CASE REPORT

Complete acute gallbladder torsion diagnosed with abdominal ultrasonography and colour Doppler imaging

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SUMMARY

An 82-year-old woman was admitted to our hospital with a provisional diagnosis of acute cholecystitis. Abdominal ultrasonography and colour Doppler imaging played the most important role in confirming a diagnosis of gallbladder torsion preoperatively, and we decided to treat it laparoscopically. Operative findings showed that gallbladder was rotated 360° counterclockwise around the cystic duct and artery. This was a complete torsion of a gross type I wandering gallbladder. The patient had an uneventful postoperative course and was discharged. Laparoscopic cholecystectomy has recently been recommended for treating gallbladder torsion. Because the gallbladder is typically minimally adherent to the liver bed, cholecystectomy can be performed easily with minimal invasion. Gallbladder torsion is a relatively rare cause of an acute abdomen and is difficult to diagnose preoperatively, but we could diagnose complete, acute gallbladder torsion preoperatively with ultrasonography and colour Doppler imaging in this case, allowing for safe and completely curative laparoscopic cholecystectomy.

BACKGROUND

Torsion of the gallbladder is an extremely rare cause of acute abdomen. It is defined as a rotation of the gallbladder on the mesentery along the axis of the cystic duct and artery. Clinically, gallbladder torsion is an acute surgical situation because of its attendant risk of necrosis and perforation. The rarity of gallbladder torsion and the fact that its symptoms are similar to those of acute cholecystitis make it difficult to diagnose preoperatively. Many cases are misdiagnosed as appendicitis, ileus or other disorders.¹

We report a case of an 82-year-old woman in whom torsion of the gallbladder was diagnosed preoperatively by abdominal ultrasonography and treated by laparoscopic cholecystectomy. We also review the clinical aspects of this disease.

CASE PRESENTATION

An 82-year-old woman awoke around midnight complaining of dull right upper quadrant pain. Her medical history was significant for hypertrophic cardiomyopathy, paroxysmal atrial fibrillation and congestive heart failure. The pain gradually worsened, becoming acute in the early afternoon, and she presented to the emergency department in our hospital. She was dehydrated at presentation, with a heart rate of 72 bpm, blood pressure 132/72 mm Hg, temperature 37.1°C and SpO₂ of 97% on room air. She was 141 cm tall, weighed

35.4 kg and had a body mass index (BMI) of 17.8. Abdominal distension and right upper quadrant pain with neither muscle guarding nor rebound tenderness were noted on physical examination. Murphy's sign was positive. A right upper quadrant mass 10×5 cm in size was noted. A complete blood count showed a mild leukocytosis (10 200/mm³) with neutrophilia. The C reactive protein level was 0.1 mg/dl. Her liver function enzymes were mildly elevated (aspartate 65 IU/l, alanine transaminase 88 IU/l and lactate dehydrogenase 326 IU/l). Other data were within normal limits.

Initial abdominal ultrasonography showed a clearly enlarged gallbladder with a thickened wall and a stone 5 mm in size. The emergency physician who is not hepato-pancreato-biliary (HPB) specialist performed the initial ultrasound. Abdominal CT without contrast media demonstrated a markedly enlarged gallbladder, measuring 85 mm×50 mm, a thickened wall and a 5 mm stone (figure 1).

At this time, she was admitted with a diagnosis of acute cholecystitis. The next day, we performed MRI and repeated the abdominal ultrasonography. MRI showed a noticeably enlarged gallbladder and a thickened wall. The wall of the gallbladder neck was thick and looked like a tumour. Submucosal haemorrhage was suspected because there was a high intensity intramural area on T1-weighted imaging (figure 2). We suspected gallbladder torsion by magnetic resonance cholangiopancreatography (MRCP), but we were not able to establish an accurate diagnosis of gallbladder torsion from this sign. Therefore, the second abdominal ultrasound showed an enlarged gallbladder, a thickened wall and a stone 6 mm in size. It also showed a highly echoic lesion that looked like a tumour in the gallbladder neck. Colour Doppler (TOSHIBA Aplio) showed no intramural blood flow in the wall of the gallbladder (figure 3). HPB specialist performed the second ultrasound and colour Doppler imaging. A small amount of ascites was found between the gallbladder and liver. Moreover, the gallbladder bed could not be seen on ultrasonography. On the basis of these findings, we diagnosed gallbladder torsion and decided to treat it laparoscopically.

TREATMENT

At laparoscopy, she was found to have a gangrenous and much distended gallbladder, which was attached to the liver only by the gallbladder neck and was rotated 360° counterclockwise around the cystic duct and artery. Because it was difficult to

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Figure 1 Abdominal CT without contrast media demonstrated a markedly enlarged gallbladder, measuring 85 mm×50 mm, a thickened wall and a 5 mm stone.

grasp the enlarged gallbladder with a laparoscopic clamp, we performed needle cholecystocentesis which yielded bile. The gallbladder was reduced and then a cholecystectomy was performed in the usual manner (figure 4).

OUTCOME AND FOLLOW-UP

Pathological examination of the specimen revealed a 95 mm×80 mm gallbladder. The histopathological findings were consistent with acute gangrenous cholecystitis with severe congestion, intramural haemorrhage, and extensive necrosis of the wall. Postoperatively, the patient recovered well and was discharged from the hospital on postoperative day 10.

Figure 2 MRI showed a noticeably enlarged gallbladder and a thickened wall. The wall of the gallbladder neck was thick and looked like a tumour. Submucosal haemorrhage was suspected because there was a high-intensity intramural area on T1-weighted imaging.

