



Case report

Gallbladder volvulus with gangrenous cholecystitis – A case report

Clarisse S. Muenyi^a, Nia N. Zalamea^{a,d}, Priya Dhindsa^c, Mark P. Miller^b, Denis A. Foretia^{a,d,*}^a Department of Surgery, University of Tennessee Health Science Center, Memphis, TN, USA^b Private Practice, 7705 Poplar Avenue, Germantown, TN 38138, United States of America^c DeBusk College of Osteopathic Medicine, Lincoln Memorial University, Harrogate, TN, USA^d Global Surgery Institute, University of Tennessee Health Science Center, Memphis, TN, USA

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ABSTRACT

Introduction and importance: Gallbladder torsion (volvulus) is a very rare pathology that occurs when the gallbladder rotates on the cystic duct/cystic artery axis, resulting in blockage of bile drainage and blood flow.

Case presentation: We present the case of an elderly 87-year-old female who experienced acute gallbladder torsion. The patient presented with *acute left chest pain* that radiated to the patient's back and nausea but no emesis. A thorough physical examination, serologic studies, abdominal ultrasound, and computed tomography scan revealed gallbladder dilation, a thickened wall, enlarged common bile duct (approximately 1 cm), and the presence of pericholecystic fluid, all of which were consistent with acute cholecystitis. Laparoscopic cholecystectomy led to an intraoperative diagnosis of completely gangrenous gallbladder volvulus (GBV) with a 360-degree counter clockwise rotation. The pathology led to a final diagnosis of acute necrotizing cholecystitis without evidence of malignancy.

Clinical discussion: GBV (gallbladder torsion) is typically observed in elderly patients at a female-to-male ratio of 4:1 and a median age at presentation of 77 years. Few advancements have been made in accurate diagnosis of GBV using clinical findings or the results of radiographic imaging, leading to accurate preoperative diagnoses in only 25 % of patients.

Conclusion: Though GBV usually presents with right upper quadrant pain, our patient had the rare presentation of left sided chest pain mimicking acute coronary syndrome. GBV is an uncommon condition that occurs frequently in the elderly, particularly in women. Accurate preoperative diagnosis remains daunting, since clinical, laboratory, and radiographic findings often lead to an incorrect diagnosis of acute cholecystitis. Prompt diagnosis necessitates a high level of suspicion, and laparoscopic cholecystectomy is the recommended treatment/management.

1. Introduction

A “floating gallbladder,” described for the first time in 1898, is an extremely rare condition that increases the risk of gallbladder volvulus (GBV) [1]. GBV (gallbladder torsion) is a clockwise or counterclockwise rotation of the gallbladder along the cystic artery/cystic duct axis that may lead to acute obstruction, gangrenous cholecystitis, or acute abdomen. This uncommon condition has a reported incidence of 1 in 365,000 and a mortality rate of approximately 6 % [2]. It is typically observed in elderly patients aged 60–80, with a female-to-male ratio of 4:1 [2]. The precise cause of GBV is unknown, although it is believed to be caused by atrophy of the liver, loss of surrounding visceral fat, and

increased gallbladder elasticity, leading to increased mobility of the gallbladder within the fossa [3]. Patient presentation is linked to the degree of gallbladder torsion. Patients with incomplete torsion (≤ 180 degrees of rotation) typically exhibit biliary colic-like symptoms, while those with complete torsion (> 180 degrees of rotation) typically present with acute cholecystitis or acute abdomen [4].

This case demonstrates the major difficulties in accurately diagnosing gallbladder torsion/volvulus preoperatively and the need for urgent, definitive management. It is presented here in compliance with the 2020 SCARE Guidelines [5].

Abbreviations: CT, computed tomography; GBV, gallbladder volvulus; MRI, magnetic resonance imaging; RUQ, right upper quadrant; US, ultrasonography..

* Corresponding author at: Department of Surgery, University of Tennessee Health Science Center, 910 Madison Ave, Ste 323, Memphis, TN 38163, USA.

E-mail address: dforetia@uthsc.edu (D.A. Foretia).

