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# **Case Report**

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# The laparoscopic management of a cholecystoduodenal fistula undiagnosed with preoperative imaging and endoscopy: A case series and literature review

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#### Abstract

Cholecystoduodenal fistula's (CCDFs) are rare complications associated with inflammatory erosion within the hepatobiliary system. Preoperative diagnosis can be challenging, and they are often managed with open surgical techniques. We present a case series of three intraoperatively discovered CCDFs managed laparoscopically on an Acute Care General Surgery service. Utilizing a stepwise approach starting with a dome-down dissection, liberal use of intraoperative cholangiogram through the infundibulum, subtotal cholecystectomy if needed, and endoscopic staplers or intracorporeal suturing for definitive fistula management resulted in favorable outcomes in our patients without requiring conversion to open surgery. Laparoscopy should be considered a safe and effective option in this clinical scenario, and our stepwise approach allows for reproducibility among general surgeons.

**Keywords:** Cholecystectomy; Cholecystoduodenal Fistula; Laparoscopy; Minimally Invasive Surgery; Fistula; Gastrointestinal; Biliary.

## Background

Biliary-enteric fistulas (BEFs) are rare complications from inflammatory erosion into adjacent structures. The incidence of BEFs is approximately 0.15-5%, with cholecystoduodenal fistula (CCDF) accounting for the majority [1]. Untreated CCDF can result in perforation, infection, bleeding, or gallstone passage into the enteric tract leading to obstruction [2]. Risk of development increases in patients over 60 years of age, with larger gallstones (2-8 cm), chronic biliary disease, and in females [3]. Historically, most BEFs were diagnosed intraoperatively, and are often managed with open surgery [1,4]. Recent Computed Tomography (CT)/Magnetic Resonance Imaging (MRI) and endoscopic advancements allow for improved identification, but the diagnosis can be challenging to make without findings of gallstone ileus or Mirizzi syndrome [5]. Other common signs and symptoms, including jaundice, cholangitis, pneumobilia, and hepatic dysfunction, are nonspecific given commonality with other biliary pathology [6]. Laparoscopic management of BEF has previously been reported but is rare and still carries a high rate of conversion to open surgery [5,7]. We present a case series of three intraoperatively discovered CCDFs managed laparoscopically on an Acute Care General Surgery service and review the current literature.

#### **Case presentations**

**Patient #1:** A 54-year-old male presented with abdominal pain, nausea, vomiting, leukocytosis, transaminitis, hyperbilirubinemia and elevated alkaline phosphatase. He had a similar episode one week prior but otherwise no prior biliary symptoms. Right-upper quadrant ultrasound demonstrated a poorly visualized and contracted gallbladder. CT imaging demonstrated a contracted gallbladder with extra-hepatic biliary ductal dilation and biliary mucosal enhancement, common bile duct (CBD) **Citation:** Taylor R, Clegg DJ, Creighton JH, Cavalea A. The laparoscopic management of a cholecystoduodenal fistula undiagnosed with preoperative imaging and endoscopy: A case series and literature review. J Clin Images Med Case Rep. 2025; 6(6): 3629.

dilation of 9-10 mm, and pneumonia concerning for choledocholithiasis with cholangitis (Figure 1). The patient was admitted on broad-spectrum antibiotics, with endoscopic ultrasound and endoscopic retrograde cholangiopancreatography (ERCP) performed that day. Four stones were noted in the CBD on EUS (Figure 2), and successfully removed after sphincterotomy during ERCP. Surgery was consulted for interval cholecystectomy, and the decision was made to proceed with laparoscopic cholecystectomy with intraoperative cholangiogram. Intraoperatively, the patient had significant adhesions to the gallbladder fossa, with a severely contracted intrahepatic gallbladder. The cystohepatic triangle was distorted with a tubular-appearing, dense connection from the neck of the gallbladder to the adjacent duodenum. A dome-down approach was used, and a cholangiogram was performed above the exposed infundibulum (Figure 3). Cholangiogram demonstrated brisk emptying into the duodenum only with no filling of the biliary tree (Figure 4A). With the cholangiogram findings in conjunction with the tubularappearing structure from the gallbladder to the duodenum, it was felt this represented a cholecystoduodenal fistula. Further dissection was performed to isolate the fistula and expose the cystic and common bile duct junction (Figure 5a). The suspected fistula tract was then occluded with an atraumatic grasper and a repeat cholangiogram was performed, which demonstrated appropriate opacification of the biliary system with emptying into the duodenum (Figure 4B). The fistula tract was then divided utilizing a medium/thick load endoscopic linear stapler (Figure 5B). The cholecystectomy was then completed in standard fashion. The patient recovered well and was discharged the following day. At 4-week follow-up, the patient was recovering without complication.

