



Retroperitoneal duodenal perforation following biliary stent migration: A case report and review of conservative management

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ABSTRACT

Endoscopic biliary stenting is a widely adopted technique for managing bile duct injuries post-cholecystectomy. However, its complications can have severe consequences. Although rare compared to other endoscopic retrograde cholangiopancreatography-related complications, duodenal perforation due to stent migration carries a significant risk of morbidity and mortality. While biliary stenting is often considered a less invasive alternative to surgery, timely recognition and management of potential complications remain crucial. We present a case of duodenal perforation due to biliary stent migration in a 49-year-old woman following laparoscopic cholecystectomy, emphasizing the effectiveness of conservative management, including the key role of interventional radiology, in selected patients.

Keywords: Biliary injury, biliary stent, ERCP, duodenum, perforation, management

INTRODUCTION

Biliary injury is a known complication of cholecystectomy, one of the most frequently performed general surgical procedures worldwide; occurring in approximately 0.3-0.6% of laparoscopic cases (1). Management depends on the extent of the injury and the patient's clinical condition. Endoscopic retrograde cholangiopancreatography (ERCP) with stent placement is an effective intervention in cases without full-thickness bile duct injury (type E) (2), particularly in experienced centers. However, ERCP-related complications can occur, including bleeding, leakage, and obstruction, with duodenal perforation due to stent migration being a rare but serious outcome (3-5).

The overall incidence of biliary stent migration is reported to be between 5% and 10%, with duodenal perforation occurring in only a small subset of cases (6,7). Identified risk factors for migration include inappropriate stent length, inadequate anchoring, and patient-specific anatomical variations (8,9). Furthermore, migrated stents may cause intestinal perforation, biliary peritonitis, or even cecal perforation in rare cases (10,11). To mitigate these risks, stent selection should be tailored to individual patient anatomy, and securing techniques should be optimized (12,13).

Here, we report a case of retroperitoneal duodenal perforation secondary to biliary stent migration and its successful conservative management.

For this case report, informed consent was obtained from the patient (or their legal guardian) for the publication of clinical details and any accompanying images. The patient was informed about the purpose of the report, and their anonymity was ensured by omitting any identifying information.

CASE REPORT

A 49-year-old female with a history of hypertension underwent laparoscopic cholecystectomy for calculous cholelithiasis at an external center in December 2024. She was referred to our center with suspected biliary injury. Upon admission, laboratory tests revealed elevated direct bilirubin (total: 1.59 mg/dL; direct: 0.83 mg/

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dl), alkaline phosphatase (500 U/L; normal: 35-104 U/L), and AST (38 U/L; normal: 0-32 U/L), while other parameters were within normal limits.

Abdominal ultrasound revealed a 2 cm loculation in the cholecystectomy area. A hepatocyte-specific contrast-enhanced magnetic resonance cholangiopancreatography performed at the referring center suggested a possible Strasberg type E injury (Figure 1). After evaluation by our radiology team, ERCP was performed and revealed a biliary leak compatible with Strasberg type A (Figure 2). A 10 cm, 8F biliary stent was placed endoscopically.

During follow-up, persistent biliary leakage and rising bilirubin levels necessitated a stent revision. Following the second procedure, the patient was clinically stable and discharged. However, on post-discharge day five, she presented with severe abdominal pain. Abdominal computed tomography (CT) demonstrated stent migration into the third portion of the duodenum, with evidence of perforation and retroperitoneal abscess formation (Figure 3).

A multidisciplinary team including general surgeons, radiologists, and gastroenterologists opted for conservative management with radiological percutaneous drainage. Interventional radiology successfully drained the abscess under ultrasound guidance, and the stent was removed endoscopically a few days later (Figure 4). The patient was started on a liquid diet on the first day after stent removal and progressed to a full diet. The repeat contrast-enhanced CT confirmed resolution of the abscess

without contrast extravasation. The percutaneous catheter was removed and the patient was discharged uneventfully on oral antibiotics. At the 3-month follow-up after discharge, the patient was in good general condition with no complaints. No further intervention was required, and repeat imaging confirmed the permanent resolution of the retroperitoneal collection.

