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Transcystic laparoscopic common bile duct stone clearance facilitated by intraoperative fluoroscopy guided cholangiography: A case report

Sanatan Bhandarkar, Nilesh Dotor, Nayan Bendapudi, Nagesh Kamat, Sanil Parekh, Sehajad Vora, Amit Maydeo

Sanatan Bhandarkar, Nilesh Dotor, Nayan Bendapudi, Department of General and Minimal Access Surgery, Sir H N Reliance Foundation Hospital and Research Centre, Mumbai 400004, Mahārāshtra, India

Nagesh Kamat, Sanil Parekh, Sehajad Vora, Amit Maydeo, Institute of Gastrosciences, Sir H N Reliance Foundation Hospital and Research Centre, Mumbai 400004, Mahārāshtra, India

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Corresponding author: Sanil Parekh, Additional Professor, Consultant, Institute of Gastrosciences, Sir H N Reliance Foundation Hospital and Research Centre, Mumbai, Mumbai 400004, Mahārāshtra, India. sanilparekh.sp@gmail.com

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Abstract

BACKGROUND

Laparoscopic cholecystectomy combined with management of choledocholithiasis can present with several challenges, particularly when attempting single-stage clearance.

CASE SUMMARY

An 83-year-old male presented with right subcostal pain of four days' duration. Magnetic resonance cholangiopancreatography showed cholelithiasis, choledocholithiasis and cholecystitis. Endoscopy showed fibrotic narrowing in the duodenum. The stricture was dilated with a controlled radial expansion balloon up to 14 mm post, allowing a gastroscope to be passed, but a duodenoscope could not be negotiated. The patient underwent a laparoscopic cholecystectomy. Calot's triangle was dissected, and the cystic artery was clipped and cut. Cystic ductotomy was performed. The cystic duct was milked to remove sludge. Under fluoroscopic guidance with laparoscopic handling, the cystic duct was cannulated using a 5Fr infant feeding tube over a 0.032" Terumo guide wire. Cholangiogram (Urografin 76%) showed a distal common bile duct filling defect suggestive of a stone. Ampulla was dilated up to 8 mm with a Hurricane RX - biliary balloon dilatation catheter. A stone extraction balloon was used to push the stone into the duodenum. Saline was flushed through the infant feeding tube till all the contents were washed away. The check cholangiogram showed no filling defect. The cystic duct was clipped and cut distal to the ductotomy. Hemostasis was achieved, and subcutaneous skin closure was done with monocryl.

CONCLUSION

The technique demonstrated adequate stone clearance with smooth postoperative recovery, highlighting its effectiveness and safety.

Key Words: Cholelithiasis; Choledocholithiasis; Cholangiography; Cholecystectomy; Laparoscopy; Case report

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Core Tip: This case demonstrates a safe and effective single-stage laparoscopic transcystic clearance of a common bile duct (CBD) stone in an 83-year-old high-risk patient with concomitant cholelithiasis, choledocholithiasis, and acute cholecystitis, for whom conventional endoscopic retrograde cholangiopancreatography was not feasible due to a tight fibrotic duodenal stricture. The procedure avoided choledochotomy, resulted in smooth postoperative recovery, and highlights transcystic CBD exploration as a valuable minimally invasive alternative when endoscopic access is limited.

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INTRODUCTION

The burden of gallstone disease is increasing rapidly, representing one of the most common causes of hospitalization among gastrointestinal and hepatology-related diagnoses[1]. In patients with cholelithiasis, up to 20% may have concomitant choledocholithiasis[2,3]. Difficult anatomy and stone burden require advanced endoscopic, surgical, and percutaneous stone-extraction techniques[4]. Choledocholithiasis often complicates cholelithiasis and requires timely management. Traditional approaches involve endoscopic retrograde cholangiopancreatography (ERCP)[5], or laparoscopic common bile duct (CBD) exploration[6]; the debate over optimal first-line therapy continues. Transcystic CBD stone clearance is a minimally invasive technique performed during laparoscopic cholecystectomy for selected patients, avoiding choledochotomy and associated complications. This report highlights a successful case using this technique.

CASE PRESENTATION

Chief complaints

An 83-year-old male presented with severe right subcostal pain for four days.

History of present illness

Not applicable.

History of past illness

His past medical history included diabetes mellitus, hypertension, ischemic heart disease, coronary artery bypass graft (2002), and percutaneous transluminal coronary angioplasty (2019). He also underwent laparoscopic bilateral inguinal hernia repair a few months ago.

Personal and family history

The patient denied any relevant family history.

Physical examination

Physical examination was unremarkable except for right hypochondriac tenderness.

Laboratory examinations

No abnormalities were found in routine blood or urine analyses.

