

Gallbladder Torsion: A Rare but Critical Diagnosis

Jessica Keller, M.D., Shaun Best, M.D., Christine Boatright, M.D.
University of Kansas School of Medicine–Kansas City, Kansas
City, KS

Department of Radiology

Received Dec. 22, 2023; Accepted for publication Jan. 19, 2024; Published online March 15, 2024
<https://doi.org/10.17161/kjmvoll721594>

INTRODUCTION

Gallbladder torsion or volvulus is a rare cause of acute abdominal pain that is often difficult to diagnose and requires prompt surgical intervention.^{1,2} Pre-operative diagnosis is only made in a quarter of patients with the remaining cases in the literature diagnosed at the time of cholecystectomy.¹ Non-torsion related acute cholecystitis may be treated conservatively with antibiotics or percutaneous drainage, however, a delay in diagnosis or misdiagnosis of gallbladder torsion may lead to gallbladder necrosis and subsequent perforation, biliary peritonitis, and sepsis.³⁻⁵ Improving the rate of pre-operative diagnosis of gallbladder torsion is essential to reduce its associated morbidity and mortality.

CASE REPORT

A 68-year-old male presented to the emergency department with abdominal pain that began five days prior and progressively worsened. Abdominal pain was accompanied by nausea and anorexia. Physical examination revealed generalized abdominal tenderness without guarding or rebound tenderness. His initial lab studies demonstrated a normal white blood cell count, total bilirubin, and serum lipase.

Initial contrast-enhanced computed tomography (CT) demonstrated a distended gallbladder within the mid abdomen with the gallbladder fundus directed toward the left side of the abdomen and nodular enhancement along the right margin of the gallbladder (Figure 1). Additional findings included diffuse biliary duct dilatation, though there was no gallbladder wall thickening or significant pericholecystic stranding or fluid. Right upper quadrant ultrasound (US) demonstrated a dilated gallbladder with edematous, thickened gallbladder wall, and biliary sludge (Figure 2). No cholelithiasis was visualized, and the sonographic Murphy sign was negative.



Figure 1. CT images of gallbladder torsion with dilated gallbladder located within the mid to left hemi-abdomen (solid arrow), diffuse intrahepatic biliary duct dilatation (dashed arrows), and enhancing cystic duct/vascular pedicle along the right margin of the gallbladder (curved arrow).

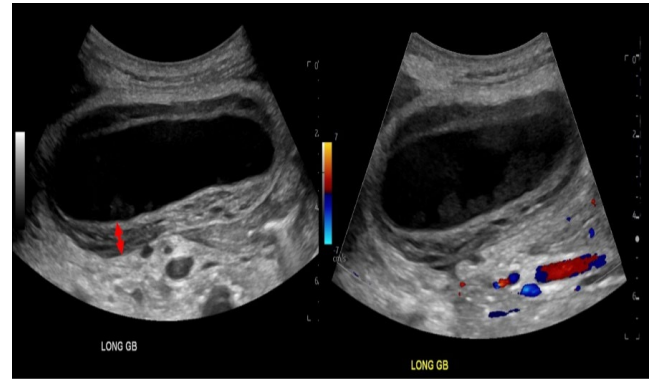


Figure 2. Grayscale and color Doppler ultrasound images of diffuse gallbladder wall thickening (double head arrow) with heterogeneous low echogenicity areas of edema within the thickened wall.

Hepatic iminodiacetic acid (HIDA) scintigraphy demonstrated adequate hepatic uptake of the radiotracer, normal biliary excretion, and normal transit to small bowel through the ampulla of Vater; however, the gallbladder was not visualized for the duration of the examination including after morphine injection (Figure 3). These findings were consistent with acute cholecystitis and cystic duct obstruction.

