

Gallbladder torsion resulting in gangrenous cholecystitis within a parastomal hernia: Findings on unenhanced CT

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ABSTRACT

Gallbladder torsion is a rare cause of acute gangrenous cholecystitis; its occurrence within an abdominal hernia has not been previously reported. We present such a case occurring within a parastomal hernia and imaged with unenhanced CT.

CASE REPORT

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A 76 year-old man presented to the emergency room with two days of abdominal pain. He denied fever, chills, nausea, vomiting, constipation, diarrhea, and blood in the stool. His prior medical history included colectomy and ileostomy for ulcerative colitis, bilateral inguinal hernia repair, and an episode of upper gastrointestinal bleeding 42 years, 18 years and one year prior to the admission, respectively.

Physical exam revealed that the patient was afebrile, with a blood pressure of 100/50 and heart rate of 72. A large non-reducible hernia was palpated in the area of his right lower quadrant ileostomy, and the patient reported tenderness at the inferolateral aspect of the hernia. There was no change in ileostomy output. Laboratory values were significant for a white count of 18.9 k/mL (normal 4.8-10.8), with a granulocyte fraction of 89% (normal 40-70%), and a creatinine/BUN of 1.7/9.2 (normal 0.5-1.5/8-26)

CT of the abdomen and pelvis was obtained; this was performed without intravenous contrast administration due to the patient's impaired renal function. The CT examination showed a large parastomal hernia at the site of the right lower quadrant ileostomy. The hernia contained multiple non-dilated small bowel loops as well as a markedly distended, thick-walled gallbladder; mural and luminal gas as well as multiple radiopaque gallstones were noted within the gallbladder (Fig. 1). The gallbladder neck appeared elongated and deformed,

which was attributed to the abnormal orientation and ectopic location of the gallbladder. At this time, diagnostic considerations included emphysematous or gangrenous cholecystitis, primary gallbladder ischemia due to incarceration within the hernia, and possible fistulous communication with the gastrointestinal tract. The latter was considered unlikely due to an unremarkable appearance of the adjacent bowel and lack of pneumobilia.

The patient was taken to the operating room, where a laparoscopic procedure was initiated with the goals of reducing the herniated gallbladder and small bowel loops and performing a cholecystectomy. Due to technical difficulties, including the fact that the narrow neck of the hernia prevented reduction of the hernia contents, the laparoscopic procedure was converted to an open surgery. Within the hernia, the gallbladder was found to be markedly distended and necrotic; the adjacent small bowel loops were edematous. The gallbladder was delivered with difficulty from the hernia sac, and was noted to have undergone a 360 degree twist (Fig. 2), with patchy areas of necrosis evident in the wall.

Pathologic inspection demonstrated the gallbladder to be markedly edematous with hemorrhagic changes, mural necrosis and acute suppurative inflammation.

The patient had an uneventful postoperative period and was discharged home on the fifth postoperative day.

DISCUSSION

Gallbladder torsion (or volvulus) is a rare condition, with approximately 400 cases reported in the literature since originally described by Wendel in 1898 [1, 2]. This condition occurs three times more frequently in women than in men [3]. It is believed that gallbladder torsion is becoming more common with increasing longevity, as the mesentery elongates with age, resulting in visceroptosis [4]. Incomplete torsion occurs when the twist is less than 180 degrees; greater than 180 degrees of twisting is considered complete torsion [2]. Gallbladder torsion is diagnosed preoperatively in only 10% of cases [5]. For unclear reasons, this condition is more frequently reported in the Asian literature. Torsion of the gallbladder neck typically results in vascular compromise and mural necrosis [3,6]. The gallbladder can occasionally be found within an abdominal hernia [7], and several cases of acute cholecystitis within a hernia have been reported [8,9,10]. No case of gallbladder torsion in an abdominal hernia has previously been described in the English language literature.

Clinical and Imaging Findings

Symptoms of gallbladder torsion may be intermittent secondary to torsion-detorsion phenomenon. The clinical presentation is otherwise similar to that of acute cholecystitis, with symptoms including right upper quadrant pain and often fever, nausea and vomiting. Depending on the degree of vascular compromise and associated infection, the radiographic presentation may differ, with the appearance often overlapping with that of acute cholecystitis [11]. Nakao et al. describe the largest surgical series (245 patients) of gallbladder torsion dating back to 1932, with a small minority of the cases undergoing cross-sectional imaging, primarily ultrasonography. On ultrasound, a freely mobile gallbladder with a thickened wall is often noted. Sonographic features most suggestive of gallbladder torsion include a horizontal lie of the gallbladder with a cystic duct located to the right of the gallbladder, and a conical structure at the gallbladder neck representing the twisted pedicle [6, 12]. Interestingly, gallstones are present in only 60% of cases of torsion, less frequently than in typical acute cholecystitis. On Doppler sonography, the wall of a torsed gallbladder may fail to demonstrate flow, while many cases of acute cholecystitis show gallbladder wall hyperemia [3]. On CT, Chou et al. report a V-shaped configuration of the hepatic ducts, pointed toward the torsed gallbladder. If contrast is administered, poor gallbladder wall enhancement may be evident, and a twisted cystic artery with a "whirl sign" may be seen [6]. When evaluated with MRI, high signal on T1-weighted images in the gallbladder wall suggests hemorrhagic change in the wall that may be seen with torsion and/or a more advanced case of cholecystitis, such as gangrenous cholecystitis [11]. MRCP may show a tapered cystic duct without clear connection to the gallbladder [13].