Imaging examinations

His ultrasound abdomen showed multiple small gallstones, the largest 1 cm, overdistended with a wall thickness of 4 mm without pericholecystic inflammation and a dilated CBD (8 mm) with an 8 mm stone. Magnetic resonance cholangiopancreatography (MRCP) confirmed choledocholithiasis and cholecystitis without malignancy (Figure 1A). An upper gastrointestinal endoscopy showed Schatzkis' ring and pyloric spasm with fibrotic benign stricture in the duodenum likely secondary to old peptic ulcer disease (Figure 1B). Dilatation with a controlled radial

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expansion balloon up to 14 mm (Boston Scientific, United States) was performed post, after which a gastroscope could be passed. However, a duodenoscope could not be negotiated (Figure 1C and D). Biopsies were deferred to minimize the risk of procedural complications after balloon dilatation.

FINAL DIAGNOSIS

In combination with the patient's medical history, the final diagnosis was cholelithiasis and choledocholithiasis.

TREATMENT

After obtaining informed consent, the patient underwent laparoscopic cholecystectomy in a supine split-leg position under general anesthesia. Following standard surgical preparation and draping, a five-port laparoscopic approach was established. Intraoperatively, omental adhesions were released, and the gallbladder was retracted. Significant omental adhesions to the gallbladder were present, requiring careful sharp and blunt dissection to achieve the critical view of safety. The gallbladder was distended, edematous, and acutely inflamed with empyema. The gallbladder contained multiple small, pigmented stones, the largest measuring 10 mm. Calot's triangle was dissected, and the cystic artery was clipped and cut. Cystic ductotomy was performed. The cystic duct was milked to remove sludge. Intraoperative findings revealed a relatively short and wide-calibre cystic duct; no anatomical variations were noted. Under fluoroscopic guidance with laparoscopic handling, the cystic duct was cannulated using a 5Fr infant feeding tube (Romsons, India) over a 0.032" Terumo guide wire. Cholangiogram (Urografin 76%) showed a distal CBD filling defect suggestive of a stone. Ampulla was dilated up to 8 mm with Hurricane RX - Biliary Balloon Dilatation Catheter (Boston Scientific, United States). Under fluoroscopy, biliary sphincteroplasty was executed for two minutes with 8 atmospheres (atm) pressure (Figure 2). A stone extraction balloon (Multi-3 V Plus, Olympus, Japan) was used to push the stone into the duodenum. The CBD stone was a single, faceted, dark-brown pigment stone measuring 8 mm in diameter,

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which matched the preoperative MRCP findings. Saline was flushed through the infant feeding tube till all the contents were washed away. The check cholangiogram showed no filling defect. The cystic duct was clipped and cut distal to the ductotomy, the gallbladder dissected off the fossa and retrieved through the 10 mm port site and sent for histopathology. A flat drain was placed in the gallbladder fossa. Hemostasis was checked and achieved. The 10 mm port site was closed with No. 1 polyglactin 910 (Vicryl). The subcutaneous skin closure was done with 3-0 Poliglecaprone 25 (Monocryl) suture using a subcuticular technique. The total operative time was 115 minutes.

OUTCOME AND FOLLOW-UP

The patient was kept nil per os and started on intravenous fluids. On day 2, he was started on clear liquids, gradually transitioning to semi-solids as tolerated. He received analgesics for pain management and antibiotics (amoxicillin and potassium clavulanate) for 3 days. The drain was removed on postoperative day 4. The patient had a smooth recovery and was discharged on day 10. Postoperative recovery was monitored through clinical assessment and repeat biochemistry. Histopathology confirmed acute gangrenous cholecystitis with pericholecystitis. At 1 month postoperatively, the patient was doing well and had no new symptoms. Liver function tests remained within normal limits prior to discharge and at the one-month follow-up.

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DISCUSSION

ERCP is the first-line therapy for choledocholithiasis, but in cases of duodenal narrowing, a combined endoscopic and surgical approach may be needed[7]. The transcystic approach is well established and requires a guidewire to facilitate entry into the cystic duct. We used an infant feeding tube to cannulate the cystic duct, identify stones on fluoroscopy, and locate the papilla. A spyglass cholangioscope can also be used to visualize the stone under direct vision[8]. Smaller stones can be easily flushed into the duodenum, whereas larger stones require retrieval baskets for extraction. Large stones are fragmented using laser lithotripsy.

