Case Report

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Lemmel syndrome: the role of prudent radiological evaluation – a case report

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Introduction and importance: Lemmel syndrome (LS) is a rare cause of obstructive jaundice resulting from compression of the distal common bile duct (CBD) by a periampullary duodenal diverticulum. The diagnosis is frequently missed due to nonspecific clinical features and subtle radiologic findings.

Case presentation: A 39-year-old woman presented with recurrent epigastric pain, fever, and jaundice. Laboratory results showed leukocytosis and elevated bilirubin levels. Ultrasonography and magnetic resonance cholangiopancreatography (MRCP) demonstrated gallstones with mild biliary dilatation and suspected CBD sludge, prompting a laparoscopic cholecystectomy with planned CBD exploration. Intraoperative findings revealed a normal cystic duct and no evidence of obstruction. Re-evaluation of the MRCP during surgery identified an air pocket adjacent to the distal CBD, suggesting a periampullary diverticulum. Subsequent endoscopic retrograde cholangiopancreatography (ERCP) confirmed LS caused by food debris within the diverticulum. Endoscopic balloon sweep and sphincterotomy achieved complete resolution, and the patient remained symptom-free at 6 months.

Clinical discussion: The case highlights a diagnostic pitfall, which is an over-reliance on radiologists' interpretations and printed MRCP images. Review of thin-slice digital MRCP images by the surgical team could have revealed the diverticulum earlier. Hospitals with infrastructure that allows simultaneous endolaparoscopic procedures offer optimal workflow and outcomes.

Conclusion: Careful review of preoperative imaging, multidisciplinary coordination, and the availability of intraoperative ERCP are crucial for the accurate diagnosis and effective management of LS, preventing unnecessary bile duct exploration and reducing morbidity.

Keywords: common bile duct compression, endoscopic retrograde cholangiopancreatography (ERCP), laparoscopic cholecystectomy, Lemmel syndrome, obstructive jaundice, periampullary duodenal diverticulum

Introduction

Duodenal diverticulum (DD) is the second most common type of intestinal diverticulum after colonic diverticula. There is no gender predilection, and DD is typically identified after the age of 40, with approximately 60% of cases occurring in individuals over 70 years old, suggesting that most cases are acquired[1]. Anatomically, DDs are most frequently located along the medial border of the second portion of the duodenum (70%), followed by the medial border of the third and fourth portions (26%), and the lateral border of the second portion (4%)[2].

HIGHLIGHTS

- Lemmel syndrome should be considered in cases of obstructive jaundice without choledocholithiasis.
- Misinterpretation of magnetic resonance cholangiopancreatography can delay diagnosis; review of thin-slice digital images is crucial.
- Intraoperative re-evaluation of imaging can prevent unnecessary bile duct exploration.
- Endoscopic retrograde cholangiopancreatography remains the gold standard for both diagnosis and minimally invasive treatment.
- Early integration of hybrid laparoscopic-endoscopic workflows enhances patient outcomes.

Most DDs are asymptomatic; however, 1–5% of patients develop complications such as hemorrhage, perforation, or biliary and pancreatic obstruction. In 1934, Dr. Gerhard Lemmel first described the association between periampullary DD and obstructive jaundice in the absence of choledocholithiasis or neoplasm, which is now termed Lemmel syndrome (LS)[3]. Recent case reports have shown variable presentations of LS, although most share the findings of common bile duct (CBD) dilatation and obstructive jaundice[4,5]. The underlying mechanisms include inflammation and fibrosis of the papilla of Vater due to diverticulitis, sphincter of Oddi dysfunction, or direct compression of the distal CBD by an inflamed or food-filled diverticulum[6,7].

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This report describes a case of LS associated with cholecystolithiasis, initially misdiagnosed as choledocholithiasis or Mirizzi syndrome. Intraoperative findings during laparoscopic cholecystectomy prompted re-evaluation of preoperative magnetic resonance cholangiopancreatography (MRCP), revealing the presence of a periampullary DD. Subsequent endoscopic retrograde cholangiopancreatography (ERCP) confirmed that the biliary obstruction resulted from extrinsic compression of the distal CBD by impacted food debris. This case is presented in accordance with the latest SCARE guidelines[8].

Case presentation

A 39-year-old woman was admitted with a 3-month history of recurrent epigastric pain. Five days prior to admission, the pain worsened and was accompanied by fever and jaundice. The patient had no history of smoking or alcohol use. On examination, her abdomen was flat, without distention or palpable masses. Her body mass index was 24.5 kg/m^2. Right upper quadrant tenderness was noted, with no hepatosplenomegaly. Laboratory investigations revealed leukocytosis (12 500/mm^3), hyperbilirubinemia (total bilirubin 4.1 mg/dL, direct bilirubin 3.0 mg/dL), SGOT 34 U/L, and SGPT 44 U/L. Abdominal ultrasonography demonstrated multiple echogenic foci with posterior acoustic shadowing within the gallbladder. MRCP showed mild dilatation of the intra- and extrahepatic bile ducts, gallbladder distention with multiple calculi, and suspected sludge within the CBD (Fig. 1A and B). A diagnosis of cholelithiasis with choledocholithiasis and grade II cholangitis was made, and laparoscopic cholecystectomy with CBD exploration was planned.