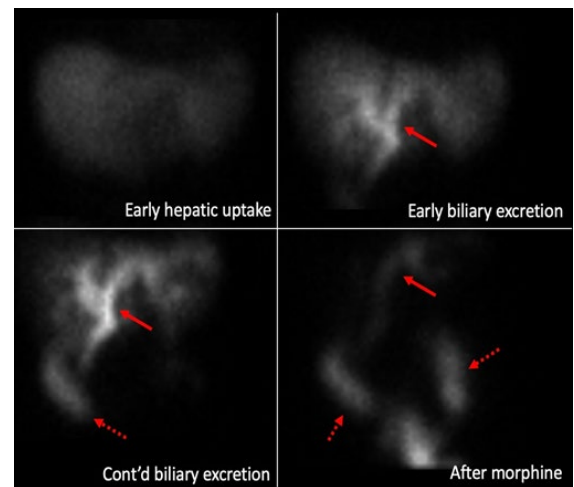


Figure 3. HIDA scan with initial, early hepatocyte uptake (upper left), progressive biliary excretion of tracer (solid arrows), and normal excretion of tracer into small bowel loops (dashed arrows). Further transit of tracer into small bowel after the administration of morphine (bottom right) though no tracer fills the gallbladder.

Non-contrast magnetic resonance cholangiopancreatography (MRCP) demonstrated marked gallbladder wall thickening and edema with diffuse T1-weighted (T1W) hyperintense signal throughout both the thickened wall and lumen of the gallbladder (Figure 4). The gallbladder orientation remained transverse with the fundus directed toward the left side of the abdomen. These imaging findings were consistent with hemorrhagic or gangrenous cholecystitis secondary to gallbladder torsion given the gallbladder orientation.

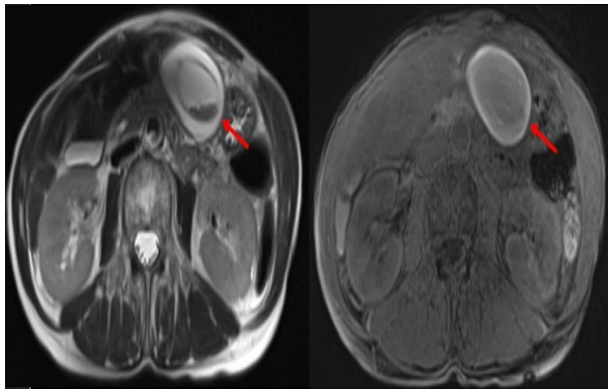


Figure 4. MRCP images of acute gangrenous/hemorrhagic cholecystitis secondary to torsion with thickened gallbladder wall (solid arrow-left) and abnormal, diffuse T1W hyperintense signal throughout the lumen and wall of the gallbladder (solid arrow-right).

The pre-operative diagnosis of gallbladder torsion was confirmed via open cholecystectomy, which demonstrated a completely gangrenous gallbladder with the gallbladder fundus located to the left of umbilicus secondary to twisting of the gallbladder along its vascular pedicle. Following cholecystectomy, the patient recovered and was discharged to home.

DISCUSSION

Gallbladder torsion, or volvulus, is a rare cause of acute abdominal pain that most commonly affects older females with a median age at presentation of 77 years old.¹ Pre-operative diagnosis is difficult though important as conservative treatments often pursued in cases of non-torsion-related acute cholecystitis in the elderly may delay surgical intervention and predispose to gallbladder necrosis, perforation, and sepsis.^{1,3-5}

Torsion of the gallbladder results in obstruction of biliary outflow from the gallbladder and narrowing or occlusion of the cystic artery perfusing the gallbladder.³ Although the direct cause of gallbladder torsion is unknown, it is thought that congenitally abnormal, incomplete, or absent mesenteric attachments of the gallbladder to the gallbladder fossa of the liver, sometimes termed *floating gallbladder* or *wandering gallbladder*, may predispose to torsion.^{3,6,7} Acquired hepatic atrophy from aging and underlying liver disease may also predispose to gallbladder torsion.³

Imaging may aid in the pre-operative diagnosis of gallbladder torsion, though imaging findings overlap with non-torsion causes of acute cholecystitis, such as gallbladder distention, wall thickening, and pericholecystic fluid.⁴ The prevalence of gallstones in gallbladder torsion is significantly less than those with acute gallbladder pathology without torsion.⁸ Ultrasound and CT may also demonstrate abnormal positioning of the gallbladder, such as with a transverse orientation or a twisted vascular pedicle or cystic duct to the right of the distended gallbladder.⁴ The presented case demonstrated transverse orientation of the gallbladder with the fundus directed towards the left hemiabdomen as opposed to the right. Additionally, there was an enhancing vascular pedicle and/or cystic duct along the right margin of the gallbladder.

