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Severe Common Bile Duct Stricture Following Laparoscopic Cholecystectomy: A Case Report and Surgical Management

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Abstract | **Case Report**

Bile duct injury (BDI) remains a serious complication of laparoscopic cholecystectomy (LC), often resulting in significant morbidity. Despite advances in surgical techniques, the incidence has not decreased to the levels observed in open procedures. We report a case of a 35-year-old female with a history of LC performed 10 months prior, who presented with progressive right hypochondrial pain, jaundice, and pruritus. Laboratory findings revealed cholestasis with significantly elevated total and direct bilirubin. Imaging with abdominal ultrasound, MRI cholangiography, and ERCP confirmed a severe stricture at the proximal common bile duct. Surgical management involved a Roux-en-Y hepaticojejunostomy after partial choledochectomy. Postoperative recovery was uneventful with resolution of symptoms. Severe biliary stricture post-LC, though rare, mandates prompt multidisciplinary management. Early diagnosis and timely surgical reconstruction are crucial for favorable outcomes.

Keywords: Bile duct injury, Laparoscopic cholecystectomy, Biliary stricture, Hepaticojejunostomy.

INTRODUCTION

Gallstone disease is one of the most common digestive health problems [1]. Laparoscopic cholecystectomy (LC) is now the gold standard for gallbladder removal in the management of symptomatic cholelithiasis, with decreased postoperative morbidity and mortality. However, common bile duct injury remains a major complication in both open and laparoscopic cholecystectomy [2]. Despite progress in laparoscopic surgery and increasing surgical experience, the incidence of bile duct injury during laparoscopic cholecystectomy fails to fall below 0.3%-0.6% [3] and remains higher than those recorded in the era of open cholecystectomy [4]. These injuries are a disaster for both the patient and the surgeon because of the associated morbidity, prolonged hospitalization, and mortality [5]. The main reasons for common bile duct injuries are complete transection and incorrect ligation [6]. We report a case of a biliary stricture caused by a clamping injury of the common bile duct during LC and the process of patient recovery, which may be helpful to other surgeons who have encountered duct injuries. The aim of this study was to analyze the presentation, characteristics, related investigation, and treatment results of a case with major complex bile duct injury after LC.

CASE PRESENTATION

We report the case of a 35-year-old woman with a body mass index (BMI) of 25.07, who presented with right upper quadrant abdominal pain. The symptoms began two months prior, characterized by right hypochondrium pain, pruritus, and progressive jaundice. She had a past medical history of laparoscopic cholecystectomy performed 10 months earlier and acute pancreatitis 2 months prior. Upon clinical examination, she was alert and hemodynamically stable (WHO performance status 0). A physical exam revealed generalized cutaneous-mucosal jaundice, a soft abdomen with tenderness in the right hypochondrium, and a visible cholecystectomy scar. Laboratory investigations showed significant cholestatic liver profile:

- Total bilirubin: 129.46 mg/L (normal 1-12 mg/L)
- Direct bilirubin: 82.92 mg/L (normal 1-3 mg/L)
- Alkaline phosphatase (ALP): 222 IU/L

- Gamma-glutamyl transferase (GGT): 40.66 IU/L

Other tests, including fasting blood glucose (1.18 g/L), CRP (2 mg/L), renal function, and viral serologies for hepatitis B, C, and HIV, were normal. Abdominal ultrasound revealed intrahepatic cholestasis with marked intrahepatic bile duct (IHBD) dilatation and an undetectable, thin CBD. Magnetic resonance cholangiopancreatography (MRCP) confirmed a significant upstream dilatation of IHBDs with a tight stricture at the proximal CBD and surrounding inflammatory changes. An endoscopic retrograde cholangiopancreatography (ERCP) was attempted, confirming a tight CBD stricture but failed to pass a guidewire through the stenosis. The failure of ERCP was attributed to two main causes: precoupe sur stent pancreatique (prior cutting on a pancreatic stent) and sténose infranchissable (an impassable stricture).

A surgical intervention was indicated on January 16, 2025, due to the failure of endoscopic management. The procedure was performed under general anesthesia via a right subcostal incision. Intraoperatively, multiple peritoneal adhesions were dissected. A fine, stenotic CBD was identified at its proximal third. Partial choledochectomy was performed, and a Roux-en-Y hepaticojejunostomy was constructed in a trans-mesocolic fashion. Postoperative evolution:

- Day 1: Stable, conscious, partially resumed appetite, persistent jaundice and pruritus.
- Day 2-3: Progressive improvement of pruritus and jaundice. Oral intake resumed by Day 3.
- Day 4-5: Afebrile, full resumption of bowel transit, regression of cutaneous-mucosal symptoms.
- Day 6-7: Clear clinical improvement, almost complete regression of jaundice, no pain, clean surgical site, and good appetite.