Patient #2: A 64-year-old female with a past medical history notable for metastatic breast cancer currently receiving chemotherapy who was initially admitted to the hospital with concern for neutropenic fever. Ultrasound and CT demonstrated gallbladder wall thickening and a large gallstone concerning for acute calculous cholecystitis (Figure 6). Broad spectrum antibiotics were initiated, and the patient was taken for a laparoscopic cholecystectomy. Dissection of dense adhesions along the anterior surface of the gallbladder revealed the duodenum in direct communication with the gallbladder. Continuing laparoscopically, the duodenum was bluntly separated from the gallbladder revealing an incidentally found CCDF. Upper endoscopy was performed, and the fistula was confirmed via passage of a catheter through the fistula into the gallbladder (Figure 7). The duodenotomy was then isolated, edges were sharply debrided back to healthy tissue, and the duodenotomy was closed with interrupted 2-0 silk suture in a transverse fashion. Due to the degree of inflammation and adhesions surrounding the gallbladder, a critical view of safety could not be achieved. A dome-down approach was then utilized to separate the gallbladder from the cystic plate and a subtotal cholecystectomy was performed utilizing end loops. Upper endoscopy was then performed again to rule out posterior duodenal involvement, and a leak test was performed to confirm adequate suture closure of the duodenotomy.

The patient was then admitted for continued broad spectrum antibiotics and was made nil per os with nasogastric tube decompression. On postoperative day 4, a contrasted fluoroscopic exam was negative for leak from the repair (Figure 8). The patient's diet was advanced and had an uneventful postoperative course.

Patient #3: A 48-year-old female with a history of gallstones and biliary colic presented to the Emergency Department with a 5-day history of abdominal pain and nausea. Ultrasound demonstrated cholelithiasis and she had elevated serum lipase levels and liver function tests. She was subsequently admitted for management of acute gallstone pancreatitis with plans for interval laparoscopic cholecystectomy. Intraoperatively, the gallbladder was noted to have significant adhesions from chronic cholecystitis. Dissection revealed the duodenum to be densely adherent to the infundibulum and appeared to have formed a fistula to the gallbladder wall (Figure 9). The two structures were separated sharply revealing a full thickness duodenotomy and full thickness gallbladder defect confirming the presence of a CCDF. The duodenotomy was primarily closed with interrupted 3-0 silk suture in a transverse fashion with an adjacent omentopexy. Additional adhesions surrounding the gallbladder prevented identification of a critical view of safety and the decision was made to perform a subtotal cholecystectomy. A dome down approach was utilized to dissect the gallbladder off the cystic plate as low as feasible until limited by dense inflammation. The gallbladder was then transected at the infundibulum and several large gallstones were removed. A cholangiogram was then passed into the cystic duct orifice and an intraoperative cholangiogram was performed demonstrating proximal filling of dilated hepatic ducts, distal filling of the common bile duct and emptying into the duodenum without any filling defects (Figure 10). Endo loops were then placed around the infundibulum to complete the subtotal cholecystectomy. The first postoperative night, the patient developed ventricular fibrillation and suffered cardiac arrest requiring defibrillation with return of spontaneous circulation. Cardiology was consulted, and the etiology was felt to be illicit surreptitious substance ingestion unmasking congenital long QT syndrome leading to Torsade de Pointes. Pacemaker was placed and the rest of the patient's postoperative course was uneventful, with no other complications dirtectly associated with her laparoscopic cholecystectomy.

