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Uncommon Presentation of Severe Empyema of the Gallbladder: Case Report and Literature Review

Authors' Contribution:

Study Design A
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Literature Search F
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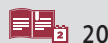
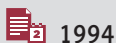
Patient: Male, 60-year-old
Final Diagnosis: Severe empyema of the gallbladder
Symptoms: Abdominal and/or epigastric pain • fever
Medication: —
Clinical Procedure: —
Specialty: Surgery

Objective: Unusual clinical course

Background: Empyema of the gallbladder is a complication of cholecystitis that can develop into sepsis if not treated promptly. Signs and symptoms of gallstone disease are nausea/vomiting, right upper quadrant tenderness, and a history of gallstone disease. With persistence of the obstruction, inflammation and bacterial overgrowth within the gallbladder lumen and tissue may lead to eventual venous congestion, pressure necrosis and even empyema of the gallbladder.

Case Report: A 60-year old male presented with complaints of mild mid-epigastric pain radiating to the back. He denied previous similar history. CT and ultrasound of the abdomen revealed acute cholecystitis. During surgery, it was clear that the imaging did not accurately represent the severity of the infection and he was diagnosed with gallbladder empyema. Surgery was difficult but was successfully finished. The patient's symptoms and laboratory results normalized by post-operative day 3 and he was discharged. He had no further complications during 2-week follow up.

Conclusions: Physicians should keep the abnormal presentations of gallbladder empyema in mind and prepare themselves for a presentation different from imaging during surgery. Several prognostic factors including gallbladder wall thickness, gender, white cell count and diabetes mellitus have been associated with severe complicated cholecystitis and empyema of the gallbladder.

MeSH Keywords: Cholecystitis • Cholecystitis, Acute • Empyema • GangreneFull-text PDF: <https://www.amjcaserep.com/abstract/index/idArt/923040>

Background

Gallstone disease is a common health concern with an annual incidence of about 1–4% in the general western population [1]. Gallstones alone are often asymptomatic but biliary colic can present as intermittent colicky pain when a stone temporarily obstructs the cystic duct. However, this obstruction may persist causing a complete closed-loop obstruction. Continued contraction of the gallbladder against this obstruction induces a local inflammatory response (cholecystitis) producing acute, often severe right upper quadrant (RUQ) pain. With persistence of the obstruction, inflammation and bacterial overgrowth within the gallbladder lumen and tissue may lead to eventual venous congestion, pressure necrosis and even perforation of the gallbladder wall [2]. Such pathologic evolution can also include accumulation of pus within the gallbladder and empyema formation [3,4]. The obstructing stone(s) may also progress into the common bile duct leading to cholestasis and potential development of ascending cholangitis or gallstone pancreatitis [5]. Gallbladder empyema may present with signs similar to acute cholecystitis. Patients can present with RUQ tenderness and positive Murphy's sign. As the infection progresses, there can be evidence of high fevers, chills, and sepsis [3]. Empyema is often associated with several pathogenic organisms including *Escherichia coli*, *Staphylococcus aureus*, *Clostridia*, and *Bacteroides* [3]. If not treated urgently, empyema and gallbladder rupture can induce peritonitis and/or bacteremia leading to a rapid systemic inflammatory response and shock [6]. Gallbladder empyema requires aggressive treatment with antibiotics, volume drainage and pressure reduction of the gallbladder lumen contents via urgent removal of the diseased organ [3,7]. Herein, we describe a 60-year-old

male who only presented with complaints of mild epigastric pain with no prior history of RUQ pain or gallstone disease and was only diagnosed with severe empyema of the gallbladder during laparoscopic surgery. This case is reported in line with the SCARE criteria [8].

Case Report

A 60 year-old male presented to the emergency department (ED) with a chief complaint of mild mid-epigastric pain that radiated to the back for 1 day, not associated with nausea. His vital signs revealed BP 140/80, HR 100, RR 18 and oxygen saturation of 99% with a temperature of 37.4°C. He denied pain at the RUQ. The patient denied any previous episodes of RUQ pain, biliary colic, or known cholelithiasis. He has a past medical history significant for prostate cancer, hypertension and hyperlipidemia. There was no family history of gallstone disease. Surgical history was significant for prostatectomy for cancer. Physical exam was significant for mild tenderness to palpation of the mid-epigastric region with an absent Murphy's sign. Laboratory results revealed a mild leukocytosis of 13,000, with a left shift showing 83.6 neutrophils. The total bilirubin was 1.9 and otherwise normal liver function tests (LFTs). Ultrasonography (US) of the abdomen performed in the emergency department showed gallbladder wall thickening of about 2.54 mm indicative of mild-moderate acute cholecystitis (Figure 1). Contrast enhanced Computed Tomography (CT) of the abdomen showed findings most consistent with cholecystitis (Figure 2). Additionally, Magnetic Resonance Cholangiopancreatography (MRCP) was performed pre-operatively and showed no choledocholithiasis. Patient developed a fever of 40.1°C few hours prior to his surgery. The patient was started on intravenous piperacillin/tazobactam preoperatively