To minimize pancreatitis risk, guidewire manipulation was performed gently under fluoroscopic guidance, with limited-duration balloon dilatation and inflation only to the minimum diameter needed for stone passage. Although transcystic stone clearance was successful in the present case due to the small stone size, a predefined stepwise rescue strategy is followed in case of failure from optimization of transcystic techniques to laparoscopic choledochotomy, staged postoperative ERCP, or percutaneous biliary intervention, with open CBD exploration reserved as a last resort. Postoperatively, papillary safety was monitored through clinical observation for 24-48 hours and by routine blood tests. The transcystic approach is ideal for stones < 10 mm and fewer than 10 distal CBD stones with favourable anatomy. The presence of a fibrotic duodenal stricture and the patient's specific surgical fitness made a single-stage laparoscopic transcystic clearance the most efficient and least morbid option, avoiding the potential complications of a permanent biliary-enteric fistula or the discomfort of external percutaneous drains. Advantages include avoidance of choledochotomy, reduced morbidity, and faster recovery. This technique can achieve a clearance rate of 71%-95% (Table 1) with low complication rates[9-14]. Contraindications include stones in the common hepatic duct, tortuous or narrow ducts, hemodynamic instability, proximal CBD stones, and lack of technical skills.

The transcystic approach uses the cystic duct (without opening the CBD) for guidewire passage, balloon dilatation (if needed), and stone extraction under fluoroscopic guidance, preserving ductal integrity and avoiding choledochotomy. In contrast, standard laparoscopic CBD exploration (often transcholedochal) involves a direct incision (choledochotomy) into the CBD wall to insert instruments such as choledochoscopes or baskets for stone removal, which requires suturing the duct afterwards. This transcystic method in our report is thus less invasive in suitable cases (*e.g.*, smaller/distal stones, favourable cystic duct anatomy), potentially reducing the risks of bile leak, stricture, or T-tube use compared to the transcholedochal approach. While the individual techniques used are established, our study's novelty lies in the integrated surgical algorithm and the specific technical use of an infant feeding tube to safely navigate a narrow cystic duct

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when ERCP is absolutely contraindicated. Most literature on transcystic stone clearance assumes a patent upper gastrointestinal tract; however, our case provides a reproducible, step-by-step technical framework for managing choledocholithiasis when the traditional endoscopic route is definitively closed. By detailing the nuances of this laparoscopic-first approach in complex-anatomy settings, this manuscript serves as an essential reference for surgeons who may encounter similar anatomical barriers.

Considering the patient's age and the risk of perforation, we did not proceed aggressively with endoscopic approaches. The other alternative could have been endoscopic ultrasonography guided rendezvous, but the CBD was mildly dilated, so it was not feasible. The patient was on anticoagulation and had multiple comorbidities, so we opted for a safer option and avoided the need for two separate procedures. Studies have shown that single-stage intraoperative management is more cost-effective and efficient than two procedures[15].

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CONCLUSION

Transcystic CBD stone clearance using intraoperative cholangiography and fluoroscopy is a minimally invasive potential alternative when traditional access is precluded for selected patients during laparoscopic cholecystectomy. It enables single-stage management with reduced morbidity and favourable outcomes in appropriately chosen cases.

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Footnotes

Informed consent statement: Written Informed consent was obtained from the patient for publication of this report and any accompanying images.

Conflict-of-interest statement: All authors declare that they have no conflict of interest to disclose.

CARE Checklist (2016) statement: The authors have read the CARE Checklist (2016), and the manuscript was prepared and revised according to the CARE Checklist (2016).

AI contribution statement: AI tools were not used to generate original scientific data, perform independent scientific analyses, or draw scientific conclusions

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Figures and Tables

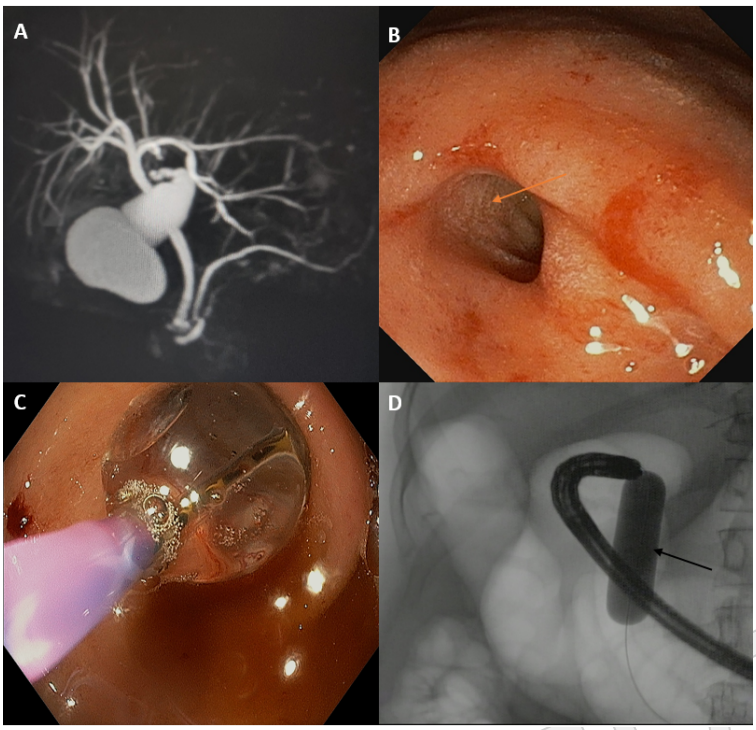


Figure 1 Preoperative investigation. A: Magnetic resonance cholangiopancreatography showing cholelithiasis and choledocholithiasis; B: Endoscopy showing fibrotic stricture (orange arrow) in the duodenum precluded a conventional ERCP approach; C: Endoscopy showing controlled radial expansion balloon dilatation; D: Fluoroscopy showing balloon dilatation (black arrow) in the duodenum.