DISCUSSION

Endoscopic procedures are essential in the management of biliary injuries, offering a minimally invasive approach. However, complications such as biliary stent migration leading to duodenal perforation pose significant risks. Although rare, these complications require prompt diagnosis and intervention to prevent morbidity and mortality (5,14).

ERCP-associated perforations commonly occur during sphincterotomy, stent placement, or endoscopic manipulation (3). Duodenal perforation due to stent migration is particularly uncommon (4). Studies have shown that perforations associated with ERCP occur in approximately 0.3% to 1% of cases, with higher morbidity associated with delayed diagnosis and treatment (6,14). Risk factors include inappropriate stent selection, technical errors and limited operator experience. Literature suggests that the use of fully covered stents may reduce the risk of migration, whereas uncovered stents are more prone to dislodgement. As this issue is the subject of another study, further randomised trials are warranted to determine optimal stent selection strategies (7).

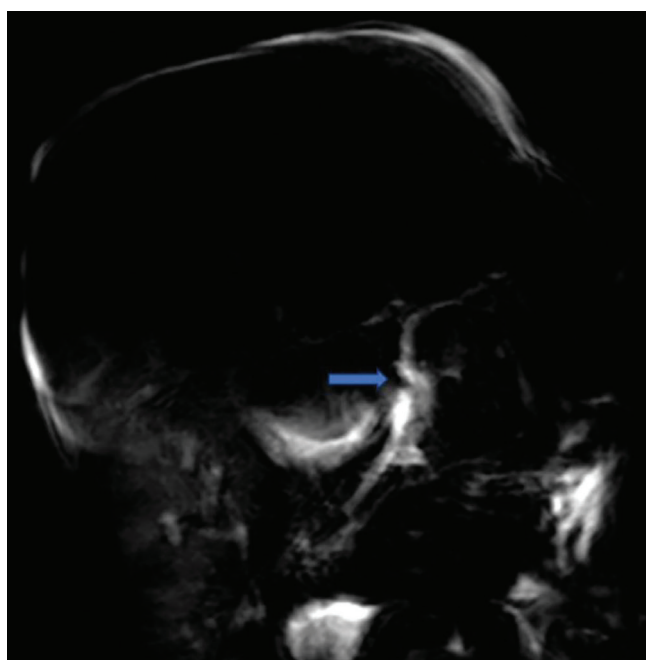


Figure 1. MRCP scan (the blue arrow shows the suspected injury located below the confluence of the extrahepatic bile duct).

MRCP: Magnetic resonance cholangiopancreatography

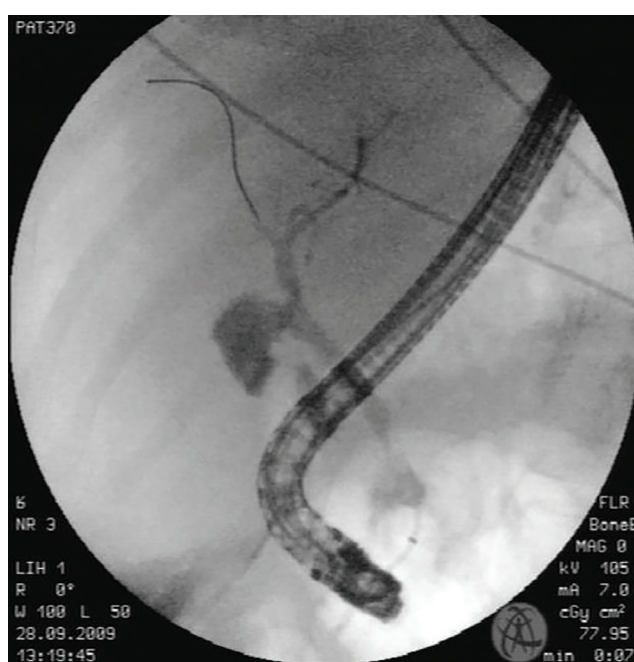


Figure 2. Cholangiography image taken during the ERCP procedure.

