Transcholecystic Access to the Common Bile Duct: A Contemporary Review and Institutional Experience

Mai Mazarieb MD[1], Nabeih Mazarieb MD[2,3], Yackov Romanenko MD[2,3], and Gil N. Bachar MD[2,3]

[1]Department of Surgery, Royal Free Hospital, Barnet Hospital, London, United Kingdom
[2]Department of Radiology, Rabin Medical Center (Hasharon Hospital), Petah Tikva, Israel
[3]Gray Faculty of Medical and Health Sciences, Tel Aviv University, Tel Aviv, Israel

ABSTRACT In this study, we assessed the efficacy and outcomes of percutaneous cholecystostomy with cystic duct cannulation for biliary drainage in patients in whom conventional endoscopic retrograde cholangiopancreatography (ERCP) was either unsuccessful or contraindicated. In addition, we provide a contemporary review of this technique. We retrospectively reviewed data of 323 consecutive patients who underwent percutaneous gallbladder drainage at our institution between 2017 and 2022. Transcholecystic common bile duct (CBD) cannulation via the cystic duct was attempted in six carefully selected patients in whom ERCP was not feasible or had failed, or who were unfit for endoscopy. Four technically successful cases are described in detail. Two additional attempts were unsuccessful due to inability to traverse the cystic duct. A focused literature review examined the historical development and contemporary applications of transcholecystic biliary intervention. Transcholecystic cannulation of the common bile duct is not routinely performed at our institution. Percutaneous cholecystostomy with cystic duct cannulation is a well-established technique with over five decades of documented use. This approach provides a viable and safe alternative to biliary drainage in complex cases in which traditional methods are not feasible, particularly in high-risk patients with anatomical challenges.

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KEY WORDS: biliary drainage, cannulation, common bile duct, transcholecystic approach

Percutaneous cholecystostomy has gained widespread recognition for its role in managing acute cholecystitis and various biliary disorders, particularly in high-risk patients who may not tolerate surgical interventions. This minimally invasive technique allows effective gallbladder drainage, alleviates symptoms, and prevents complications, while serving as either a bridge to definitive treatment or as definitive therapy itself [1,2].

The transcholecystic approach extends beyond simple gallbladder drainage and serves as an alternative route for accessing the biliary tree via catheterization of the cystic duct. This technique is particularly valuable in complex biliary scenarios in which conventional endoscopic or percutaneous transhepatic approaches may be challenging or contraindicated. This procedure can be applied to both benign and malignant biliary conditions, assisting in the management of obstructive biliary diseases such as cholangitis and common bile duct stenosis, and in preparation for gallbladder sclerotherapy [3,4].

Although this approach has been described in the medical literature for over five decades, contemporary applications continue to demonstrate its clinical utility in specific patient populations. This technique is particularly valuable when conventional endoscopic retrograde cholangiopancreatography (ERCP) is not feasible because of anatomical challenges such as duodenal diverticula, altered surgical anatomy, or high-risk for endoscopic procedures [5,6].

In this review, we illustrate the contemporary application of cystic duct cannulation via percutaneous transhepatic access for effective biliary drainage in patients for whom conventional ERCP was not feasible or had failed. We reviewed all patients who underwent gallbladder drainage at our institution between 2017 and 2022 and identified four cases in which cannulation of the common bile duct was successfully achieved through the cystic duct. Each case highlights a different clinical scenario in which this technique facilitated successful CBD drainage, underscoring its continued role as a valuable alternative approach for managing biliary obstruction.

HISTORICAL CONTEXT AND LITERATURE REVIEW

The transcholecystic approach for biliary intervention has a well-documented history spanning over five decades. Mazzariello's seminal work in 1974 [1] represents

the first comprehensive description of the transcholecystic extraction of residual calculi in the common bile duct, establishing the fundamental principles that continue to guide contemporary practice. This pioneering study described 13 cases of residual biliary stone extraction using forceps and catheters through the gallbladder, achieving a 69% success rate and demonstrating the feasibility of accessing the biliary tree via the cystic duct.

Building on this initial experience, Mazzariello reported a much larger series in 1978 [2], documenting a 14-year experience with non-operative instrument extraction of retained bile duct stones in over 1000 patients. This extensive follow-up study demonstrated the evolution and refinement of the technique, with success rates improving significantly as experience was accumulated. This study established transcholecystic access as a viable alternative to surgical exploration for retained biliary stones, laying the groundwork for future developments in interventional biliary procedures.