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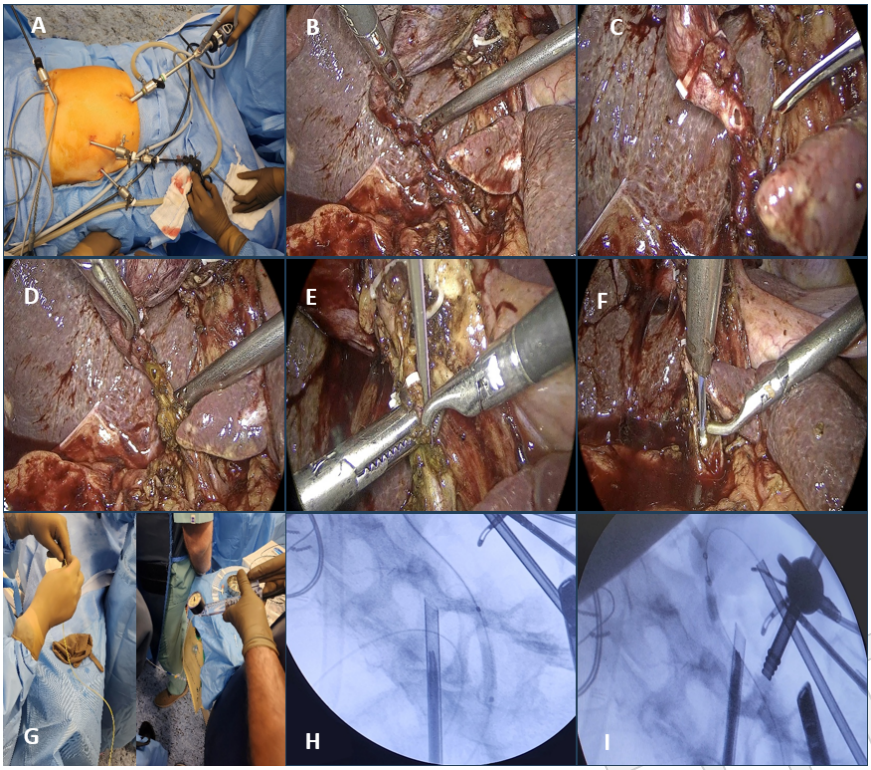


Figure 2 Intraoperative sequence of transcystic common bile duct clearance. A: Patient and port positioning during laparoscopic cholecystectomy; B: The cystic duct stump is isolated using a grasper and suction; C: A clip is placed proximally near the junction of the cystic duct and infundibulum, before the duct is transected, showing controlled ductotomy; D: Surgical field showing bile coming out of the cystic duct opening; E and F: Transcystic approach showing a guidewire passed through a cost-effective infant feeding tube for entry into the cystic duct; G: Management of the common bile duct stone - under fluoroscopy, biliary sphincteroplasty was executed for two minutes with 8 atmospheres pressure; a critical step for facilitating the mechanical passage of the stone into the duodenum; H and I: Cholangiogram showing filling defect suggestive of stone and ampulla being dilated with Hurricane RX - Biliary Balloon Dilatation Catheter.

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Table 1 Comparison of studies with transcystic approach for choledocholithiasis

Ref.	Sample size	Success rate (clearance), %	Biliary morbidity, %	Key findings
Fugazzola *et al*[8], 2024. Retrospective case series	18	88.90	0	Used SpyGlass™ Discover; mean LOS was 3 days; no major complications
Abdelkader *et al*[16], 2025. Retrospective case series	38	100	0	Single-stage laparoscopy assisted transcystic CBD clearance to be highly cost-effective
Zheng *et al*[17], 2024. Systematic Review	5518	95.40	1.3 *vs* 6.1	Laparoscopy assisted transcystic approach had significantly shorter operative times and shorter hospital stays than laparoscopy assisted CBD clearance
Feng *et al*[18], 2016. Meta-analysis	2782	88.90	1.30	Biliary morbidity was 1.3% for transcystic *vs* 6.1% for choledochotomy
Chan *et al*[19], 2014. Retrospective cohort study	215	96.30	6.0 (overall)	High success in both elective and emergency settings; conversion rate was only 5.1%

LOS: Length of stay; CBD: Common bile duct.

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