ERCP: Endoscopic retrograde cholangiopancreatography

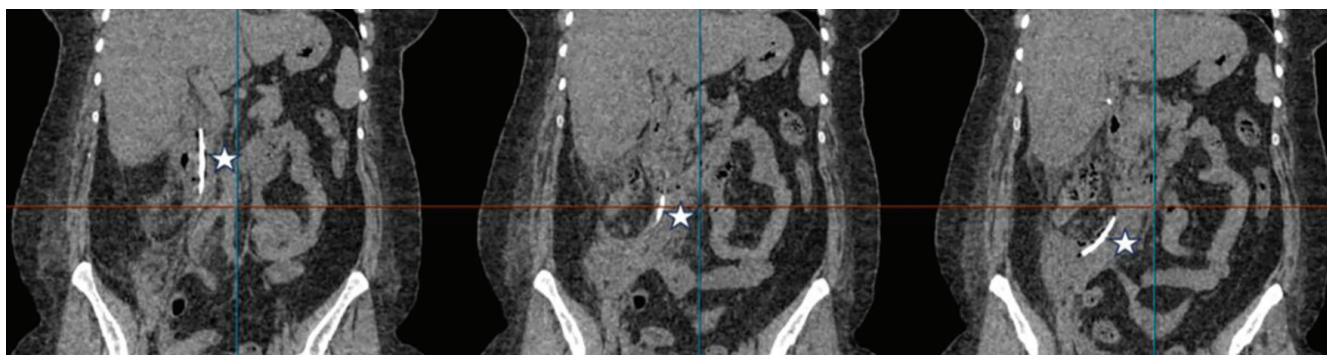


Figure 3. CT scan (the white star marks the biliary stent perforating the duodenum and extending into the retroperitoneal space).

CT: Computed tomography

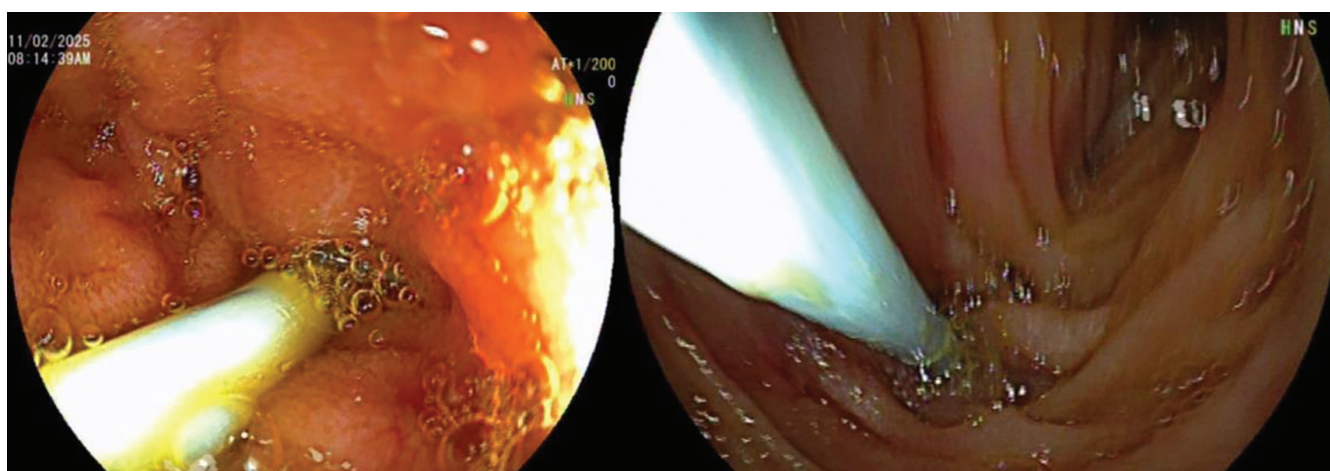


Figure 4. Endoscopic view of the biliary stent perforating the duodenal wall.

Management depends on the location and severity of the perforation. In our case, the decision to manage conservatively was based on several key clinical factors—the patient remained hemodynamically stable, there was no evidence of generalised peritonitis, and imaging confirmed that the perforation and resulting abscess were localized to the retroperitoneal space. These findings were consistent with a contained injury with no ongoing leakage into the peritoneal cavity. Cases of retroperitoneal duodenal perforation may be amenable to conservative management, particularly if the injury is self-contained (15). Endoscopic retrieval of dislodged stents, image-guided percutaneous drainage performed by interventional radiology, and close clinical monitoring are key strategies to avoid surgical intervention. However, if patients develop peritonitis, sepsis or progressive imaging findings, early surgical intervention is imperative.