TRANSCHOLECYSTIC ACCESS SERVES AS A DEPENDABLE ALTERNATIVE FOR BILIARY INTERVENTION IN CASES IN WHICH ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY IS UNSUCCESSFUL OR CONTRAINDICATED.

EVOLUTION OF TECHNIQUE

The 1980s marked a significant evolution in transcholecystic techniques, with the emergence of interventional radiology as a distinct specialty. Burhenne's contributions during this period were particularly influential as they built on earlier surgical approaches with more sophisticated imaging guidance and instrumentation. His landmark study described percutaneous extraction of retained biliary tract stones in 661 patients, achieving an overall success rate of 95% [3]. This study established percutaneous techniques as the method of choice for the removal of postoperatively retained stones. In parallel, Teplick and colleagues [7] assessed common bile duct obstruction using transcholecystic cholangiography.

A particularly significant advancement was Burhenne and Scudamore's [4] publication describing antegrade transcholecystic sphincterotomy in a canine study. This study demonstrated the feasibility of performing sphincterotomy through the transcholecystic route, thereby expanding the therapeutic options available through this approach. The study involved the placement of an endoscopic diathermy catheter through the cystic duct into the duodenum and positioning it at the Vater's papilla under fluoroscopic control for sphincterotomy.

USING A METICULOUS TECHNIQUE AND ENSURING APPROPRIATE PATIENT SELECTION ARE ESSENTIAL FOR ACHIEVING SAFE AND SUCCESSFUL OUTCOMES.

CONTEMPORARY APPLICATIONS

Several investigators have reported modern refinements. Krokidis and Hatzidakis [5] made important contributions to the percutaneous transcholecystic stent placement. In a 2010 publication [5], they described the percutaneous transcholecystic placement of covered stents in the common bile duct, demonstrating the feasibility of deploying covered stents through the transcholecystic route for biliary drainage in patients with malignant obstruction. Additional contemporary reports include the trans-papillary elimination of stones via an existing cholecystostomy access [8], a comprehensive review of percutaneous biliary interventions through the gallbladder [9], an editorial perspective on transcholecystic management of choledocholithiasis [10], and the demonstration of cholecystostomy as an exclusive access route for stone removal [11].

Contemporary applications were further validated by Jung et al. [6] in a 2019 study of 114 patients who underwent percutaneous transcholecystic removal of common bile duct stones. This large contemporary series demonstrated the safety and effectiveness of modern transcholecystic stone removal techniques, with high success rates and acceptable complication profiles. This study emphasized the importance of careful patient selection, noting that the technique was particularly valuable in patients with duodenal diverticula, altered anatomy, or high anesthetic risk.

CASE PRESENTATIONS

Case 1: Failed ERCP due to duodenal diverticulum

A 77-year-old man presented with clinical features of cholangitis, including fever, chills, and jaundice. An initial abdominal ultrasound revealed a congested gallbladder and a dilated common bile duct. Two attempts at ERCP were unsuccessful because of a large duodenal diverticulum in the second part of the duodenum, which prevented adequate visualization and cannulation of the Vater's papilla.

Given the failure of the endoscopic approach, percutaneous cholecystostomy was performed as an alternative drainage method. Following the procedure, the drain output increased, raising suspicion of distal CBD obstruction despite improvement in the patient's clinical

condition and liver enzyme levels. Computed tomography (CT) revealed a suspected space-occupying lesion in the distal CBD and mild dilatation of the proximal CBD.

Magnetic resonance imaging was performed to further characterize the suspected lesion, which confirmed the presence of a distal CBD stone. Given the possibility of a stone requiring removal and the previous failure of ERCP due to the duodenal diverticulum, we decided to attempt CBD cannulation via the cystic duct through the existing cholecystostomy tract.

Under fluoroscopic guidance, successful cannulation of the CBD was achieved through the cystic duct, allowing papillary balloon dilation. Attempts to advance the distal CBD stone were unsuccessful; therefore, an internal-external biliary drain was placed to ensure adequate drainage. The patient's clinical condition improved significantly, with normalization of liver enzyme and bilirubin levels, and he was discharged with the drain in place [Figure 1].

