasive and preferred when feasible, choledochotomy offers the advantage of direct visualization and access to both the CBD and the common hepatic duct, making it especially useful for the retrieval of difficult or proximally located stones. The success or failure of laparoscopic management of CBD stones is influenced by several key factors, including the surgeon's expertise, the availability of appropriate equipment, the anatomy of the biliary tree, and the number and size of the stones [2].

The LCBDE has been demonstrated to be as effective as endoscopic stone removal, with the added advantages of shorter procedural time and reduced hospital stay. Reported stone clearance rates for LCBDE range from 85% to 95%, with a morbidity rate of 4–16% and mortality between 0% and 2% [4]. An important benefit of this procedure is the preservation of the Sphincter of Oddi, which avoids complications commonly associated with sphincterotomy, such as cholangitis and pancreatitis. However, LCBDE is not without risks—bile leaks and CBD stricture formation are among the known postoperative complications. A meta-analysis of 1,762 patients across 19 studies worldwide reported a mean duct clearance rate of 80%, with an average morbidity of less than 10% (4–16%) and a mortality rate of less than 1% (0–2.7%) [4]. For optimal outcomes, the use of a choledochoscope is considered invaluable. It allows for direct intraductal visualization, facilitates stone removal under direct vision, and enables real-time confirmation of complete ductal clearance.

The resurgence of the laparoscopic approach to bile duct exploration has also reignited discussions regarding the optimal method of CBD management following exploration. In cases of attempted but incomplete stone clearance, a T-tube or transcystic drainage tube may be left in place. Notably, when passed across the ampulla, the T-tube facilitates easy identification and cannulation of the duct during subsequent endoscopic procedures. Alternatively, the CBD may be sutured closed either over a T-tube, which provides external drainage and access for postoperative cholangiography. Also, as seen in this report, the CBD may be sutured over an internal stent placed across the ampulla, intraoperatively, in an antegrade fashion, which allows for internal drainage, supports ductal healing, and avoids the morbidity associated with external tubes.

The use of a T-tube is associated with several well-documented disadvantages, including patient discomfort,

prolonged hospital stay, delayed recovery, as well as risks of tube displacement or dislodgement, infection, and fragmentation, among others [5]. Tissue edema resulting from surgical manipulation of the bile duct can obstruct the distal flow of bile into the duodenum, thereby increasing the risk of biliary leakage through the choledochotomy site. The use of a T-tube provides an external bypass for bile drainage, which helps to reduce intraductal pressure and promotes optimal healing of the choledochotomy.

Following common bile duct exploration, primary closure risks bile leakage due to high biliary pressure, while T-tube drainage, though effective, carries complications such as bile leak, tube displacement, infections, electrolyte disturbances, and patient discomfort from prolonged external drainage. Antegrade biliary stenting offers a safer alternative by allowing internal bile drainage, reducing pressure on the choledochotomy, and promoting healing. It involves the placement of a stent across the ampulla into the duodenum through the choledochotomy site. It is especially useful when tissue edema impedes bile flow after difficult stone removal. This approach shortens hospital stay by eliminating the need for T-tube management and follow-up imaging and facilitates postoperative ERCP if needed. Overall, antegrade stenting minimizes complications and improves patient comfort, compared to T-tubes [6].

A study by Dorrian et al has also proved the safety, feasibility, and superiority of antegrade stenting of CBD over T-tube drainage of the CBD [3]. Other treatment options, including Extracorporeal Shock Wave Lithotripsy (ESWL), LASER lithotripsy, and chemical dissolution therapies such as Urso-Deoxy-Cholic Acid (UDCA) and Methyl Tert Butyl Ether (MTBE), have not gained widespread acceptance [7]. With advancements in laparoscopic equipment and surgical expertise, LCBDE should be considered a first-line option in appropriate candidates, especially where ERCP fails or is not feasible.

CONCLUSION

As seen in this report, it is feasible to perform a laparoscopic common bile duct exploration with stone retrieval using ERCP accessories, in an advanced setup complemented by requisite advanced minimal access surgical skills. Also, as seen here, the completeness of the stone clearance does not get compromised in the absence of a choledochoscope. It is ensured by the tactical optimal use of fluoroscopy and ERCP accessories. The optimally placed internal CBD stent is more comfortable and convenient than an external ‘T’ tube drain for the patient, albeit with the need to undergo an endoscopy for its retrieval, after 4-6 weeks.

REFERENCES

1. Bandyopadhyay SK, Khanna S, Sen B, *et al*. Antegrade common bile duct (CBD) stenting after laparoscopic CBD exploration. J Minim Access Surg. 2007; 3(1):19-25. doi: 10.4103/0972-9941.30682.
2. Riaz U, Joshi A. Laparoscopic Common Bile Duct Exploration as a Rescue Procedure for Failed Endoscopic Retrograde Cholangio-Pancreatography - A Case Report. J Clin Diagn Res. 2021; 15(7). doi: 10.7860/JCDR/2021/49296.15179
3. Jalal Q, Forouzanfar A, Bhatt A, *et al*. Case series of ante-grade biliary stenting: an option during bile duct exploration. Int J Surg Open. 2018; 10:10-4. doi: 10.1016/j.ijso.2017.11.003
4. Masudi, F. A., & Arish, H. Antegrade biliary stenting following surgical management of choledocholithiasis. Int Surg J. 2023; 10(10):1595–1598. doi:10.18203/2349-2902.isj20232980
5. Swamygowda NN, Setty BN, Govindaiah SK, *et al*. Primary closure of CBD with antegrade stenting for choledocholithiasis. J. Evolution Med. Dent. Sci. 2017; 6(48):3681-3685. doi: 10.14260/Jemds/2017/795.
6. Martínez-Baena D, Parra-Membríves P, Díaz-Gómez D, *et al*. Laparoscopic common bile duct exploration and antegrade biliary stenting: leaving behind the Kehr tube. Rev Esp Enferm Dig. 2013; 105(3):125-9. doi: 10.4321/s1130-01082013000300002.
7. Shandilaya U, Joshi A S. Laparoscopic Common Bile Duct Exploration for Multiple Large Common Bile Duct Stones: A Case Report with Review of Literature. South Asian Res J Med Sci. 2024; 6(1):1-4. doi : 10.36346/sarjms.2024.v06i01.00

Funding: Nil; Conflicts of Interest: None Stated.

How to cite this article: Kaur R, Joshi AS. Laparoscopic common bile duct exploration with antegrade stenting – A case report with review of literature. Eastern J Med Sci. 2025: Epub ahead of print.