HIDA scintigraphy can be utilized in equivocal or difficult cases of acute gallbladder pathology, however, it is not helpful in determining the cause of cystic duct obstruction in the setting of acute cholecystitis. In both cases of gallbladder torsion and obstructing calculus within the cystic duct, the gallbladder will not opacify with radiotracer despite the administration of morphine, which acts by closing the ampulla of Vater and allowing excreted radiotracer within the bile ducts to be directed towards the gallbladder lumen rather than the small bowel.⁹

MRI and/or MRCP in cases of gallbladder torsion may demonstrate areas of T1W hyperintense signal within the wall of the gallbladder, as seen in the presented case, compatible with acute necrosis and/or hemorrhage.¹⁰ Other findings that can be seen on MRI/MRCP are similar to those seen on CT with abnormal gallbladder orientation and/or twisted pedicle.

CONCLUSIONS

In summary, gallbladder torsion is a rare though important cause of acute abdominal pain and should be a diagnostic consideration, particularly in elderly patients with acute gallbladder pathology, abnormal gallbladder orientation by imaging, and an absence of gallstones.

REFERENCES

- 1 Reilly DJ, Kalogeropoulos G, Thiruchelvan D. Torsion of the gallbladder: A systematic review. *HPB* 2012; 14(10):669-672. PMID: 22954002.
- 2 Yokoi T, Miyata K, Yuasa N, et al. Twisted cystic artery disclosed by 3-dimensional computed tomography angiography for torsion of the gallbladder. *Am J Surg* 2011; 201(5):e33-e34. PMID: 21545895.
- 3 Revzin MV, Scoutt L, Smitaman E, Israel GM. The gallbladder: Uncommon gallbladder conditions and unusual presentations of the common gallbladder pathological processes. *Abdom Imaging* 2015; 40(2):385-399. PMID: 25063238.
- 4 Ahluwalia A, Allaway MGR, Giga S, Curran RJ. Torsion of the gallbladder: A rare but important differential to consider when treating acute cholecystitis non-operatively. *BMJ Case Rep* 2021; 14(1):e237842. PMID: 33408103.
- 5 Cecire J, Sutherland A, Kanta Das K. Gallbladder torsion masking as acalculous cholecystitis: A review of two cases including unsuccessful management with percutaneous cholecystostomy. *J Med Cases* 2021; 12(6):223-225. PMID: 34434462.
- 6 Copely K, Dawkins A. The floating gallbladder. *Abdom Radiol* 2020; 45(10):3369-3370. PMID: 31993698.
- 7 Morales AM, Tyroch AH. Wandering gallbladder. *Am J Surg* 2008; 196(2):240-241. PMID: 18436179.
- 8 Nho WY, Kim JK, Kee SK. A comparative analysis of gallbladder torsion and acute gallbladder disease without torsion: A single-center retrospective case series study. *Ann Transl Med* 2021; 9(18):1399. PMID: 34733951.
- 9 Snyder E, Kashyap S, Lopez PP. Hepatobiliary Iminodiacetic Acid Scan. *StatPearls*. 2022, Treasure Island (FL): StatPearls. PMID: 30969603.
- 10 Moriwaki Y, Otani J, Okunda J, Niwano T. Gallbladder torsion: US, CT, and MRI findings. *J Gastrointest Surg* 2018; 23(5):1077-1079. PMID: 30187329.

Keywords: gallbladder; gallbladder disease; acute cholecystitis