Figure 1. Fluoroscopic cholangiogram obtained via percutaneous cholecystostomy, demonstrating transcholecystic balloon dilatation of the distal common bile duct

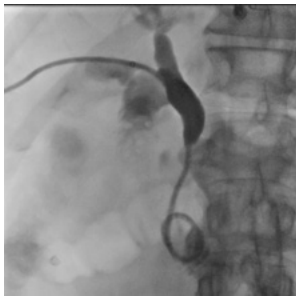


Figure 2. Fluoroscopic cholangiogram obtained via percutaneous cholecystostomy, demonstrating a distal common bile duct stricture

Figure 3. Fluoroscopic image demonstrating percutaneous transcholecystic papillary balloon dilatation

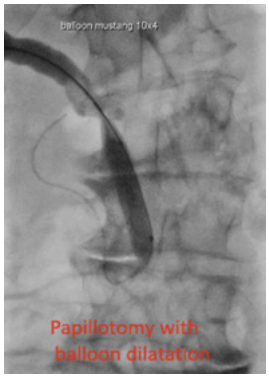
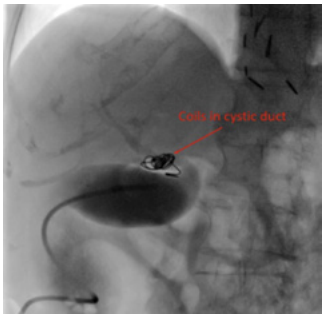


Figure 4. Fluoroscopic image demonstrating cystic duct coil embolization as part of percutaneous gallbladder sclerotherapy; the coils occlude the cystic duct to prevent leakage of the subsequently instilled sclerosing agent



Case 2: Recurrent cholangitis with failed endoscopic access

A 77-year-old man presented to the emergency department with fever, chills, abdominal pain, and elevated liver enzymes, consistent with a clinical diagnosis of cholangitis. An initial abdominal ultrasonography revealed gallstones without CBD dilation or signs of acute cholecystitis. Cholangitis was clinically diagnosed based on the presence of fever, chills, abdominal pain, and abnormal liver test results in the context of gallstones.

Initial conservative management with intravenous antibiotics and percutaneous cholecystostomy resulted in clinical improvement and normalization of liver enzyme and bilirubin levels. The patient was discharged with a cholecystostomy tube in place to facilitate continued drainage.

At a routine follow-up one week later, laboratory studies revealed that the patient's bilirubin level had increased to 6.6 mg/dl. The patient was readmitted for further evaluation and management. Repeat abdominal ultrasonography showed dilation of 15 mm, intrahepatic ductal dilation, and the presence of a duodenal diverticulum.

ERCP was attempted with needle-knife sphincterotomy; however, CBD access could not be achieved because of the anatomical challenges posed by the duodenal diverticulum. Subsequently, cholangiography performed through the existing cholecystostomy tube indicated the presence of a CBD stricture, raising suspicion for a possible tumor. Given the failed endoscopic approach and the need for biliary drainage, successful recanalization of the distal CBD was performed through the cystic duct, allowing the placement of an internal-external biliary drain to ensure adequate drainage. The patient's clinical condition improved following this intervention [Figure 2].

Case 3: High surgical risk patient

An 88-year-old woman presented to our hospital with acute cholecystitis. Given her advanced age and complex medical history, including atrial fibrillation, ischemic heart disease, previous coronary artery bypass grafting, hypertension, and Parkinson's disease, she was considered a high-risk candidate for surgery. A CT scan confirmed the diagnosis of acute cholecystitis with no evidence of CBD dilation.

The patient was managed conservatively with percutaneous transhepatic cholecystostomy rather than surgical

intervention. Initially, the patient remained clinically stable under conservative management, with a cholecystostomy tube providing adequate gallbladder drainage.

However, her bilirubin and liver enzyme levels began to increase over time, raising concerns about potential biliary obstruction. A fluoroscopic study performed using a cholecystostomy tube revealed a gallstone lodged in the distal common bile duct. Despite these findings, the patient remained clinically stable with conservative management.

To address the distal stone and prevent further complications, we planned to access the CBD through the cholecystostomy tract. Under fluoroscopic guidance, the CBD was successfully cannulated through the cystic duct, and papillary balloon dilation was performed. The obstructing stone was successfully addressed, and an internal-external biliary drain was placed for continuous drainage. Following this procedure, the patient's clinical condition improved, and her laboratory values normalized [Figure 3].

