CASE REPORT

Laparoscopic Fundus-first Approach—Cholecystectomy in Case of Gangrenous Perforated Gallbladder: A Case Report

Devesh C Prajapati[1], Rajan B Patel[2], Pranav B Chaudhary[3], Arth J Patel[4], Jyot B Panchal[5]

Received on: 11 July 2025; *Accepted on*: 19 August 2025; *Published on*: XX XXXX XXXX

Abstract

Background: Gangrenous cholecystitis with perforation is a rare but life-threatening complication of acute cholecystitis. Its clinical presentation often mimics uncomplicated biliary disease, making early diagnosis difficult. Prompt surgical intervention is essential to prevent severe complications such as peritonitis and sepsis.

Case description: A 51-year-old male presented with right upper quadrant pain, fever, and new-onset jaundice. Laboratory investigations revealed an elevated white blood cell count. Imaging showed an overdistended gallbladder with thickened walls, multiple calculi, pericholecystic fluid collections, and a hypodense area suggestive of gallbladder wall breach and abscess formation. The patient was taken for an emergency laparoscopic cholecystectomy. Intraoperatively, a gangrenous gallbladder with a 0.5 cm perforation at the fundus was found, with active bile leakage and dense omental adhesions. Due to distorted anatomy at Calot's triangle, a fundus-first approach was employed. The cystic duct and artery were successfully identified, clipped, and divided. Peritoneal lavage was completed. Histopathology confirmed acute-on-chronic cholecystitis with pericholecystic abscess. The postoperative period was uneventful, and the patient was discharged on day 7.

Conclusion: This case demonstrates the successful use of a minimally invasive fundus-first laparoscopic approach in managing a complex case of gangrenous cholecystitis with perforation. It highlights the importance of surgical adaptability and early intervention in reducing morbidity. Even in the setting of severe inflammation and anatomical distortion, laparoscopic management is not only feasible but also safe with experienced hands.

Keywords: Biliary peritonitis, Case report, Fundus-first approach, Gallbladder perforation, Gangrenous cholecystitis, Gangrenous cholecystitis with gallbladder perforation with biliary peritonitis, Laparoscopic cholecystectomy, Minimally invasive approach.

World Journal of Laparoscopic Surgery (2025): 10.5005/jp-journals-10033-1733

Introduction

Gangrenous acute cholecystitis is an uncommon form of cholecystitis, which, if undiagnosed, is rapidly fatal. The incidence varies from 2 to 30% in most surgical series of acute cholecystitis.[1] Gangrenous cholecystitis is more commonly seen in elderly patients, particularly males with underlying cardiovascular disease or diabetes, and is often associated with a markedly elevated white blood cell count, typically exceeding 14,900 cells/mm^3.[2]

Clinical diagnosis can be highly challenging, as distinguishing gangrenous cholecystitis from acute cholecystitis preoperatively is often difficult due to non-specific laboratory and imaging findings.[1] Gallbladder perforation occurs with increased frequency in up to 10% of cases and is often associated with complications such as peritonitis, fistula formation, and intra-peritoneal abscess development.[1,2]

This article provides insight into the minimally invasive management of perforated and gangrenous gallbladders, broadening the understanding of laparoscopic treatment approaches in such cases.

While numerous independent studies have documented the outcomes and feasibility of laparoscopic cholecystectomy (LC) using the fundus-first approach, as well as in cases of gangrenous or perforated gallbladder, most focus on collective data and procedural statistics. In contrast, this report presents a detailed analysis of an individual case, correlating preoperative imaging with intraoperative findings. The surgical challenges encountered during laparoscopic management are highlighted, emphasizing the complexity of performing cholecystectomy in such advanced cases. This case highlights key intraoperative points and technical difficulties, offering valuable insights for practicing surgeons and surgical trainees. It reinforces the importance of operative adaptability and advanced laparoscopic skills in the successful management of complicated gallbladder pathology.

[1–5]Department of General Surgery, Smt. N.H.L. Municipal Medical College, Ahmedabad, Gujarat, India

Corresponding Author: Devesh C Prajapati, Department of General Surgery, Smt. N.H.L. Municipal Medical College, Ahmedabad, Gujarat, India, Phone: +91 7622001007, e-mail: dvshprajapati@gmail.com

How to cite this article: Prajapati DC, Patel RB, Chaudhary PB, *et al*. Laparoscopic Fundus-first Approach—Cholecystectomy in Case of Gangrenous Perforated Gallbladder: A Case Report. World J Lap Surg 2025;xx(x):xx–xx.