Acute cholecystitis occurring within various types of abdominal wall hernias has been described in several case reports. The locations included Spigelian, inguinal, and parastomal hernias [8,9,10]. In the reported cases, the etiology of acute cholecystitis was a calculus obstructing the gallbladder neck or ischemia secondary to incarceration by the

narrow neck of the hernia. The authors of these case reports did not describe the imaging findings in these cases.

In our case, the non-contrast CT showed that a markedly distended, thick-walled gallbladder with mural and luminal gas and containing stones was located within a parastomal hernia. There was distortion at the gallbladder neck, which at the time was believed to be a consequence of the gallbladder herniation. Furthermore, due to non-contrast technique, the actual twist could not be identified. Although wall thickening of a distended gallbladder is often seen with uncomplicated acute cholecystitis due to cystic duct obstruction, the presence of mural and luminal gas suggests a more advanced process, usually seen with emphysematous or gangrenous cholecystitis; resulting from gas-producing infection in the former and inflammation-induced focal ischemia in the latter [14]. In our case, gangrenous changes in the gallbladder wall occurred because of torsion of its neck with secondary suppuration. We believe that the entrapment of the gallbladder within the hernia made it less likely for the gallbladder to untwist once torsion occurred.

Treatment and Prognosis

Gallbladder torsion is treated with emergent laparoscopy, surgical detorsion, and cholecystectomy. In complex cases, such as our case with the gallbladder within a hernia, open surgery may be required. The prognosis is similar to other types of complicated cholecystitis.

Differential Diagnosis

The most common findings of gallbladder torsion, mural thickening and pericholecystic fluid, are much more commonly associated with acute calculous or acalculous cholecystitis. Additionally, these imaging findings are nonspecific and may be present in the setting of cardiac or hepatic disease. A distended, thick-walled gallbladder with cholelithiasis and mural and luminal gas is highly suspicious for emphysematous or gangrenous cholecystitis. When such a gallbladder is located within a hernia along with mildly thickened small bowel, additional considerations include primary gallbladder ischemia due to incarcerated hernia, as well as possible cholecystoenteric fistula.

TEACHING POINT

Albeit rare, gallbladder torsion should be considered when imaging findings of complicated cholecystitis are present, if there is an abnormal lie of the gallbladder, or when a distended, inflamed gallbladder is seen within a hernia. Further evaluation of the pedicle with Duplex sonography or contrast enhanced CT or MRI may be helpful in arriving at the correct pre-operative diagnosis, if a patient's condition permits.

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FIGURES

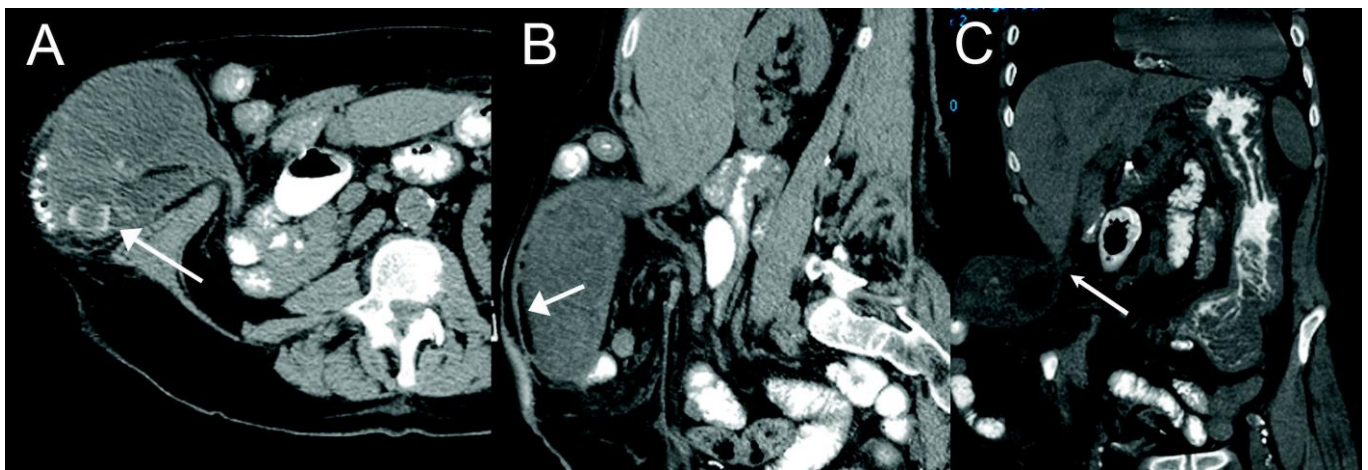


Figure 1: 76 year-old man with gallbladder torsion in a parastomal hernia. Findings: Markedly distended and thick-walled gallbladder with gallstones, intramural and intraluminal gas (arrows) in a right lower quadrant parastomal hernia. The gallbladder neck is elongated and deformed; however, the twist is not clearly appreciated due to lack of intravenous contrast. Technique: Reconstructed axial (a), sagittal (b) and coronal (c) unenhanced CT with oral contrast, mAs 181, kV 120, slice thickness 5 mm.