During laparoscopic cholecystectomy, no operative complications occurred. The cystic duct was of normal caliber (approximately 2 mm), while the CBD appeared mildly dilated (8 mm). Several small gallstones (2–4 mm) were retrieved from the gallbladder, and no significant adhesions were present around the hepatocystic triangle. Intraoperative findings suggested that neither Mirizzi syndrome nor CBD obstruction by sludge, as initially suspected, could explain the patient's symptoms. A re-evaluation of the preoperative MRCP images was conducted intraoperatively, revealing the presence of an air bubble within the duodenal wall lateral to the CBD (Fig. 1C). This finding raised the suspicion of a DD; thus, CBD exploration was deferred, and the patient was scheduled for ERCP the following day, to be performed by the same operating surgeon.

ERCP demonstrated a DD located cranial to the papilla of Vater, containing food debris (Fig. 2A). Attempts to remove the material using a biopsy grasper were unsuccessful. Following successful CBD cannulation, cholangiography revealed no stones but did indicate minimal sludge. Endoscopic sphincterotomy and balloon extraction were performed, yielding a small amount of sludge along with trapped food debris from the diverticulum (Fig. 2B and C). The patient's postoperative recovery was uneventful, and she was discharged the next day with dietary advice to consume small, frequent, high-fiber meals. At the 6-month follow-up, the patient remained asymptomatic.

Discussion

LS is an uncommon cause of obstructive jaundice, resulting from extrinsic compression of the distal CBD by a periampullary DD. As highlighted in the systematic review by Love *et al*[9], only 17 well-documented cases have been reported to date, with a mean patient age of 70 years. The majority of patients presented with right upper quadrant pain (64.7%), jaundice (68.8%), and CBD dilatation (100%). However, the clinical presentation and laboratory findings remain highly variable, often leading to diagnostic uncertainty. A comparison of patient demographics, presentations, and management outcomes is summarized in Table 1.

In the present case, the patient's symptoms and imaging findings: cholelithiasis, mild ductal dilatation, and suspected CBD sludge, initially suggested cholecystitis with choledocholithiasis. This is consistent with the diagnostic pitfalls described by Love *et al*, in which imaging findings of periampullary diverticula are often misinterpreted as choledocholithiasis or even pancreatic head lesions due to their proximity and overlapping radiological features. In retrospect, the DD was visible on MRCP but was overlooked during the initial assessment. This underscores the importance of direct surgeon review of imaging studies in their digital format, rather than relying solely on printed reports or radiologists' interpretations. Printed MRCP images are often displayed in thicker slices, which may obscure subtle findings such as small air bubbles or the diverticular sac adjacent to the distal CBD. When reviewing digital thin-slice MRCP sequences, periampullary diverticula often present as extraluminal outpouchings containing fluid or air, which appear as signal voids on T2-weighted images. This finding should be distinguished from intraductal filling defects such as CBD stones or sludge. Additionally, alternative imaging modalities can be valuable, such as endoscopic ultrasound, which is highly sensitive for differentiating diverticula from biliary stones or neoplasms, while CT with oral contrast can help visualize the diverticular sac.

Another crucial learning point concerns the timing and coordination of multidisciplinary management. Ideally, once the

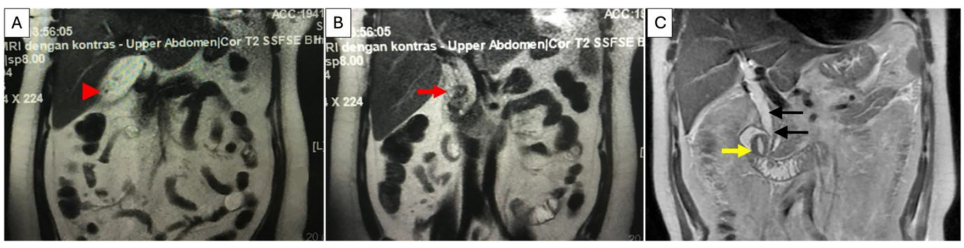

Figure 1. T2-weighted MRCP coronal view showing (A) multiple cholecystolithiasis (red arrowhead), (B) sludge within the CBD (red arrow), and (C) periampullary diverticulum (yellow arrow) adjacent to the ampulla, compressing the distal CBD (black arrowheads).