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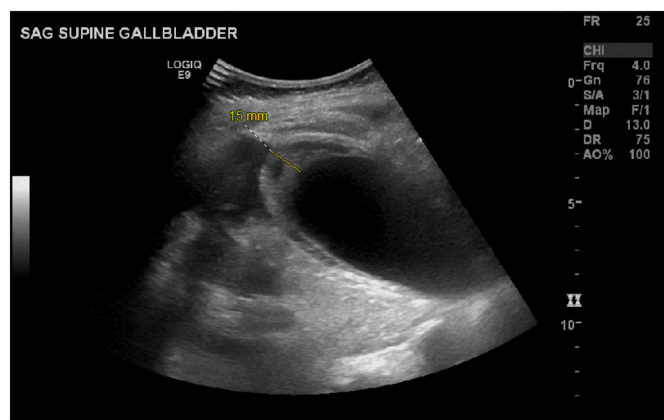


Fig. 1. Abdominal ultrasound revealing acalculous distended gallbladder.

2. Presentation of case

We present here the case of an 87-year-old Caucasian female with hypertension, congestive heart failure, atrial fibrillation post-cardiac pacemaker, and coronary artery disease post percutaneous coronary intervention (PCI) to the circumflex artery. The patient presented to the emergency department (ED) of our academic medical center by ambulance complaining of acute onset, intense left-sided chest pain that radiated to their back and nausea without emesis. The patient was afebrile, normotensive, and not tachycardic in the emergency room, with an oxygen saturation of 97 % on room air.

A physical examination revealed abdominal tenderness in the right upper quadrant (RUQ) and positive Murphy's sign. Serologic laboratory tests revealed leukocytosis of 12.5 and elevated total bilirubin of 1.4, while the results of liver function tests (LFTs) were normal. An electrocardiogram (EKG) revealed rate-controlled atrial fibrillation, blood troponin levels were negative x3, and a chest x-ray (CXR) revealed no acute findings. An abdominal ultrasound (US) revealed acalculous cholecystitis with a one-centimeter dilated common bile duct. (Fig. 1). A CT scan revealed a dilated gallbladder with thickened wall and pericholecystic fluid, indicating acute cholecystitis (Fig. 2a and b).

The patient was admitted and given intravenous antibiotics (Zosyn). The cardiology service was consulted for perioperative cardiac evaluation and optimization given the patient's extensive cardiac history. The general surgery service was consulted for surgical evaluation on hospital day one. After the cardiology team evaluated the patient and deemed

there was an increased risk for perioperative cardiac complications, the patient was taken to the operating room on the second day of hospitalization for a laparoscopic or possibly open cholecystectomy. The operation was performed by a surgeon with 30 years of experience, who found intraoperatively that the patient had a "floating" gallbladder. It was gangrenous and completely twisted, being rotated counter clockwise 360 degrees. There was no attachment of the gallbladder mesentery, cystic duct, or cystic artery to the liver bed (Fig. 3). The gangrenous gallbladder was untwisted, and laparoscopic cholecystectomy was performed by obtaining critical view, triple clipping and dividing the cystic artery and duct. The gallbladder was retrieved using an Endo Catch specimen retrieval pouch.

The patient was continued on Zosyn postoperatively. On postoperative day one, the leukocytosis increased from 12.5 to 17.3 and bilirubin levels increased from 1.4 to 3.5, while the LFTs remained within normal range. The patient was advanced to a regular diet that was well tolerated. On postoperative day two, the laboratory values began trending downward (white blood cells (WBC) 12.3, total bilirubin 3.3). The patient remained in the hospital for an additional day for monitoring of WBC and bilirubin levels. On the third postoperative day, the WBC count was within the normal range at 7.9 and total bilirubin was trending downward to 2.7 %. The patient was discharged with a five-day supply of oral antibiotics (Augmentin). The final pathology report revealed acute necrotizing cholecystitis devoid of dysplasia or cancer. Patient noted to be doing well during her post operative visit.

3. Discussion

Appropriate preoperative diagnosis of GBV remains very difficult. Most patients present with right upper quadrant pain, but our patient initially presented with left chest pain thus requiring prompt evaluation for possible acute coronary syndrome. A systematic review of 324 patients with GBV by Reilly et al. (2012) showed that only 26 % were accurately diagnosed preoperatively [2]. Lau et al. (1982) proposed a triple triad to assist in the clinical diagnosis of GBV [6]. These criteria include 1) a triad of patient-specific findings: thin, elderly patients with spinal malformation or deformity, 2) a triad of presenting characteristics: abrupt onset, RUQ abdominal pain, with early emesis, and 3) a triad on physical examination of nontoxic presentation, a palpable RUQ mass, with a pulse-temperature difference [6]. Consistent with the triple triad hypothesis, our patient exhibited five of these nine criteria: thin build, elderly patient, abrupt onset, RUQ pain, and a nontoxic presentation.