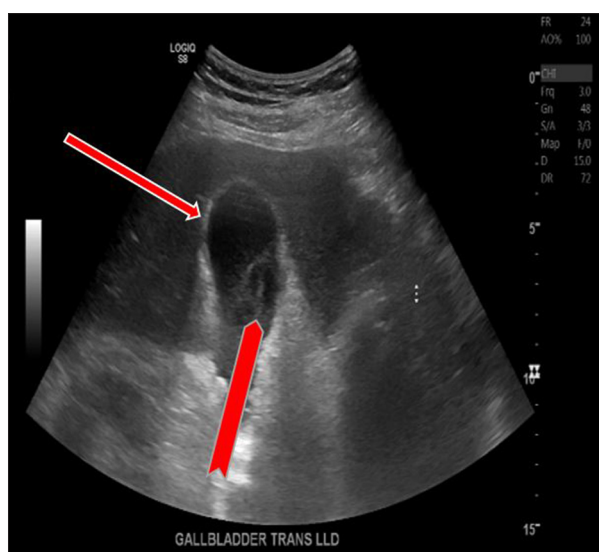


Figure 1. Sagittal view of a distended gallbladder with 2.54 mm thickening of gallbladder wall (thin arrow) and gallstone (thick arrow).

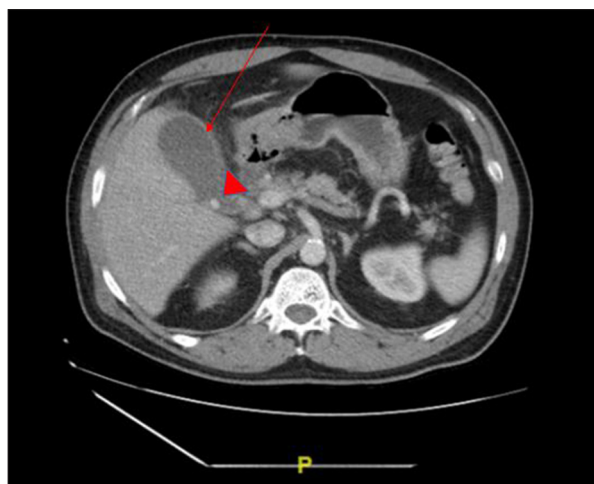


Figure 2. CT-Abdomen showing findings consistent with acute cholecystitis, including mild thickening of the gallbladder wall (arrow) and cholelithiasis (arrowhead).

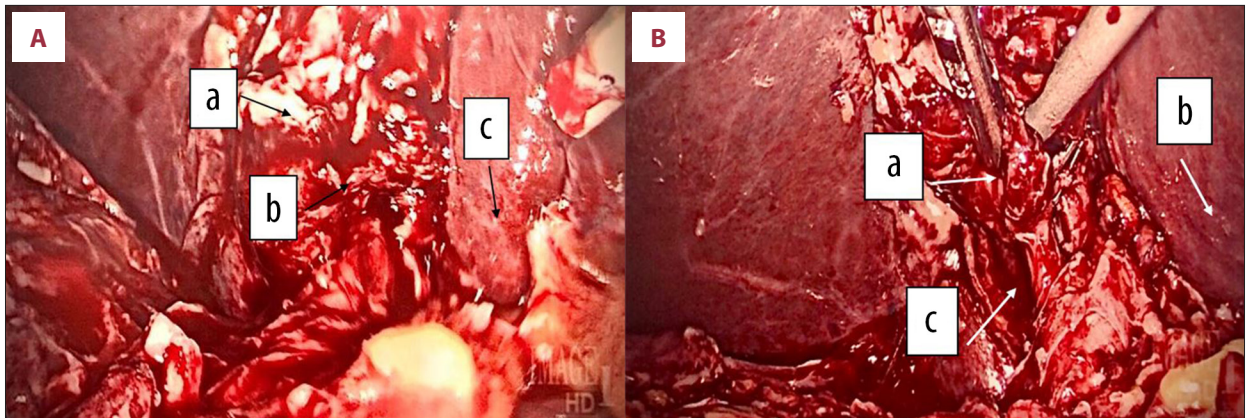


Figure 3. (A) Laparoscopic imaging of the gallbladder showing suppurative inflammation and unrecognizable views/anatomy of the gallbladder. Gallbladder infundibulum (a), medial edge of liver (b), cystic duct (c). (B). Laparoscopic imaging of the gallbladder showing suppurative inflammation and unrecognizable views of the gallbladder. Pus (a), distorted gallbladder anatomy (b), medial edge of liver (c).

and was taken for laparoscopic cholecystectomy within 24 hour of his initial presentation. Given patient initial presentation, blood cultures were sent from the ED, and results received on post-operative day 1, showed positive cultures for *E. coli*.