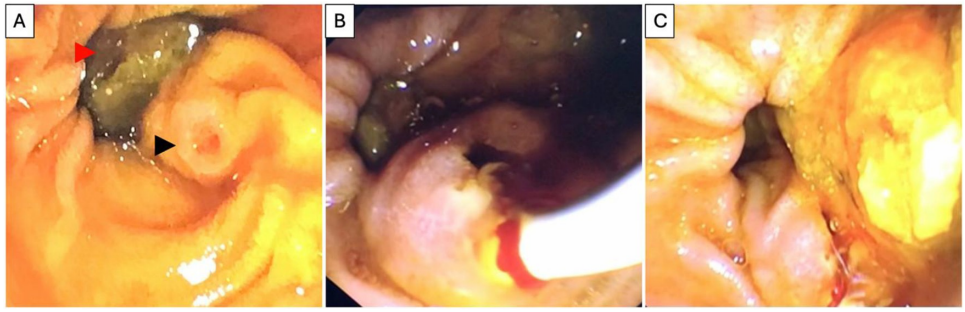

Figure 2. Photographs of ERCP showing: (A) trapped food debris within the periampullary diverticulum (red arrowhead) posterocranial to the ampulla of Vater (black arrowhead); (B) an endoscopic CBD balloon sweep after sphincterotomy yielding clear bile, minimal sludge, and no bile duct stones; and (C) dislodged food debris following the balloon sweep with free-flowing bile.

intraoperative MRCP re-evaluation suggested a DD, the patient should have undergone a same-session ERCP within the same anesthetic period, which is feasible in hospitals equipped with a hybrid operating theater. As discussed by Love *et al*, ERCP remains the gold standard for both the diagnosis and treatment of LS, allowing direct visualization of the diverticulum and immediate therapeutic intervention through lavage, sphincterotomy, balloon sweep, or stenting. In our institution, however, ERCP was delayed until the following day due to infrastructural limitations, necessitating separate scheduling in a different suite. Despite this, the patient had an uneventful recovery after sphincterotomy and balloon sweep. For centers lacking hybrid operating theaters, ensuring seamless coordination to minimize obstruction time is crucial. This can be achieved by prioritizing ERCP slots for the next day and utilizing intraoperative cholangiography to confirm ductal clearance if ERCP is delayed.

Endoscopic therapy, as demonstrated by Love *et al* and corroborated by multiple reports in their review, offers excellent outcomes with minimal morbidity. Among the 17 cases analyzed, 46.7% were successfully managed endoscopically, while only a minority required definitive diverticulectomy. Endoscopic lavage or balloon sweep to remove food debris from the diverticular cavity, such as in this case, has been shown to achieve symptom resolution and normalization of laboratory findings. These outcomes highlight that surgery should be reserved for refractory or recurrent cases or when complications such as perforation or recurrent cholangitis occur.

Our experience also reinforces the broader implication that careful imaging interpretation and timely multidisciplinary coordination can prevent unnecessary surgical exploration. Surgeons should maintain a high index of suspicion for LS when encountering unexplained biliary dilatation without intraductal obstruction, especially when MRCP shows periduodenal air or cystic structures near the ampulla.

Conclusion

LS remains an uncommon but important differential diagnosis in patients presenting with obstructive jaundice or cholangitis without choledocholithiasis. Based on the diagnostic pitfalls and the management outcome of this case, we highlight the following recommendations for clinical practice: (1) meticulous preoperative imaging analysis must include the operating surgeon's direct review of MRCP results in digital format to prevent diagnostic oversight; (2) surgeons must maintain a high index of suspicion, as early recognition of atypical intraoperative findings during laparoscopic cholecystectomy allows for timely reconsideration of the diagnosis and avoids unnecessary CBD exploration; and (3) given that ERCP remains the gold standard for diagnosis and minimally invasive treatment, early multidisciplinary collaboration and institutional readiness for same-session ERCP in hybrid settings are crucial to improve outcomes, reduce morbidity, and avoid redundant surgical interventions.

Table 1

Comparison of the present case with the aggregated literature for Lemmel syndrome.

Clinical feature	Present case (2026)	Literature average (Love *et al*, 2022, *n* = 17)
Age (years)	39	70 19.2
Sex	Female	58.8% female
Primary presentation	Recurrent epigastric pain, fever, and jaundice	Jaundice (68.8%), abdominal pain (64.7%), fever (52.9%)
Initial diagnosis	Choledocholithiasis/Mirizzi syndrome	Various (e.g., pancreatic neoplasm, choledocholithiasis)
Definitive diagnostic modality	MRCP + ERCP	CT (94.1%), direct visualization/endoscopy (58.8%), MRI/MRCP (47.1%)
Management approach	Endoscopic sphincterotomy and balloon sweep	Endoscopic intervention (46.7%), surgical diverticulectomy (20%), intravenous antibiotics (67%)
Clinical outcomes	Complete resolution; asymptomatic at 6-month follow-up	100% symptom resolution with endoscopic therapy, no deaths or long-term complications reported

CT, computed tomography; ERCP, endoscopic retrograde cholangiopancreatography; MRCP, magnetic resonance cholangiopancreatography; MRI, magnetic resonance imaging.

Ethical approval

Ethical approval was deemed exempt by our institution.

Consent

Written informed consent was obtained from the patient. Information within the paper has been sufficiently anonymized to avoid causing harm to the patient. A copy of the signed informed consent is available for review by the Editor-in-Chief upon request.

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Author contributions

A.F.F.: performed surgery, conception of report, data collection, data analysis, manuscript writing, revision, and submission. S.A.P.: performed surgery, conception of report, manuscript writing, revision, and final approval for submission. T.S.: data collection, data analysis, manuscript writing, revision, and final approval for submission. I.R.: performed surgery, conception of report, manuscript revision, and final approval for submission.

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