TRANSCHOLECYSTIC ACCESS EXPANDS THE RANGE OF MINIMALLY INVASIVE OPTIONS AVAILABLE AND HAS THE POTENTIAL TO AVERT THE NEED FOR MORE INVASIVE SURGICAL PROCEDURES.

Case 4: Pre-sclerotherapy CBD evaluation

A 70-year-old woman was admitted to our hospital with acute cholecystitis, which was confirmed by abdominal ultrasonography. The initial management involved conservative treatment with intravenous antibiotics. However, owing to persistent symptoms, percutaneous transhepatic cholecystostomy was performed, resulting in clinical improvement.

Subsequent discussions were held regarding the patient's candidacy for a laparoscopic cholecystectomy. A thorough evaluation by a cardiologist classified the patient as high-risk and unfit for surgery due to preexisting cardiac conditions. Given the patient's surgical risk profile, gallbladder sclerotherapy with coil embolization was considered an alternative treatment option.

Before proceeding with sclerotherapy, CT was performed to rule out any pathology in the common bile duct, such as stones, which showed no evidence of CBD abnormalities. As per our institutional protocol, before proceeding with gallbladder sclerotherapy, it is our standard practice to perform CBD cannulation through the existing cholecystostomy tract to rule out any CBD findings, even when previous imaging studies are normal.

Successful cannulation of the CBD was performed using a transcholecystic approach, which confirmed the absence of CBD pathology. This evaluation ensured that sclerotherapy could be safely performed without the risk of biliary obstruction or other complications related to undetected CBD abnormalities [Figure 4]. Two additional attempts failed due to inability to achieve CBD cannulation via the cystic duct.

DISCUSSION

Clinical context and indications

The standard treatment for calculous cholecystitis is surgical gallbladder removal, which is associated with favorable outcomes and minimal morbidity in appropriate candidates. However, postsurgical morbidity and mortality increase considerably in elderly patients and those with significant co-morbidities, with rates reaching 14–46% in high-risk populations [12]. This substantial increase in risk necessitates alternative approaches for patients who are unsuitable surgical candidates.

When surgery is contraindicated and conservative treatment fails, percutaneous cholecystostomy drainage can serve as either a holding procedure to be followed later by delayed laparoscopic cholecystectomy or as a definitive treatment option for patients who are considered permanently unfit for surgery. However, only a small percentage of high-risk patients who undergo external gallbladder drainage ultimately undergo cholecystectomy [13].

Long-term percutaneous gallbladder drainage is associated with significant morbidity, and tube removal is associated with 1- and 3-year acute cholecystitis recurrence rates of 35% and 46%, respectively. Prolonged percutaneous gallbladder drainage-related morbidity reportedly ranges from 8% to 44%, with frequent tube exchange, hospitalization, and adverse effects on the patient's quality of life [13].

INDICATIONS AND CONTRAINDICATIONS

Indications include failed or infeasible ERCP (e.g., periampullary diverticulum, altered anatomy), the need for internal–external drainage via the cystic duct, or presclerotherapy CBD assessment in high-risk patients. Relative contraindications include an impassable cystic duct (tight stenosis, tortuosity, or low insertion), uncontrolled coagulopathy, and unstable sepsis despite resuscitation efforts.

TECHNICAL CONSIDERATIONS

The transcholecystic approach for cannulation of the common bile duct is a valuable alternative in the management of biliary obstruction, particularly when conventional methods, such as ERCP and percutaneous tran-

shepatic biliary drainage (PTBD), are unsuccessful or contraindicated. This approach leverages the cystic duct as a conduit to access the CBD, offering a minimally invasive solution that can be particularly beneficial in patients with complex anatomical challenges or those who are high-risk surgical candidates [14].

The literature indicates that although ERCP and PTBD are the first-line treatments for biliary obstruction, they can be associated with complications and may not always be successful. The transcholecystic approach offers an alternative that requires specialized expertise but can be performed in centers with interventional radiology capabilities. This method minimizes the risks associated with external drainage while providing effective internal decompression.

INTERVENTIONAL RADIOLOGY TECHNIQUE

In accordance with our departmental protocol, a percutaneous cholecystostomy tube was inserted into the gallbladder and left in situ for at least 24 hours to allow tract maturation and reduce bile leakage. Under fluoroscopic guidance, a hydrophilic 0.035″ wire was advanced via the drain through the cystic duct into the CBD and, when feasible, across the papilla into the duodenum. Once access was confirmed, the wire was exchanged for a stiff guidewire to facilitate catheterization. A 10 F biliary catheter can be placed for balloon dilation, stone retrieval, or internal–external drainage, depending on the indication.