Laparoscopic cholecystectomy revealed a significant amount of inflammation in the RUQ involving the gallbladder and the adjacent structures. The omentum had adhered to the gallbladder and required significant lysis. The gallbladder exhibited severe friability and necrotic tissue (Figure 3A, 3B) compared to commonly looking acute cholecystitis (Figure 4). To facilitate surgery, intraoperative drainage of the gallbladder was undertaken revealing a large amount of frank pus consistent with empyema formation. Despite the significant progression of our patient's gallbladder pathology, laparoscopic surgery allowed the critical view of safety to be obtained and was completed at that time. By post-operative day 3, patient was asymptomatic with no reports of pain, hemodynamically stable, and afebrile (36.9°C). His repeat white blood cell count and total bilirubin normalized and a second set of blood cultures were negative. The patient was switched to oral antibiotics for a 10-day treatment.

The patient had an uncomplicated post-operative course and was discharged home in stable condition on post-operative day 3. On 2-week outpatient clinic follow-up, the patient reported feeling well and had no complications.

Discussion

This is an uncommon case of a gangrenous gallbladder and severe empyema with frank pus of the gallbladder secondary to calculous cholecystitis which developed rapidly despite an atypical presentation of afebrile on admission and mild abdominal

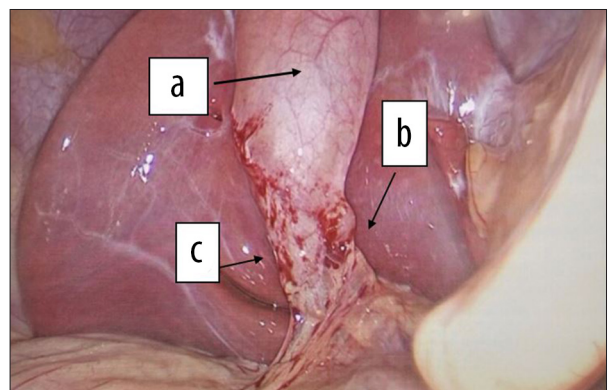


Figure 4. Laparoscopic imaging of commonly appearing gallbladder acute cholecystitis. Gallbladder body (a), cystic artery (b), medial edge of liver (c).

pain. Not only did this patient not have signs of such a suppurative infection but imaging studies also showed mild changes to the gallbladder not proportional to the extent of damage. The incidence of gallbladder empyema is difficult to assess, but the literature ranges from 5–15% [3]. The typical symptoms and signs of cholecystitis such as significant abdominal pain, positive Murphy's sign and a history of previous episodes of biliary colic were absent in this patient. Regardless, the presence of hallmark symptoms alone still make it difficult to distinguish the severity of cholecystitis [9]. Therefore, clinicians encountering individuals with none to mild fevers/chills should have a high index of suspicion for sepsis with origin in the gallbladder even when only mild pain is experienced. Albeit uncommon, the implications of missing such pathology could be catastrophic. When Aljaberi et al. analyzed patients with gallbladder empyema only 3.4% (1/29) presented with fever and none/minimal abdominal signs and 45% of the cases were actually afebrile [9].

The imaging results in our patient were suggestive of a routine cholecystitis which was not representative of the operative findings of a severe cholecystitis with extensive pus/sever empyema and inflammation. US is the first choice in regards to imaging modality to diagnose the presence of gallstone disease but CT may be obtained in cases where US findings are equivocal or complications are suspected [10]. Two key signs of cholecystitis on imaging is the presence of pericholecystic fluid and gallbladder wall thickening, with by far the most specific findings being presence of pericholecystic fluid [10]. Wall thickening alone is a rather non-specific finding but may mimic pericholecystic fluid on CT imaging [11]. Other findings such as intraluminal air seen on CT scan may be suggestive of disease progression and formation of an empyema [5]. A retrospective review of patients with acute cholecystitis complicated by empyema and gangrene revealed that male gender and US showing gallbladder wall thickness more than 4.5 mm were both significant risk factors for suspicion of complicated cholecystitis [12]. The exact gallbladder wall thickness varies among studies but evidence seems to support it being a statistically significant risk factor for gallbladder empyema in general [13]. Importantly, the symptoms and imaging findings may not accurately depict the severity of cases. In regards to gangrenous progression, differentiation of acute cholecystitis with necrosis from routine acute cholecystitis is difficult and often made at the surgical level. However, signs of irregular wall enhancement on contrast enhanced CT may be an indication of a necrotic gallbladder [10].

