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CASE REPORT

Preoperative diagnosis of gallbladder torsion by magnetic resonance cholangiopancreatography: A case report

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Abstract

Gallbladder torsion is a rare and potentially fatal condition presenting with acute abdominal pain. Gallbladder torsion requires early diagnosis and treatment; however, preoperative diagnosis is difficult. In the present case, magnetic resonance cholangiopancreatography provided definitive imaging findings and was very useful in making the preoperative diagnosis.

KEYWORDS

cholecystectomy, cholecystitis, gallbladder torsion, magnetic resonance cholangiopancreatography

1 | INTRODUCTION

Gallbladder torsion is a rare cause of acute abdominal disease and is well-recognized in elderly women.[1] Gallbladder torsion is an emergent surgical situation because of its attendant risk of necrosis and perforation[2]; however, despite the widespread use of computed tomography (CT), diagnosis is difficult, and most cases are diagnosed intraoperatively.[3,4] We herein report a case of gallbladder torsion in which the preoperative definitive diagnosis was made by magnetic resonance cholangiopancreatography (MRCP), and the patient was successfully treated by laparoscopic cholecystectomy.

2 | CASE REPORT

An 84-year-old woman was admitted to our hospital with the complaint of sudden right upper quadrant pain of approximately 1 day duration. Her medical history included hypertension. On examination, her blood pressure was 128/85 mmHg, pulse: 80 beats/min and regular and temperature: 36.4°C. She was 145.0 cm tall, weighed 38.0 kg, and had a body mass index of 18.1 kg/m^2. Physical examination revealed a soft abdomen, tender mass in the right upper quadrant, and positive Murphy's sign. Laboratory investigation revealed the following: white blood cell count: 12.5 × 10^3/μl, C-reactive protein concentration:

3.2 mg/dl, and albumin concentration: 3.3 g/dl. The results of other laboratory tests, including serum hepatobiliary system enzymes, were within their normal ranges. Abdominal enhanced CT showed a gallstone in the gallbladder neck with swelling and a thickened gallbladder wall, suggesting acute cholecystitis (Figure 1A,B). At this point, gallbladder torsion could not be diagnosed, and on the basis of a preoperative diagnosis of acute cholecystitis, we recommended emergency laparotomy. However, the patient and family refused surgery and requested conservative treatment. After this, MRCP photography was performed in consideration of the possibility of emergency surgery during hospitalization. MRCP revealed that the cystic duct was tapered, with a "swirl" sign, and v-shaped distortion of the extrahepatic bile duct was visible (Figure 2A,B). In addition, the extrahepatic bile duct showed strong and high intensity, and the gallbladder was observed to have extremely low intensity in comparison with it. With a preoperative diagnosis of gallbladder torsion and after we explained the condition again, the patient and family agreed to laparoscopic cholecystectomy.

At laparotomy, we confirmed a distended, ischemic, and floating gallbladder twisted clockwise by 180 degrees around the cystic duct. Detorsion and cholecystectomy were performed easily, and the duration of surgery was 59 min (Figure 3A,B). A pathological specimen showed transmural hemorrhage and necrosis consistent with torsion (Figure 4). The patient's postoperative course was uneventful, and she was discharged from hospital on postoperative Day 6.

3 | DISCUSSION

Gallbladder torsion is a particularly rare clinical entity first reported by Wendel in 1898.[5] Clinical presentation can range from severe abdominal pain to death from gangrene and perforation due to torsion-induced blood flow disorders. Therefore, gallbladder torsion requires early diagnosis and treatment.[1,2] However, despite previous reports revealing the clinical characteristics of patients with gallbladder torsion indicating that 85% of cases occur between the ages of 60 and 80 years, with a high proportion of females with emaciation, and with improvements in diagnostic imaging ability,[6] accurate preoperative diagnosis of gallbladder torsion is still difficult.[7]

The results of laboratory investigations of gallbladder torsion are often nonspecific, and the preoperative diagnosis is based on diagnostic imaging. Ultrasonography and CT show gallbladder enlargement, gallbladder wall thickening, and free gallbladder and hepatic bed or narrow contact area with the hepatic bed. Median or downward deviation of the gallbladder is a characteristic finding.[8] Furthermore, in contrast-enhanced CT, the contrast effect in the gallbladder wall is diminished, with a spiral structure of the gallbladder neck and an increase in fat concentration.[7] The preoperative diagnosis rate has recently increased owing to improved diagnostic imaging ability; however, preoperative diagnosis is still often difficult, with many cases diagnosed intraoperatively. Additionally, contrast-enhanced CT is often difficult to perform owing to the decline in renal function in older populations.

Although there are few reports of MRCP in gallbladder torsion, the following characteristics are reported when making the preoperative diagnosis[9,10]: 1. v-shaped distortion of the extrahepatic bile ducts as a result of traction by the cystic duct; 2. tapering and twisting interruption of the cystic duct; 3. distended, enlarged gallbladder deviated toward the midline; and 4. the gallbladder, extrahepatic bile ducts, and cystic duct might display different intensities. Moreover, as an advantage of MRCP, no contrast medium is required, there is no risk of adverse effects, and the procedure can be performed even in cases of impaired renal function, and even if there is a passage obstruction.