CONTEMPORARY RELEVANCE

The cases presented in this series demonstrate the versatility and effectiveness of the transcholecystic approach in diverse clinical scenarios, including duodenal diverticula, failed ERCP attempts, and high-risk surgical profiles. Each case illustrates how this technique can provide successful biliary drainage when conventional methods are not feasible or fail.

Despite its advantages and established history, the transcholecystic approach has been selectively reported in recent literature, with most evidence derived from case series and institutional experiences, indicating the need for further studies to evaluate its safety, efficacy, and long-term outcomes in modern practice. As more cases are documented and reported, this technique should gain wider acceptance as a standard practice for managing complex biliary obstructions, particularly in patients in whom other interventions have failed [14].

Recent literature from 2023–2025 highlights continued interest in alternative biliary drainage strategies when conventional ERCP is unsuccessful or contraindicated. Contemporary reviews and meta-analyses emphasize the expanding role of non-standard access routes, including percutaneous and endoscopic ultrasound-guided techniques, particularly in high-risk or anatomically complex patients. These studies underline the importance of individualized decision-making based on anatomy, co-morbidities, and local expertise. Although most recent publications focus on EUS-guided biliary drainage or percutaneous transhepatic approaches, they reaffirm the ongoing clinical need for alternative access routes to the biliary system. In this context, the transcholecystic approach remains a relevant and valuable option within the spectrum of minimally invasive biliary interventions, especially in selected patients where ERCP and PTBD are not feasible or have failed [15-17].

CONCLUSIONS

The transcholecystic approach for CBD cannulation is a well-established technique with over five decades of documented use. Although not a novel innovation, contemporary applications continue to demonstrate its clinical utility, safety, and effectiveness in appropriately selected patients for whom conventional endoscopic or surgical approaches are not feasible. This technique should be considered as a valuable alternative in the armamentarium of interventional approaches for complex biliary drainage.

Correspondence
Dr. M. Mazarieb
Dept. of Surgery, Royal Free Hospital, Barnet Hospital, London NW2 2QG, United Kingdom
E-mail: mayemazareeb@gmail.com

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To be capable of embarrassment is the beginning of moral consciousness. Honor grows from qualms.

John Leonard (1939–2008), American literary, television, film, and cultural critic

Capsule

Homologous recombination deficiency and hemizygosity drive resistance in breast cancer

Through an integrated clinicogenomic analysis of more than 5800 patients, **Safonov** and colleagues showed that germline (g) pathogenic variants dictate the evolutionary trajectory of acquired resistance. They found that g*BRCA2*-associated tumors were uniquely predisposed to develop acquired *RB1* loss-of-function alterations, resulting in poor outcomes on standard-of-care frontline CDK4/6 inhibitor (CDK4/6i) combinations. This vulnerability is driven by a dual mechanism: baseline *RB1* hemizygosity (heterozygous loss resulting in a single functional *RB1* allele), which lowers the evolutionary barrier to biallelic inactivation, and ongoing homologous recombination deficiency, which promotes acquisition of *RB1* loss-of-function alterations under the selective pressure of CDK4/6i. Preclinical models from g*BRCA2* carriers showed near-uniform resistance to CDK4/6i, with consistent post-treatment Rb loss. Across multiple independent models and in our clinical data, PARP inhibition consistently outperformed CDK4/6i. The author's findings suggest that prioritizing PARP inhibition in g*BRCA2* carriers may intercept *RB1*-loss trajectories and delay resistance.

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Eitan Israeli

Capsule

Taking a BiTE out of atherosclerosis

Atherosclerosis is characterized by the buildup of lipid-containing plaque in blood vessels including coronary arteries and is a leading cause of death worldwide. The mainstay of therapy is lipid-lowering agents such as statins, which help but do not always fully prevent disease progression and mortality. To gain further insight into the biology of atherosclerotic plaques, **Amrute** and colleagues performed single-cell spatial transcriptomics on coronary arteries from people with and without atherosclerosis. This analysis helped identify smooth muscle cells expressing fibroblast activation protein as a major culprit in blood vessel plaque formation. Immunotherapy using a bispecific T cell engager (BiTE) against this protein reduced the atherosclerotic plaque burden in mouse models, suggesting a potential therapeutic strategy.

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Eitan Israeli