Recent studies emphasise the importance of individualised treatment strategies. Dumonceau et al. (4) highlight that prophylactic stenting techniques and appropriate stent selection

can significantly reduce complications. In addition, Fujisawa et al. (7) discuss novel stent designs aimed at reducing migration rates. In some cases, fully covered self-expanding metal stents have been proposed to minimise the risk of migration (16). In addition, new advances in biodegradable stents may offer future alternatives to reduce complications associated with long-term stent placement (17).

Cross-sectional imaging with IV contrast is essential to assess the extent of perforation, abscess formation and adjacent anatomical involvement. In our case, percutaneous drainage served as an important insurance policy until oral feeding could be safely resumed without recurrence of symptoms. This highlights the importance of a stepwise approach, balancing conservative and invasive management strategies.

Long-term follow-up studies suggest that while non-surgical management can be effective, close follow-up after discharge is essential. Patients with previous ERCP complications, including stent migration, may benefit from scheduled follow-up, additional imaging and multidisciplinary consultation. In

addition, understanding patient-specific risk factors, including anatomical variations and procedural history, may help make informed decisions about stent type and placement duration. Given the challenges of stent migration, future advancements should focus on improving stent design, including self-expanding stents with anti-migration mechanisms (7). Training in ERCP techniques is also essential to reduce procedural risks (8). In addition, advances in bioresorbable stents and improved endoscopic techniques may help to minimise complications.

To aid clinical decision making, we have included a simplified flowchart (Figure 5) outlining the key criteria that guide the selection between conservative and surgical management in patients with duodenal perforation due to biliary stent migration.

CONCLUSION

Duodenal perforation after ERCP-related biliary stenting is associated with a high risk of morbidity and mortality, with reported mortality rates between 10% and 30% in some series (18). Early diagnosis and intervention are essential. While conservative management, including endoscopic stent removal and percutaneous drainage, is feasible in selected cases, prompt surgical intervention remains crucial in patients with worsening sepsis, persistent leakage, or peritonitis.

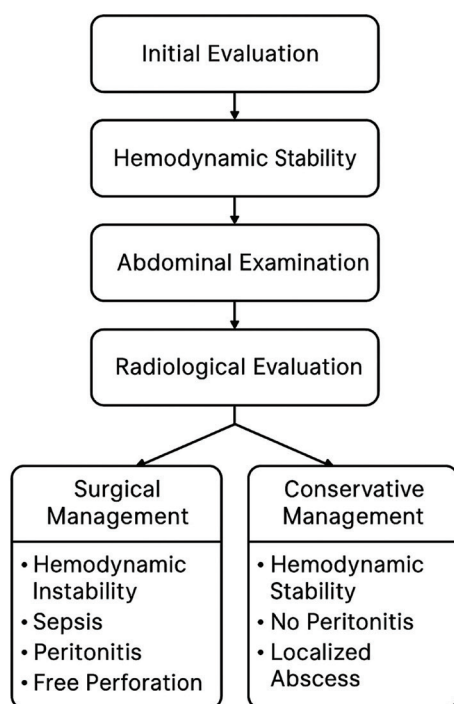


Figure 5. Decision-making algorithm summarizing the criteria for conservative versus surgical management in patients with duodenal perforation secondary to biliary stent migration.

Ethics

Informed Consent: For this case report, informed consent was obtained from the patient (or their legal guardian) for the publication of clinical details and any accompanying images. The patient was informed about the purpose of the report, and their anonymity was ensured by omitting any identifying information.

Footnotes

Author Contributions

Surgical and Medical Practices - R.R.E.S., T.Ö., F.B., O.A.; Concept - F.B., O.A.; Design - O.A.; Data Collection or Processing - R.E.S., T.Ö., F.B.; Analysis or Interpretation - R.R.E.S., F.B., O.A.; Literature Search - R.R.E.S., T.Ö.; Writing - R.R.E.S., T.Ö.

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