The probability of gallstones in gallbladder torsion is considered incidental, with a rate of 24.4%–32%.[11] Gallstone cholecystitis is generally treated surgically[12]; however, gallstone cholecystitis can often be treated conservatively, and emergent surgery is difficult, especially in community medicine, with problems with uneven distribution of doctors and aging patients. Therefore, many hospitals have no choice but to provide conservative treatment, including gallbladder drainage.[13] Moreover, MRCP appears not to have been performed for patients with

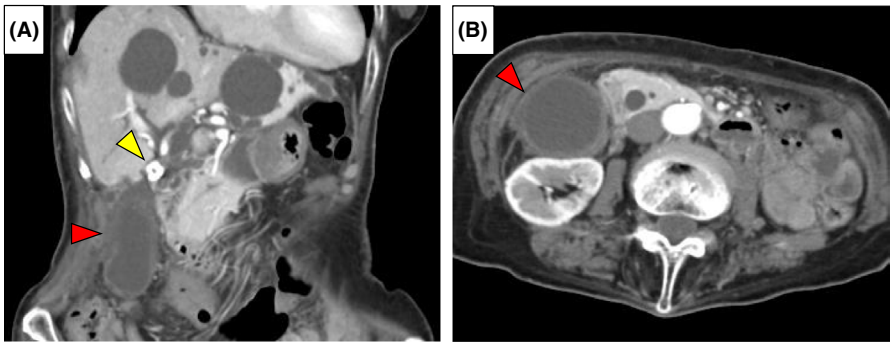

FIGURE 1 Contrast-enhanced abdominal computed tomography. An enlarged gallbladder separated from the hepatic bed (A, red arrow) with gallstones is seen (A, yellow arrow), and the wall of the gallbladder is thickened; however, the contrast effect is maintained (B, red arrow)

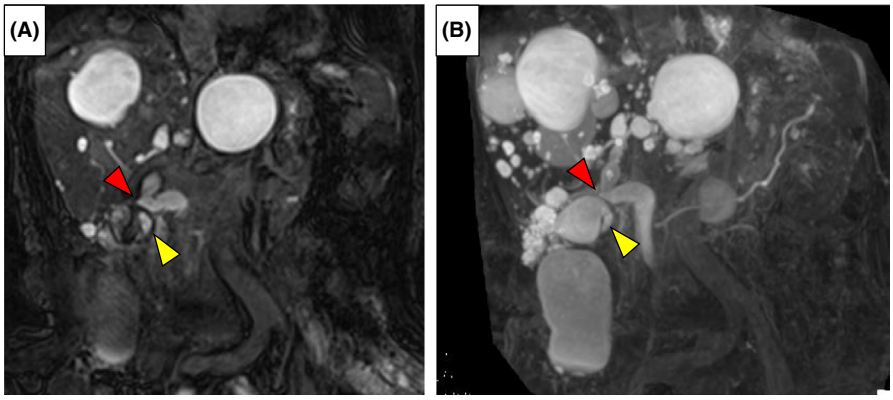

FIGURE 2 Magnetic resonance cholangiopancreatography. The extrahepatic bile ducts are distorted on the right side and appear in the shape of the letter v (A, B: red arrow). The cystic duct (A, B: yellow arrow) is tapered and twisted around the pedicle with the swirl sign

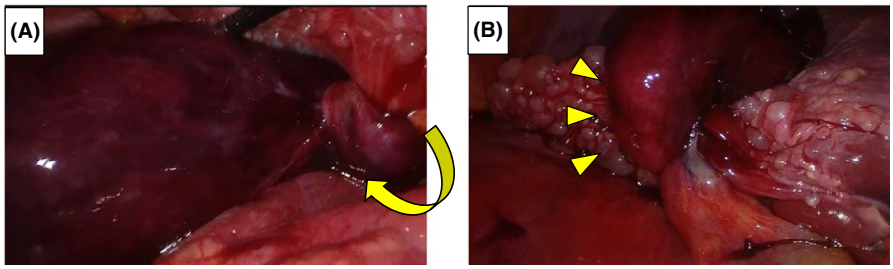

FIGURE 3 Laparoscopy. The gallbladder is dark red, necrotic, distended, and almost floating, and is rotated 180° clockwise at its neck (A, yellow arrow). Untwisting the gallbladder (B) revealed that it was not completely attached to the bed of the liver (B, yellow arrows)

