Delayed, Recurrent Bile Leak from Isolated Right Posterior Sectoral Duct Injury After Laparoscopic Cholecystectomy: An Unusual Presentation

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March 30, 2022

Abstract

Bile leak after cholecystectomy is associated with significant comorbidity. Biliary duct variant anatomy can complicate identification and management. We report a rare presentation of recurrent delayed leaks years after laparoscopic cholecystectomy secondary to missed right posterior sector bile duct injury. Surgical intervention was required after failure of conservative management.

Introduction

Clinically significant bile leaks complicate about 0.3–2.7% of cholecystectomies¹. Biliary tree anomalies may be present in up to 25% of patient population and aberrant right hepatic ducts are the most common². While a majority of bile leaks originate from the cystic duct (CD) stump or the sub-vesical duct of Luschka¹, those from aberrant sectoral bile ducts are rarely discussed.

Aberrant sectoral duct arises most commonly from the right liver segments and drain into the common hepatic duct (CHD) or CD. These ducts usually represent the only route of biliary drainage for the portion of the right hepatic lobe they drain. From a surgical stand-point, the most dangerous sectoral variant is when the CD runs alongside of a low-lying aberrant right sectoral duct. Most commonly this is the right posterior sectoral duct (RPSD), which drains segments 6 and 7. It is present in 4.8–8.4% of the population². Injuries to these ducts are likely underreported since they may be asymptomatic and often unrecognized as the injured area atrophies over time.

We present an unusual case of right posterior sector bile duct injury that presented as a delayed, recurrent bile leak, two and seven years after laparoscopic cholecystectomy discussing challenges with diagnosis and management.

Case Report

A 62-year-old female was referred to our surgical clinic for evaluation of recurrent bile leak following an uneventful laparoscopic cholecystectomy 7-years ago, at an outside hospital. The patient had remained asymptomatic for about two years post-cholecystectomy when she developed right upper quadrant abdominal pain. A periphecal fluid collection that was percutaneously drained and was consistent with a bile leak. She then underwent an endoscopic retrograde cholangiopancreatography (ERCP) with sphincterotomy and biliary stent placement. Additionally, percutaneous transhepatic biliary drainage (PTBD) was performed due to persistence of bile leak in the external drain (images from outside hospital were not available). After several weeks, she had eventual resolution of the bile leak followed by removal of all the drains and stent. Patient remained asymptomatic for another 5 years before presenting to our gastroenterology department with a recurrent bile leak for which a percutaneous drain had been placed.
She underwent an ERCP which showed irregular contrast filling in the gallbladder fossa consistent with leak possibly from an isolated right posterior sectoral duct (Figure 1A). An internal biliary stent was placed. While a repeat ERCP, two months later, failed to demonstrate a bile leak, she continued to have 20 - 40 ml/d of bilious output in her percutaneous drain. The patient was consented for an exploratory laparotomy for possible isolation and ligation of the leaking bile duct versus a partial wedge hepatic resection if the leaking duct was not identified.

Exploration was performed via a right subcostal incision. The percutaneous catheter was tracked in to a chronic abscess cavity along the inferior edge of the liver and overlying the gallbladder fossa. The cavity was de-roofed and about 10 ml of bilio-purulent fluid was drained. The common bile duct was identified. After debridement and irrigation, a pinpoint (3 mm diameter) area of bile leak was identified in the gallbladder fossa. This was probed with coronary dilators and confirmed to be the offending bile duct branch. The overlying scar tissue was excised and the freshened edges of the duct were oversewn using running 5-0 Polydioxanone sutures. The percutaneous drain was removed and a 19-Fr surgical drain placed.

The patient had an uncomplicated recovery. The surgical drain was removed on post-operative day 10 in the clinic. An ERCP was performed 6-weeks after surgery and the biliary stent was removed (Figure 1B). 24 months after surgery, the patient continues to do well without any evidence of bile leak, (serum total bilirubin of 0.6 mg/dL and serum ALP 100 units/L).