Source of support: Nil

Conflict of interest: None

Patient consent statement: The author(s) have obtained written informed consent from the patient for publication of the case report details and related images.

Case Description

A 51-year-old male presented to the General Surgery Outpatient Department of a tertiary care hospital with complaints of right upper quadrant abdominal pain for the past 5–6 days. The pain was dull, non-radiating, not influenced by food intake, and had no specific aggravating or relieving factors.

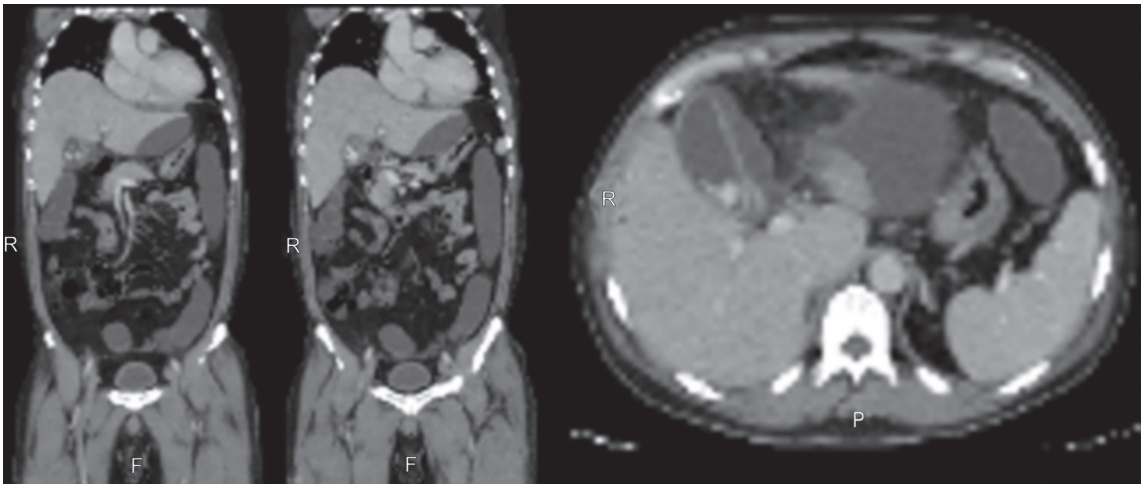

Fig. 1: Computed tomography scan showing an edematous gallbladder with radiodense calculi with a surrounding pericholecystic collection[3]

He also reported high-grade fever with chills and rigors for the past 2 days, which subsided with medication. Additionally, the patient noted yellowish discoloration of the eyes, skin, and urine since 5–6 days. He denied any history of nausea, vomiting, postprandial fullness, weight loss, or urinary symptoms or similar complaints in the past. The patient had no known comorbidities such as diabetes mellitus, hypertension, thyroid disorders, tuberculosis, or prior history of blood transfusion. On admission, he was hemodynamically stable. Clinical examination revealed icterus on scleral inspection and fullness in the right hypochondrium on abdominal palpation. Abnormal blood investigations included an elevated leucocyte count of 16,000 per microliter.

Ultrasound of the whole abdomen, which is confirmed by a computed tomography (CT) scan, suggested the gallbladder is overdistended with edematous walls (maximum wall thickness measures approximately 4–5 mm) with a few radiodense calculi within it, the largest measures approximately 14 × 13 mm. Approximately 8 × 6 mm-sized radiodense calculi were noted in the neck of the gallbladder. Approximately 60 × 16 × 30 mm-sized non-enhancing elongated hypodense collection is noted along the medial wall of the gallbladder, which communicates with the gallbladder through multiple indistinct walls, the largest measuring approximately 10 mm in the fundus region. Approximately 77 × 65 × 40 mm-sized loculated non-enhancing hypodense collection with adjacent fat stranding is noted along the anterior-inferior aspect of the left lobe of the liver, which scallops its margin and extends up to the gastro-hepatic and peri-splenic space. Right laterally, it abuts the body of the stomach with a preserved fat plane. Mild intrahepatic edema was noted adjacent to the gallbladder.

There is evidence of pericholecystic fat stranding noted. The above findings suggest the possibility of gallbladder perforation (Fig. 1).[3]

The patient was scheduled for an emergency high-risk LC.