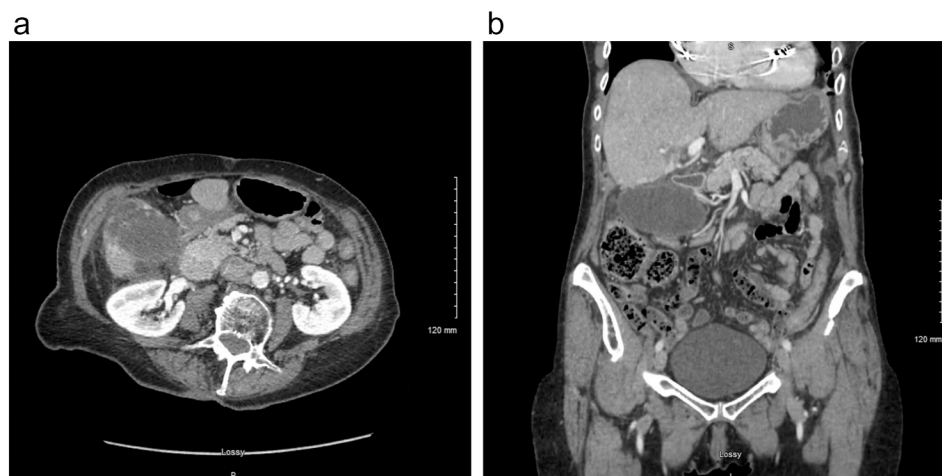


Fig. 2. Preoperative CT scan of the abdomen and pelvis with IV contrast revealing distended gallbladder

a: Axial view

b: Coronal view of preoperative CT scan revealing distended, low laying gallbladder.

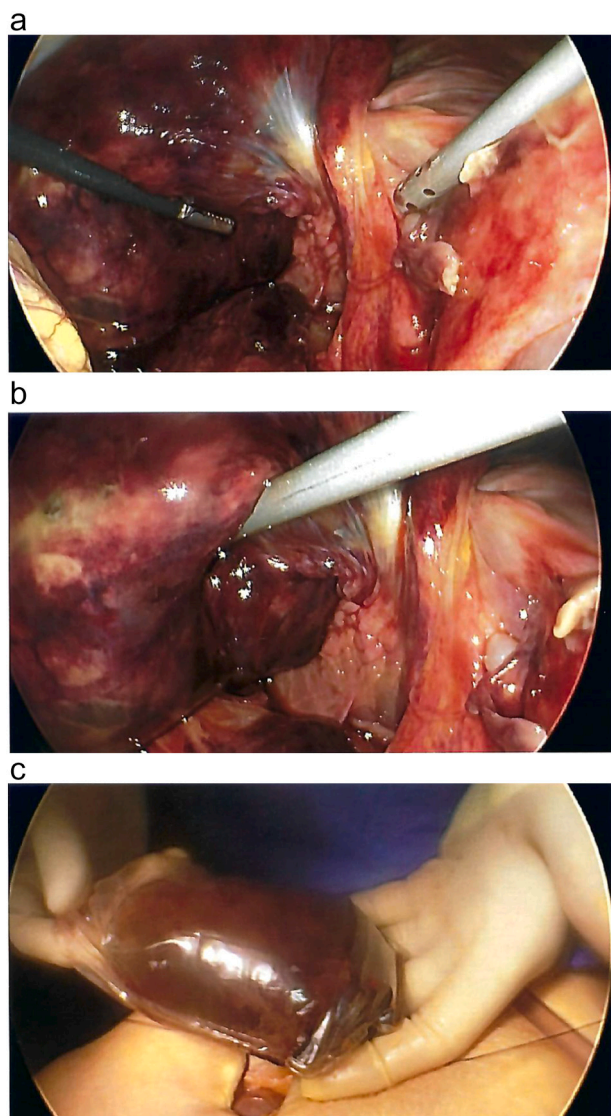


Fig. 3. Intraoperative finding of gangrenous gallbladder volvulus with 360 degrees counter clockwise rotation
a and b: Partially reduced
c: Specimen.

