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Complete torsion of gallbladder following laparoscopic cholecystectomy: A case study



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ABSTRACT

INTRODUCTION: Gallbladder torsion is mainly associated with a floating gallbladder. From an anatomical perspective, laparoscopic cholecystectomy is a more optimal treatment than open cholecystectomy.

PRESENTATION OF CASE: An 84-year-old woman visited the Onomichi General Hospital because of progressive pain in the right upper quadrant of her abdomen. Physical examination revealed a positive Murphy sign and peritoneal irritation. Laboratory data demonstrated that inflammatory marker levels were increased. Abdominal ultrasonography showed that blood flow in the cystic artery was reduced and the gallbladder was swollen. Abdominal contrast-enhanced computerized tomography indicated that the swollen gallbladder was modestly enhanced and the fundus was displaced under the midline and detached from the gallbladder bed. The cystic duct was twisted. Magnetic resonance cholangiopancreatography showed that the root of the cystic duct was unclear and the extrahepatic bile duct had V-shaped distortion. The gallbladder neck showed a tapering interruption with the common biliary duct. We made a preoperative diagnosis of gallbladder torsion. Accordingly, emergency laparoscopic cholecystectomy was performed. The intraoperative findings included a dark swollen gallbladder that was twisted in the counterclockwise direction. The patient was discharged without any postoperative complications on day 7.

DISCUSSION: Combined acute onset of abdominal pain with characteristic radiological findings made it possible to precisely diagnose gallbladder torsion.

CONCLUSION: Laparoscopic cholecystectomy can be the gold standard treatment for gallbladder torsion after a preoperative diagnosis is made.

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1. Introduction

Gallbladder torsion is a relatively rare disease, with only 500 cases published since Wendel first reported the condition in 1898 [1,2]. Gallbladder torsion is often associated with a floating gallbladder, which occurs when adhesion between the gallbladder and liver is lost. Gallbladder mobility is classified as either type I or type II according to the Gross classification [3]. This condition occurs more frequently in elderly women [3]. Preoperative diagnosis of gallbladder torsion is difficult because the findings of physical examination and radiological images mimic those of acute cholecystitis. Furthermore, laboratory data often indicate

acute inflammation, based on increases in white blood cell (WBC) count and C-reactive protein (CRP) levels, without abnormal liver function or alterations in biliary enzyme levels [4–6].

Radiological findings play an important role in achieving a precise diagnosis, with distortion of the gallbladder fundus toward the abdominal center, a V-shaped extrahepatic duct, and torsion of the cystic duct being the well-known magnetic resonance cholangiopancreatography (MRCP) findings [7,8]. Because we made a preoperative diagnosis, laparoscopic rather than open cholecystectomy was performed as an appropriately treatment.

We report this case with a review of the literature. This work has been reported in line with the SCARE criteria [9].

2. Presentation of case

An 84-year-old woman was admitted to the Department of Surgery of Onomichi General Hospital for complaints of progres-

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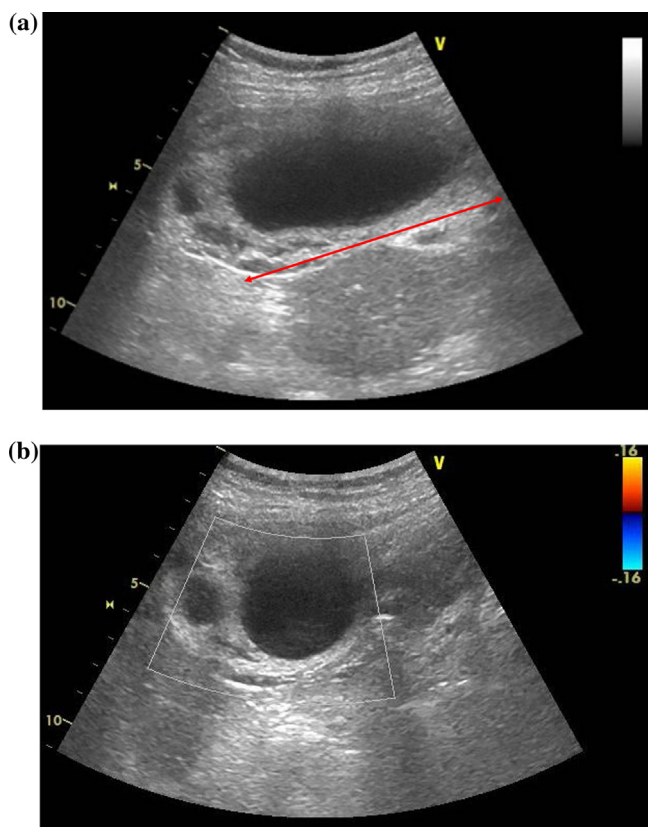