A gangrenous, perforated gallbladder with active bile leakage and surrounding inflammation was identified (Fig. 2).[3] Approximately 0.5 × 0.5 cm perforation was identified (Fig. 3) at the fundus of gallbladder with dense omental and peritoneal.[3] Dissection surrounding calots triangle was attempted, but due to altered anatomy, fundus-first approach was done. Two gallstones were retrieved from the perforated gallbladder. An umbilical tape was placed around the gallbladder neck for traction. The gallbladder was detached from its fossa. Anterior and posterior

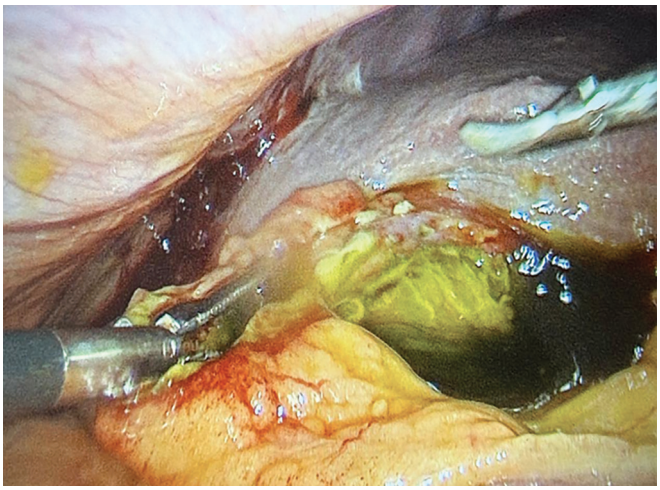

Fig. 2: Dense omental adhesions with active bile seepage from the gallbladder[3]

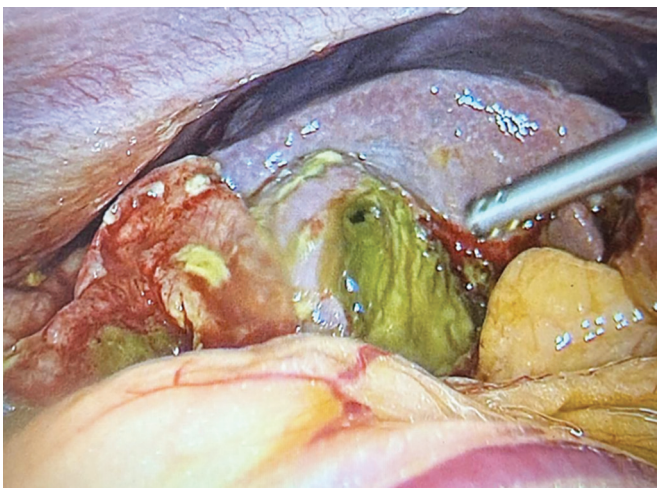

Fig. 3: Perforation identified at the fundus of gallbladder[3]

window dissection was done, and the cystic artery and cystic duct were clearly identified, clipped with appropriate-sized Ligaclips (Fig. 4), and divided safely.[3] Peritoneal lavage was performed

Fig. 4: Clipping of cystic artery and duct[3]

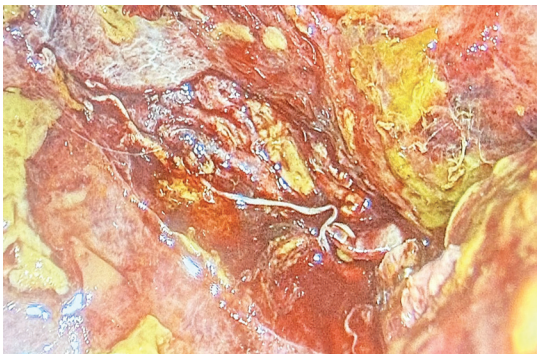

Fig. 5: Post-cholecystectomy status[3]

(Fig. 5).[3] Histopathology of the specimen revealed acute-on-chronic cholecystitis with pericholecystic abscess formation.

Patient drain was removed on day 2 postoperatively, with average daily drain output being less than 20 cc serous. Postoperatively patient was discharged on postoperative day 7 with no complications.