Given the context of our patient's presentation, past medical history, and his preliminary diagnostic findings, empyema and gangrenous development of the gallbladder was not suspected prior to surgery. His lack of history of biliary colic or gallstone disease made his sudden development of symptoms atypical and the subsequent rapid progression to gallbladder necrosis with empyema formation even more so. Regarding risk factors for such development, one study reported associations of empyema with gallbladder carcinoma, AIDS, and male gender [9,17]. In a study of 117 patients with gangrenous cholecystitis, researchers not only found male gender and gallbladder wall-thickness to be risk factors, but they also concluded that leukocytosis, diabetes mellitus, and age >40 years were also associated with the development gangrene complicated calculous cholecystitis. Specifically, leukocytosis >15,000 cells/ml was found to be a statistically significant laboratory value. Diabetes mellitus was not only statistically significant but it was the strongest predictive factor for gangrenous gallbladder due to the finding that the group had a clinically aggressive presentation, difficult surgery, and more complicated post-operative outcomes [13]. Other prognostic values could be neutrophil to lymphocyte ratio (NLR). A high NLR is defined as >4.18. In a study to determine the prognostic value of NLR, researchers found that NLR >4.18 was significantly associated

with severe cholecystitis [14]. Our patient had a neutrophil of 83.6 and a lymphocyte of 10.9, resulting in an NLR of 7.7, above this threshold. A separate study evaluated patients with acute cholecystitis through retrospective cohort analysis and the development of empyema of the gallbladder [15]. They developed a scoring system, named Lewisham Scoring System, to help diagnose empyema. Their scoring system was based on eight components. Age greater than 50 or 70 received 1 or 2 points respectively. Female gender led to 1 point. Heart rate over 100 or 120 received 1 or 2 points respectively. WBC greater than 12,000 or 15,000 was given 1 or 2 points respectively. C reactive protein over 100 or 200 resulted in 1 vs. 2 points respectively. Finally, 1 point each for diabetes mellitus, chronic steroid use, or presence of biliary stent. The patients that developed empyema had a score >5 [15]. Our patient had a score of three.

A case series in 2016 was conducted to study the clinical profile of patients with gallbladder empyema. Most patients are in their 4th and 5th decade of life with the most common symptom being upper abdominal pain. Findings on examination were that 45% of patients were anemic. 75% of their patients had a total WBC count >10,000 and one or more abnormal finding in LFTs [16]

Acute cholecystitis is usually treated with surgical intervention via laparoscopic cholecystectomy to avoid progression to a gangrenous gallbladder or empyema. Performing the surgery early allows for shorter total hospital stay [17,18]. Our patient underwent surgery less than 24 hours after admission and was discharged 3 days after laparoscopic surgery. Some laparoscopic techniques are not safe due to severe inflammatory changes and distorted anatomy. If a laparoscopic cholecystectomy is not technically feasible, a lesser operation is subtotal cholecystectomy. A study from a single-center institution chose to analyze the technique of laparoscopic modified subtotal cholecystectomy on mortality and morbidity of complicated cholecystitis. Their technique started with drainage at the level of the fundus to reduce the gallbladder volume. The gallbladder is assessed for the critical view of safety. If this is not obtainable then a subtotal cholecystectomy is considered or an open technique. In their study, their technique resulted in successful laparoscopic surgery in over 80% of complex gallbladder disease including empyema [19]. Other studies have shown that laparoscopic subtotal cholecystectomy is favorable to standard laparoscopy and open cholecystectomies [20]. Our patient underwent standard laparoscopic cholecystectomy and did well post-operatively.

Conclusions

We present the case of a 60-year old patient who presented with severe gallbladder pathology including severe empyema and a gangrenous gallbladder discovered on laparoscopy. Our patient had a successful operation with no residual complications. Although this presentation is uncommon, surgeons should maintain a high index of suspicion for empyema of the gallbladder given the significant consequences of disease progression in the context of systemic inflammatory symptoms. Physicians with low index of suspicion may not consider the patient as an emergency due to mild symptoms and can lead to severe, even fatal, consequences. Several prognostic factors such as gallbladder wall thickness, gender, and white cell count and a comorbid condition of diabetes mellitus have been associated with severe complicated cholecystitis and empyema

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of the gallbladder. Surgical intervention such as laparoscopic cholecystectomy has been shown to be necessary and a safe modality to manage patients with significant gallbladder pathology but should be performed as early as possible in the disease process. Intraoperative drainage of the gallbladder and possible subtotal cholecystectomy should be considered.

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Conflicts of interests

None.