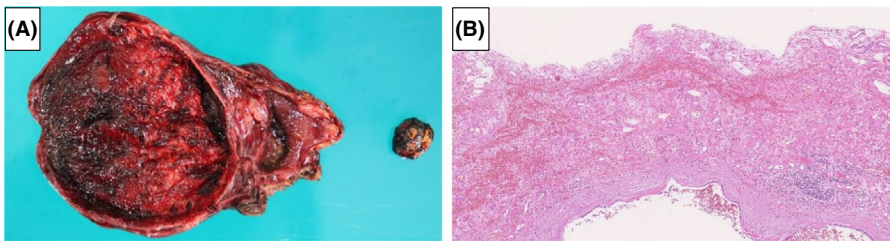

FIGURE 4 Resected specimen and histopathological findings. Resected specimen showing congestion with a dark red color and necrosis in all layers (A). The gallbladder wall is necrotic with marked epithelial shedding and marked congestion and bleeding (B, magnification ×40, hematoxylin and eosin stain)

cholecystitis in the emergency department because the imaging takes time.[9] Although looking back on this case, there were no findings because no echo was performed, and CT did show a free gallbladder and hepatic bed or narrow contact area with the hepatic bed, which is characteristic of twisting gallbladder, our patient was initially misdiagnosed as having gallstone cholecystitis. However, this was a valuable case that was successfully diagnosed and treated by MRCP.

Treatment of gallbladder torsion is based on cholecystectomy. Because the area of attachment of the gallbladder to the hepatic bed is small, and inflammation is often mild with gallbladder torsion compared with acute cholecystitis, many cholecystectomies in gallbladder torsion are easier than for other cholecystitis-related surgical procedures.[10] The patient in this case was also elderly; however, the surgery was performed without problems, and no complications were observed after the operation.

In conclusion, gallbladder torsion is a rare disease that is difficult to diagnose. However, the prognosis is good if the condition is diagnosed promptly and treated appropriately. MRCP is considered the best way to make a definitive diagnosis because of its characteristic imaging findings, as was seen in this case. This case report provides a useful guide for the clinical diagnosis and treatment of gallbladder torsion.

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CONFLICT OF INTEREST

The authors declare that they have no competing interests.

AUTHOR CONTRIBUTIONS

T Miyata performed a central role in treating this patient and drafted the manuscript. YS, TN, RK, HN, AH, YF, SM, DK, YT, NN, TM, HF, NU, and HT also managed the patient. All authors have approved the manuscript.

ETHICAL APPROVAL

The study design was approved by the ethics committee of the Kanazawa Medical University.

CONSENT

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the editor in chief of this journal.

DATA AVAILABILITY STATEMENT

Not applicable.

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REFERENCES

1. Reilly DJ, Kalogeropoulos G, Thiruchelvam D. Torsion of the gallbladder: a systematic review. *HPB (Oxford)*. 2012;14(10):669-672.
2. Shaikh AA, Charles A, Domingo S, Schaub G. Gallbladder volvulus: report of two original cases and review of the literature. *Am Surg*. 2005;71(1):87-89.
3. Chou CT, Chen RC, Yang AD, Wu HK. Gallbladder torsion: preoperative diagnosis by MDCT. *Abdom Imaging*. 2007;32(5):657-659.
4. Alkhalili E, Bencsath K. Gallbladder torsion with acute cholecystitis and gross necrosis. *BMJ Case Rep*. 2014;2014:bcr2014204917.
5. Wendel AVVI. A case of floating gall-bladder and kidney complicated by cholelithiasis associated with perforation of gall-bladder. *Ann Surg*. 1898;27(2):199-202.
6. Ikematsu Y, Yamanouchi K, Nishiwaki Y, et al. Gallbladder volvulus: experience of six consecutive cases at an institute. *J Hepatobiliary Pancreat Surg*. 2000;7(6):606-609.
7. Matsuhashi N, Satake S, Yawata K, et al. Volvulus of the gall bladder diagnosed by ultrasonography, computed tomography, coronal magnetic resonance imaging and magnetic resonance cholangio-pancreatography. *World J Gastroenterol*. 2006;12(28):4599-4601.
8. Brewer GE IV. Preliminary report on the surgical anatomy of the gall-bladder and ducts from an analysis of one hundred dissections. *Ann Surg*. 1899;29(6):721-730.
9. Usui M, Matsuda S, Suzuki H, Ogura Y. Preoperative diagnosis of gallbladder torsion by magnetic resonance cholangiopancreatography. *Scand J Gastroenterol*. 2000;35(2):218-222.
10. Fukuchi M, Nakazato K, Shoji H, Naitoh H, Kuwano H. Torsion of the gallbladder diagnosed by magnetic resonance cholangiopancreatography. *Int Surg*. 2012;97(3):235-238.
11. Kachi A, Nicolas G, Nasser J, Hashem M, Abou SC. A rare presentation of gall bladder volvulus: a case report. *Am J Case Rep*. 2019;20:1466-1470.
12. Miura F, Okamoto K, Takada T, et al. Tokyo guidelines 2018: initial management of acute biliary infection and flowchart for acute cholangitis. *J Hepatobiliary Pancreat Sci*. 2018;25(1):31-40.
13. Miyata T, Matusi D, Fujiwawa Y, et al. Predictive factors for developing acute cholangitis and/or cholecystitis in patients undergoing delayed cholecystectomy: a retrospective study. *Asian J Surg*. 2021;44(1):280-285.

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