Discussion

The leading cause of gallbladder perforation is calculous cholecystitis. Less common causes include traumatic injury, iatrogenic damage, biliary stasis, and ischemia of the gallbladder.[4] And among acute calculous cholecystitis, gangrenous cholecystitis develops in up to 30% of individuals hospitalized. However, the predictors of progression to gangrenous disease are not well established, which poses a challenge for accurate preoperative diagnosis.[2] When the gallbladder perforates at the fundus, it is less likely to be contained by the omentum, allowing bile to leak freely into the peritoneal cavity. In contrast, perforations occurring at other sites are more likely to be sealed off by the omentum or adjacent bowel loops, leading to localized inflammation in the right upper quadrant with the formation of a plastron and pericholecystic fluid collection.[5] Usually, the condition remains asymptomatic. Murphy's sign, characterized by right upper quadrant tenderness on palpation of a distended gallbladder, may be absent in up to two-thirds of patients due to gallbladder wall necrosis leading to loss of nerve supply.[1] Ultrasound findings commonly seen in acute cholecystitis—such as gallbladder wall thickening, distension, pericholecystic fluid, and a positive sonographic Murphy's sign—may also be observed in cases of gallbladder perforation.[5]

The most frequently performed laparoscopic surgical procedure is LC.[6] Laparoscopy aims to offer advantages over open surgery, including reduced postoperative pain, shorter hospitalization, and improved cosmetic results.[7] Technical challenges of laparoscopy in intra-abdominal gallbladder perforation cases include the requirement of good surgical skills, achieving adequate peritoneal lavage, and poor endovision in view of acute inflammation, unclear anatomy, and dense adhesions. Due to challenges in diagnosis, delay in initiating appropriate treatment often results in increased morbidity and mortality rates.[5] Glenn and Moore reported a mortality rate of 42% in patients with gallbladder perforation. However, more recent studies have shown a reduction in mortality to 12–16%, attributed to advancements in anesthetic techniques and improvements in intensive care management.[8] This case emphasizes the clinical value of early diagnosis and the fundus-first laparoscopic approach as a safe and effective strategy in the management of gangrenous cholecystitis with perforation, even in the presence of distorted anatomy and severe inflammation.

Learning Objectives

This case highlights the clinical presentation and diagnostic challenges of gangrenous cholecystitis with perforation, emphasizing the importance of recognizing key imaging features such as gallbladder wall necrosis, perforation, and pericholecystic abscess. It underscores the role of emergency LC in managing complicated biliary disease and illustrates the benefits of the fundus-first approach, particularly when Calot's triangle is obscured. Early surgical intervention, combined with intraoperative adaptability, is crucial for optimizing outcomes and minimizing complications such as sepsis and bile peritonitis.

Orcid

Devesh C Prajapati https://orcid.org/0009-0007-3011-2758

References

1. Corr P. Sonography of gangrenous cholecystitis. J Emerg Trauma Shock 2012;5(1):82–83. DOI: 10.4103/0974-2700.93112.
2. Merriam LT, Kanaan SA, Dawes LG, et al. Gangrenous cholecystitis: Analysis of risk factors and experience with laparoscopic cholecystectomy. Surgery 1999;126(4):680–686. DOI: 10.1016/S0039-6060(99)70122-4.
3. Prajapati D. Computed tomography image of gangrenous and perforated gall bladder. Sardar Vallabhbhai Patel Hospital, Paldi, Ahmedabad, Gujarat; 2025.
4. Sharma A, Jariwala P, Kaur N, et al. Biliary ascariasis presenting with gangrenous perforation of the gall bladder: Report of a case and brief review of literature. Trop Doct 2018;48(3):242–245. DOI: 10.1177/0049475518768103.
5. Derici H, Kara C, Bozdag AD, et al. Diagnosis and treatment of gallbladder perforation. World J Gastroenterol 2006;12(48):7832–7836. DOI: 10.3748/wjg.v12.i48.7832.
6. Mayir B, Dogan U, Koc U, et al. Safety and effectiveness of three-port laparoscopic cholecystectomy. Int J Clin Exp Med 2014;7(8):2339–2342. PMID: 25232432.
7. Kim BS, Kim KC, Choi YB. A comparison between single-incision and conventional laparoscopic cholecystectomy. J Laparoendosc Adv Surg Tech A 2012;22(5):443–447. DOI: 10.1089/lap.2011.0476.
8. Glenn F, Moore SW. Gangrene and perforation of the wall of the gallbladder: A sequela of acute cholecystitis. Arch Surg 1942;44(4):677–686. DOI: 10.1001/archsurg.1942.01210220080005.