DISCUSSION

Torsion of the gallbladder is an extremely rare condition that was first reported in 1898 by Wendel *et al*² and occurs in people aged 60–80. The female-to-male ratio is 4:1.^{1 3–7} The primary symptom of gallbladder torsion is the acute onset of abdominal pain, but the symptoms are largely non-specific and therefore preoperative diagnosis is difficult on the basis of history and physical examination alone.^{7–9}

Two types of gallbladder torsion have been described: complete (rotation >180°) and incomplete (rotation <180°).^{10 11} Rotation in the present case was 360° counterclockwise and thus complete type. Incomplete torsion causes intermittent symptoms of biliary colic. Spontaneous remission may occur in this type. Complete torsion, however, presents with sudden onset severe, right upper quadrant pain, nausea and vomiting, with a tender, palpable mass. The vascular supply, especially the venous return of the gallbladder, is compromised and the cystic duct becomes occluded and gangrenous and may perforate.

Congenital floating gallbladder is grossly classified into two types: type I is defined as the attachment of the gallbladder and cystic duct to the inferior surface of the liver via the mesentery, while type II involves attachment of only the cystic duct to the liver.¹² Our case was type I.

Torsion of the gallbladder is believed to occur in anatomically predisposed patients, but its precise aetiology remains unknown. It is estimated that 4–5% of the population has a congenital anatomic anomaly predisposing to gallbladder torsion.¹³ Why does the gallbladder torsion after presumably decades of health despite a congenitally floating gallbladder? It is said that migration of the gallbladder increases due to childbearing and delivery, among other factors, and gallbladder torsion does occur most commonly in elderly women. It may also result from the reduction in adipose tissue and elastic fibres associated with ageing. Gallbladder torsion is thought to occur due to the accumulation of congenital, acquired and physical factors. Acquired factors include visceroptosis, senile kyphosis, lateral curvature and emaciation. Physical factors include intra-abdominal pressure change, rapid postural change, pendulum motion in a bent-over position, childbirth and abdominal contusion. What was striking in our case was that the patient had a lateral curvature.¹⁴

Early diagnosis of gallbladder torsion and prompt surgical intervention is critical for a good outcome as this prevents the complication of perforation and the attendant bilious peritonitis. Laparoscopic cholecystectomy has recently been recommended for treating torsion of the gallbladder. Because the gallbladder is typically minimally adherent to the liver bed, cholecystectomy can be performed easily with minimal invasion. However, preoperative diagnosis of gallbladder torsion is difficult, not just because it is a fairly unknown disease. Clinical presentation is similar to other intra-abdominal conditions. Radiological imaging can help with diagnosis.

Generally speaking, the CT features suggesting gallbladder torsion are horizontal misplacement, presence of a well-enhanced cystic duct located on the right side of the gallbladder, and a liver bed indicating a 'floating gallbladder'. A rare, but very specific sign on CT is the so-called 'whirl sign'. This sign is only visible if the plane of CT is perpendicular to the axis of the twisted gallbladder mesentery.^{7 10 15} This sign was not found on CT in our case. MRI findings include a high-intensity area within the gallbladder wall on T1-weighted images suggesting haemorrhagic infarct and necrosis.⁹ In our case, the wall of the gallbladder neck was thick and looked like a tumour. Submucosal haemorrhage was suspected because the inside of

Figure 3 Abdominal ultrasound showed an enlarged gallbladder, a thickened wall and a stone 6 mm in size. It also showed a highly echoic lesion that looked like a tumour in the gallbladder neck. Colour Doppler showed no intramural blood flow in the wall of the gallbladder. A small amount of ascites was found between the gallbladder and liver.

the wall showed a high-intensity area on T1-weighted imaging: we suspected gallbladder torsion by MRCP, but we were not able to establish an accurate diagnosis of gallbladder torsion from this sign. Abdominal ultrasonography will normally identify the enlarged gallbladder inferior to its normal anatomical position with a thickened wall, surrounded by free fluid. It can also show a hypoechoic zone between two echoic zones of the gallbladder, suggesting oedema, most probably due to venous and lymphoid stasis.^{9 16 17} In our case, ultrasonography and colour Doppler imaging played the most important role for confirming the diagnosis. Abdominal ultrasonography showed an enlarged gallbladder, a thickened wall and a small amount of ascites between the gallbladder and liver. Moreover, the gallbladder bed could not be seen on ultrasonography. Colour Doppler showed no intramural blood flow in the wall of the gallbladder. Taking together all these findings, we diagnosed gallbladder torsion and decided on laparoscopic treatment.

In conclusion, gallbladder torsion is a rare disease and is difficult to diagnose preoperatively, but we were able to diagnose complete, acute gallbladder torsion preoperatively with

abdominal ultrasonography and colour Doppler imaging in this case, allowing for safe and completely curative laparoscopic cholecystectomy.

Learning points

- ▶ Gallbladder torsion
- ▶ Acute cholecystitis
- ▶ Colour Doppler imaging

Contributors YO and MH analysed and interpreted the data; drafted the article; critically revised the article for important intellectual content; and final approval of the article. YO, MH, KS and GW were involved in provision of study materials or patients.

Competing interests None.

Patient consent Obtained.

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Figure 4 (A) A gangrenous and much distended gallbladder, which was attached to the liver only by the gallbladder neck and was rotated 360° counterclockwise around the cystic duct and artery. (B) The gallbladder was slightly attached to the inferior surface of the liver via the mesentery.

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