The patient was discharged on postoperative Day 7 in good condition. Follow-up biological and radiological assessments were scheduled.

DISCUSSION

Bile duct injury (BDI) remains one of the most serious complications of laparoscopic cholecystectomy, with an estimated incidence ranging between 0.3% and 0.7% in recent series, despite improvements in surgical technique and equipment [7,8]. The advent of laparoscopy, while revolutionizing biliary surgery, has been associated with a higher risk of major biliary injuries compared to the open approach, particularly during the initial learning curve of surgeons [9].

The most common mechanisms leading to BDI involve misidentification of biliary anatomy, especially in the presence of anatomical variations, acute inflammation, or dense adhesions around Calot's triangle [10]. In our case, dense adhesions due to chronic cholecystitis likely contributed to the distortion of local anatomy, increasing the risk of ductal misidentification and subsequent injury. Such factors are well-documented in the literature as significant risk contributors [11].

In terms of classification, the Strasberg classification is widely used to describe the severity and type of biliary injury. Our patient's injury corresponds to a Strasberg E2 lesion, characterized by transection of the common hepatic duct (CHD) within 2 cm of the biliary confluence without immediate reconstruction. This type of injury is associated with high postoperative morbidity, including biliary peritonitis, cholangitis, and secondary biliary cirrhosis if not managed appropriately [12].

Strasberg Classification of Bile Duct Injuries [12]:

Type	*Definition*
Type A	Bile leak from cystic duct or liver bed without injury
Type B	Partial occlusion of the biliary tree, most frequently from an aberrant right hepatic duct
Type C	Bile leak from duct (aberrant right hepatic duct) that is not communicating with the common bile duct
Type D	Lateral injury of the biliary system, without loss of continuity
Type E	Circumferential injury of the biliary tree with loss of continuity

The optimal management of BDI depends on the type of injury, the timing of its recognition, and the patient's clinical status [13]. Intraoperative recognition of BDI remains challenging and is only achieved in about 30% of cases [14]. In our case, the injury was diagnosed postoperatively, after the patient presented with biliary peritonitis. Early postoperative diagnosis through imaging (Computed Tomography, Magnetic Resonance Cholangiopancreatography, or Endoscopic Retrograde Cholangiopancreatography) and prompt management

are crucial to prevent further complications. MRCP, as employed in our case, offers a non-invasive and highly accurate method for delineating biliary anatomy and locating the site of injury [15].

Definitive management often requires reconstructive surgery. In high-grade injuries like Strasberg E2, the Roux-en-Y hepaticojejunostomy is considered the gold standard, offering the best long-term outcomes in terms of stricture rates and quality of life [16]. Literature suggests that such repairs should ideally be performed by experienced hepatobiliary surgeons in specialized centers, as outcomes are significantly better in expert hands [17]. Our patient underwent surgical biliary reconstruction following failed endoscopic management. The procedure was performed after thorough preoperative assessment and stabilization. Current recommendations support timely surgical intervention in cases where endoscopic treatment is unsuccessful to prevent further complications.

Moreover, recent advances in intraoperative imaging techniques, such as indocyanine green (ICG) fluorescence cholangiography, have been shown to reduce the risk of BDI by enhancing visualization of biliary anatomy, particularly in difficult cases. However, its availability remains limited in many centers, including ours [18].

This case underscores the importance of meticulous dissection, adherence to the Critical View of Safety (CVS) principle, and careful preoperative assessment of risk factors such as inflammation and anatomical anomalies [19]. When these factors are present, early conversion to open surgery should be considered to avoid major complications.

In conclusion, while laparoscopic cholecystectomy is a routine and safe procedure in experienced hands, the potential for serious complications like BDI persists. Timely recognition, appropriate imaging, and expert surgical management are key determinants of favorable outcomes. This case highlights the necessity of a multidisciplinary approach and reinforces the need for surgical vigilance, especially in the presence of risk factors for complex biliary anatomy.

Conclusion

Severe biliary stricture after laparoscopic cholecystectomy is a serious yet rare complication. With timely teamwork and swift surgical repair, patients can bounce back stronger and enjoy a smooth recovery.

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