3.1. Laboratory studies

In patients with GBV, serologic tests are usually nonspecific and tend to simply indicate the presence of an acute inflammatory process. Only 55 % of patients with GBV exhibit elevated levels of inflammatory markers such as WBC and C-reactive protein (CRP) and the liver function values of approximately 85 % of patients are within normal limits [7,8]. Given the non-specificity of these serologic tests, imaging studies are usually required for diagnosis, as was the case for our patient.

3.2. Imaging and diagnosis

Preoperative imaging modalities such as ultrasonography (US), CT scan, magnetic resonance imaging (MRI), and magnetic resonance cholangiopancreatography (MRCP) are an essential component in the diagnosis of biliary pathologies, including GBV. Of these, US and CT scans are the most common. Findings on abdominal US and CT are usually suggestive of acute cholecystitis with pericholecystic fluid, thickening of the gallbladder wall, localization of the gallbladder below the fossa, or a pedicle that is twisted at the neck of the gallbladder,

resulting in a cone-like appearance [2].

Our patient highlights the dilemma in accurately diagnosing GBV despite the widespread availability and use of many imaging modalities. For example, Kitagawa et al. (1997) described diagnostic imaging criteria for GBV to facilitate preoperative diagnosis and to distinguish it from other biliary pathologies [9]. These criteria include 1) a floating gallbladder in the horizontal position with associated surrounding fluid collection; 2) cystic duct enhancement to the right of the gallbladder; and 3) the presence of inflammatory or ischemic signs, such as marked edema and thickening of the gallbladder wall [9]. Strikingly, our patient's US results were consistent with the first and third of these criteria.

CT findings suggestive of GBV include 1) accumulation of fluid between the fossa and gallbladder; 2) the gallbladder laying in a horizontal axis; 3) a so-called whirl sign that may indicate a twisted cystic artery; and 4) a cystic duct that is found to the right of the gallbladder [3]. Again, our patient's CT scan findings were consistent with only the first and second of these criteria.

In some cases, magnetic resonance imaging (MRI) and MRCP may aid preoperative diagnosis. Matsushashi et al. (2006) revealed that T1 weighted images on MRI may show high signal intensity and reveal gallbladder necrosis, while MRCP can indicate the relative position of the cystic duct with respect to other elements of Calot's triangle [10]. On MRCP, the four findings characteristic of GBV are 1) a V-shaped contortion of the extrahepatic bile duct resulting from cystic duct traction; 2) a cystic duct that is tapered and twisted; 3) an enlarged and distended gallbladder with midline deviation; and 4) differential intensities of the gallbladder, cystic duct, and extrahepatic bile ducts [11]. However, MRI and MRCP imaging are usually not necessary to determine the need for operative intervention. Our patient did not undergo either MRI or MRCP.

3.3. Operative management

Operative management for GBV involves gallbladder decompression, detorsion, and removal. The recommended technique is laparoscopic cholecystectomy, with or without intraoperative cholangiography, although open cholecystectomy has been performed in difficult cases or in settings without access to laparoscopy. It is extremely important to obtain critical view since the extrahepatic bile ducts tend to be unusually located.

4. Conclusion

GBV (gallbladder torsion) is a very rare pathology that presents predominantly in female patients. While most cases present with abdominal pain, our patient indicates chest pain as initial presenting symptom. Preoperative diagnostic accuracy remains a major predicament. An incorrect diagnosis of acute cholecystitis is frequently made based on clinical, laboratory, and radiographic findings. A high level of clinical suspicion is required for rapid diagnosis and, once a diagnosis is suspected or confirmed, urgent surgical management with laparoscopic cholecystectomy is indicated.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Ethical approval

Ethical approval is not required for the publication of case reports at our institution.

Research registration

Not applicable.

Guarantor

Denis Foretia, Department of Surgery, University of Tennessee Health Science Center, 910 Madison Ave, Memphis, Tennessee, 38163. dforetia@uthsc.edu

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Registration of research studies

None.

CRedit authorship contribution statement

Clarise Muenyi: study design, manuscript writing – original draft.
Nia Zalamea: manuscript writing.
Priya Dhindsa: data curation; writing - editing.
Mark Miller: manuscript review and editing.
Denis Foretia: study design, manuscript writing and review, overall supervision.
All authors approved the final manuscript.

Declaration of competing interest

None declared.

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