Discussion

We report a very rare presentation of recurrent bile leak after cholecystectomy in context of aberrant anatomy that failed conservative management and required surgical intervention with good patient outcome. The exact etiology of this delayed bile leak is unclear; however, we postulate that it may be secondary to a tangential thermal injury to a superficial right posterior sectoral duct during dissection at the gallbladder fossa during index laparoscopic cholecystectomy.

Timing of presentation of bile ducts injury after cholecystectomy can be variable. If the duct injury is not recognized intraoperatively, postoperative bile leaks will be resulted with patients’ reported symptoms of abdominal pain, nausea, loss of appetite and lethargy. Posterior sectoral duct injuries may escape detection and opacification on intraoperative cholangiogram or post-operative ERCP due to the lack of communication of the injured ducts with the main biliary channels, thereby rendering angiographic assessment challenging. Diagnosis presents the most significant barrier to prompt treatment and such injuries should be suspected when a bile leak persists despite “normal” cholangiography and there is a presumed failure of a “CD stump leak” closure after biliary stent placement2.

While most bile leaks after cholecystectomy can be managed conservatively via ERCP and biliary stent placement, alternative treatment options must be explored when conservative managements fail. The case presentation in our patient and repeat ERCP was most consistent with leak from rare anatomic variations of the right posterior sectoral duct system. Perera et al proposed that nonoperative management is feasible in majority of patients with leaks secondary to right posterior sectoral duct injuries via percutaneous drain placement and endoscopic stenting3. In cases where the leak persists, operative intervention should be sought. Although hepatic abscess can be resulted with posterior sectoral bile duct ligation, it can be safely considered in small duct size as performed in our case3. Partial hepatic resection or biliary reconstruction via Roux-en-Y hepaticojejunostomy might be required based on intraoperative assessment, biliary anatomy, underlying liver disease and patient comorbidities4.

Conclusion

We conclude that subvesical bile duct injury may rarely present with delayed abdominal pain and fever after cholecystectomy. Avoiding deep dissection into liver parenchyma and staying close to the gallbladder can potentially avert injury to these ducts. Subvesical bile duct leaks that cannot be managed by endoscopic biliary stenting and external drains may need surgical intervention for definitive control of the bile leak.

Figure legend
Figure 1. (A) Preoperative ERCP with irregular contrast filling near the gallbladder fossa consistent with bile leak from a right posterior sectoral duct branch (solid white arrow). Cystic duct remnant (dashed arrow) is seen without any evidence of leak. (B) Postoperative ERCP after removal of biliary stent showing no evidence of bile leak in the gall bladder fossa.

Funding: None

Conflicts of interest: None

Consent: Written informed consent was obtained from the patient to publish this report in accordance with the journal’s patient consent policy

Author’s contribution: Drs. Sharma, Ruch, Alwatari, Bouhaidar and Ms. Lele were responsible for manuscript design, and data acquisition. All authors contributed to drafting the manuscript, revising it critically, and provided approval of the final manuscript version

References

1. Ahmad F, Saunders RN, Lloyd GM, et al. An algorithm for the management of bile leak following laparoscopic cholecystectomy. *Ann R Coll Surg Engl* 2007; 89: 51-56. 2007/02/24. DOI: 10.1308/003588407x160864.

2. Babel N, Sakpal SV, Paragi P, et al. Iatrogenic bile duct injury associated with anomalies of the right hepatic sectoral ducts: a misunderstood and underappreciated problem. *HPB Surg* 2009; 2009: 153269. 2009/09/16. DOI: 10.1155/2009/153269.

3. Perera MT, Monaco A, Silva MA, et al. Laparoscopic posterior sectoral bile duct injury: the emerging role of nonoperative management with improved long-term results after delayed diagnosis. *Surg Endosc* 2011; 25: 2684-2691. 2011/03/19. DOI: 10.1007/s00464-011-1630-4.

4. Vasiliadis K, Moschou E, Papaioannou S, et al. Isolated aberrant right cysticohepatic duct injury during laparoscopic cholecystectomy: Evaluation and treatment challenges of a severe postoperative complication associated with an extremely rare anatomical variant. *Ann Hepatobiliary Pancreat Surg* 2020; 24: 221-227. 2020/05/28. DOI: 10.14701/aibps.2020.24.2.221.