## Discussion

Fistulous connections to the biliary system represent a rare and heterogenous subgroup of complicated gallstone disease. Cholecystoduodenal fistulas are the most common, followed by cholecystocolonic and cholecystogastric fistulas8. BEF are classically associated with gallstones ileus, represented by Rigler's triad: Pneumobilia, ectopic gallstones, and proximally dilated bowel. However, the classic presentation is rare, and associated symptoms are nonspecific given overlap of symptoms with other acute biliary diseases such as cholangitis [1]. Diagnostic studies can aid in the preoperative diagnosis of CCDF. MRCP has a diagnostic accuracy of about 50%, while accuracy of ERCP ranges from 55% to 90% [5]. CT has been considered one of the best modalities for preoperative diagnosis, particularly if gallstone ileus is present, with a reported sensitivity, specificity, and accuracy of up to 93%, 100%, and 99%, respectively [9]. However, in our three patients with intraoperatively discovered



**Figure 1:** CT imaging obtained demonstrating dilated CBD, pneumonia and a severely contracted and atrophied gallbladder without other evidence of fistula tract or obstruction.



Figure 2: Four stones were noted in the CBD on EUS.



**Figure 3:** Cholangiogram performed above the exposed infundibulum following dome down approach.

CCDF, only one of three had pneumobilia on preoperative imaging thus highlighting the importance of maintaining a high degree of clinical suspicion when faced with distorted anatomy or abnormal findings in the operating room. Conversion to open cholecystectomy has traditionally been the most common approach of choice for management of CCDF. A systematic review by Sareen et al. found that CCDF can be safely managed with standard laparoscopic techniques [7]. While our specific operative approaches varied for all three patients according to surgeon preference, once a CCDF was discovered we avoided converting to open by utilization of well-established safe laparoscopic techniques. In such situations, we recommend a step-



**Figure 4: (A)** Initial intraoperative cholangiogram demonstrating free flowing passage of contrast directly into the duodenum. **(B)** Intraoperative cholangiogram after occlusion of the suspected fistula tract with a laparoscopic grasper, demonstrating opacification of the cystic duct, common bile duct, hepatic ducts, and emptying into the duodenum.



**Figure 5: (A)** Intraoperative photograph of the mobilized and isolated cholecystoduodenal fistula. **(B)** Intraoperative photograph of the divided cholecystoduodenal fistula tract with a linear endoscopic stapler, with remaining cystic duct and common bile duct junction isolated.



**Figure 6:** Gallbladder wall thickening and large gallstone on cross sectional imaging and ultrasound.

wise approach starting with a dome-down dissection, liberal use of intraoperative cholangiogram through the infundibulum, subtotal cholecystectomy if needed, and endoscopic staplers or intracorporeal suturing for definitive fistula management. Laparoscopic management of CCDF with these techniques was safe and effective, minimized morbidity, and led to favorable outcomes in our patients.



**Figure 7:** Catheter through the fistula into the duodenum confirming diagnosis of a CCDF.



**Figure 8:** Postoperative upper GI series without evidence of contrast extravasation.



**Figure 9:** Graspers elevating gallbladder superiorly and suction irrigator depressing duodenum inferiorly to reveal an intraoperatively discovered CCDF.

#### Conclusion

While cholecystoduodenal fistulas are rare, recognition is paramount for general surgeons in both the acute care surgery and elective practice settings. There is a paucity of literature pertaining to safe laparoscopic management, especially when discovered intraoperatively. We present three cases of CCDF diagnosed intraoperatively and successfully managed with various laparoscopic techniques. Laparoscopy should be considered a safe and effective option in this clinical scenario, and our stepwise approach allows for reproducibility among general surgeons.



**Figure 10:** Intraoperative cholangiogram through infundibulum following repair of CCDF demonstrating no filling defects.

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