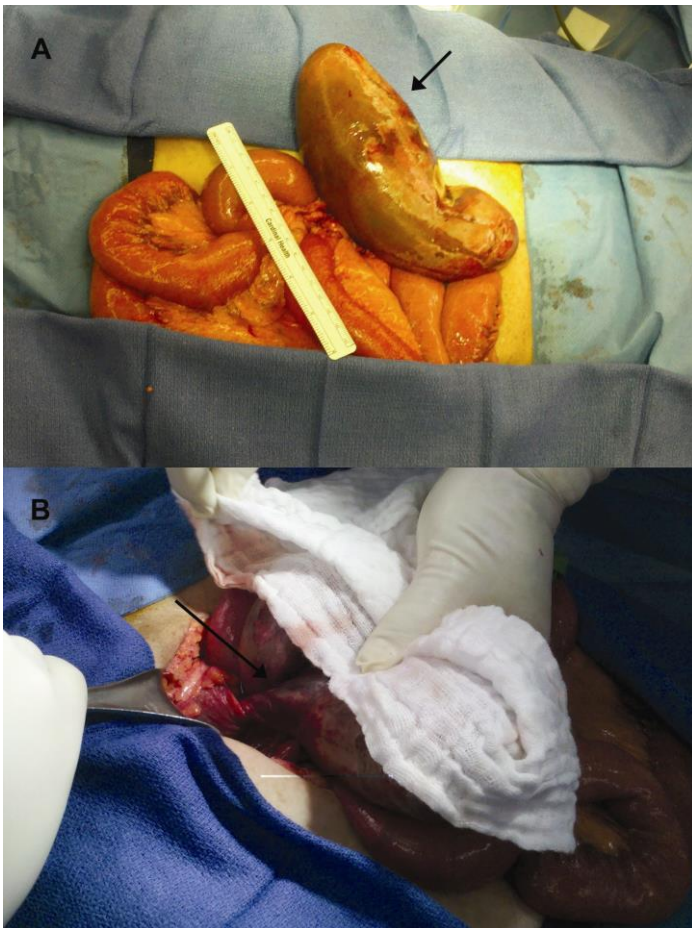


Figure 2 (left): 76 year-old man with gallbladder torsion in a parastomal hernia. Findings: Markedly distended gallbladder with a discolored necrotic appearing surface (short arrow). The 360 degree twist of the gallbladder neck (long arrow). Technique: Intraoperative photographs

Etiology	Twisting of the gallbladder along its mesentery.
Incidence	Approximately 400 cases reported in the literature. More frequently reported in the Asian literature.
Gender Ratio	Three times more frequent in women
Age Predilection	More common in older patients, as the mesentery elongates with age
Risk Factors	An elongated gallbladder mesentery
Treatment	Detorsion and cholecystectomy
Prognosis	Similar to complicated cholecystitis, such as gangrenous cholecystitis
Findings on Imaging	Overlaps with gangrenous/emphysematous cholecystitis. Unusual gallbladder location or lie suggests the diagnosis. A conical structure at the gallbladder neck on ultrasound, if seen, represents the twisted. Whirl sign indicating a torsed pedicle may be present.

Table 1: Summary table of the key aspects and imaging findings associated with gallbladder torsion

Differential	US/CT/MRI
Acute Cholecystitis	Cholelithiasis, Gallbladder wall thickening, Distended gallbladder
Gangrenous/Emphysematous Cholecystitis	Gas in the gallbladder wall and/or lumen. Hyperemia of the gallbladder wall on Doppler ultrasound or after IV contrast administration. High T1 signal in the gallbladder wall on MRI suggests mural hemorrhage.
Gallbladder Torsion	Overlaps with gangrenous/emphysematous cholecystitis, as they frequently occur together. Gallstones are present in only 60% of cases of torsion, less frequently than in acute cholecystitis. Unusual gallbladder location or lie suggests the diagnosis. Whirl sign at the gallbladder neck indicates a torted pedicle. Horizontal lie of the gallbladder with the cystic duct located to the right of the gallbladder, and a conical structure at the gallbladder neck representing the twisted pedicle may be seen.

Table 2: Differential diagnosis table for gallbladder torsion. The differential diagnosis for gallbladder torsion includes acute cholecystitis and gangrenous/emphysematous cholecystitis.

ABBREVIATIONS

CT = Computed Tomography

KEYWORDS

gallbladder torsion; gallbladder volvulus; acute cholecystitis; gangrenous cholecystitis; parastomal hernia

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