Fig 1. Findings of abdominal ultrasonography (US). US images showing a swollen gallbladder (a) and reduced blood flow to the gallbladder (b).

sive pain in the right upper quadrant of the abdomen and nausea. She had a slight fever; however, all other vital signs were within the normal range. Physical examination showed tenderness in the abdominal right upper quadrant as well as a positive Murphy sign and peritoneal irritation. Her medical history included left breast cancer. Laboratory data showed that her WBC count and CRP level were elevated. Liver function and biliary enzyme levels were normal. Abdominal ultrasonography (US) showed a swollen gallbladder with scarce blood flow in the wall (Fig. 1a and b). Mild ascites was noted on the liver surface. There were no findings suggesting the presence of stones. Abdominal contrast-enhanced computerized tomography (CT) showed a swollen gallbladder and poorly enhanced mucous membranes. The gallbladder wall was thick and the fundus was displaced toward the center of the abdomen (Fig. 2a and b). MRCP demonstrated that the gallbladder was swollen and the gallbladder neck and cystic duct were tapered. The extrahepatic bile duct was distorted into a V shape (Fig. 3). A preoperative diagnosis of gallbladder torsion was made, which was followed by an emergency laparoscopic cholecystectomy. The operative findings indicated the presence of a dark-red swollen gallbladder that was twisted by 360° in a counterclockwise rotation, with the neck and cystic duct being rotated by 180° (Fig. 4a). After the rotation was corrected, the gallbladder was only attached to the neck and cystic duct. After ligating the cystic artery and cystic duct, the gallbladder was successfully removed (Fig. 4b). The operation time was 134 min and the total intraoperative bleeding volume was 20 ml. The postoperative course was uneventful and the patient was discharged on postoperative day 7. Histopathologic findings of the gallbladder showed acute and chronic cholecystitis with massive hemorrhage (Fig. 5).

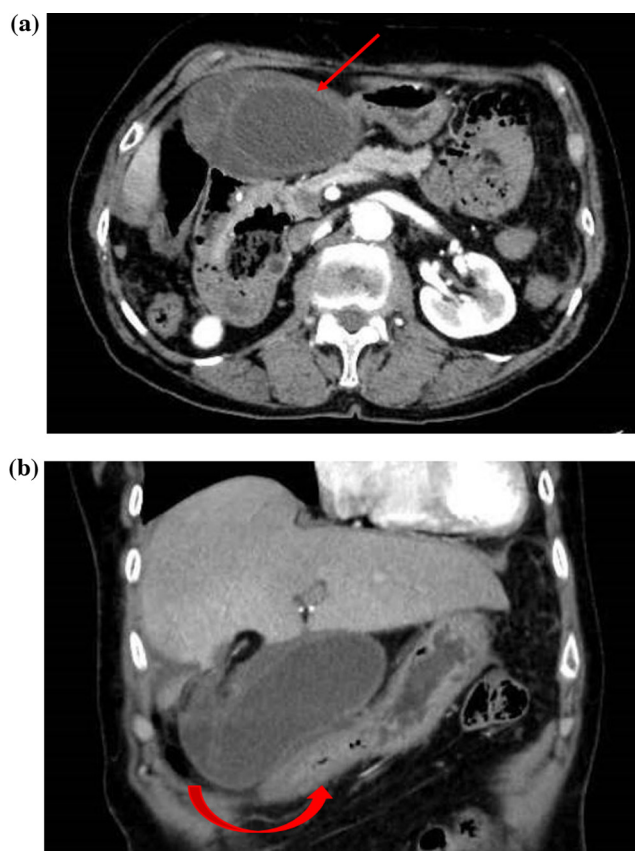


Fig. 2. Findings of abdominal contrast enhanced computed tomography (CT). (a) CT image showing a swollen gallbladder and poorly enhanced mucous membrane. (b) The gallbladder wall is thick and the fundus gallbladder is displaced below the midline.



Fig. 3. Findings of abdominal magnetic resonance cholangiopancreatography (MRCP). MRCP image showing tapering of the gallbladder neck and cystic duct (arrow). The extrahepatic bile exhibits a V-shaped distortion (line) and the fundus of the gallbladder is displaced toward the abdominal center.

3. Discussion

Gallbladder torsion is most commonly seen in patients between the sixth and eighth decades of life, with a female-to-male ratio of 3:1 [1]. Several risk factors for gallbladder torsion, including kyphoscoliosis, forceful peristaltic movements, adhesions, atherosclerosis of the cystic artery, and sigmoid volvulus, have been previously reported [1]. A floating gallbladder, which occurs after

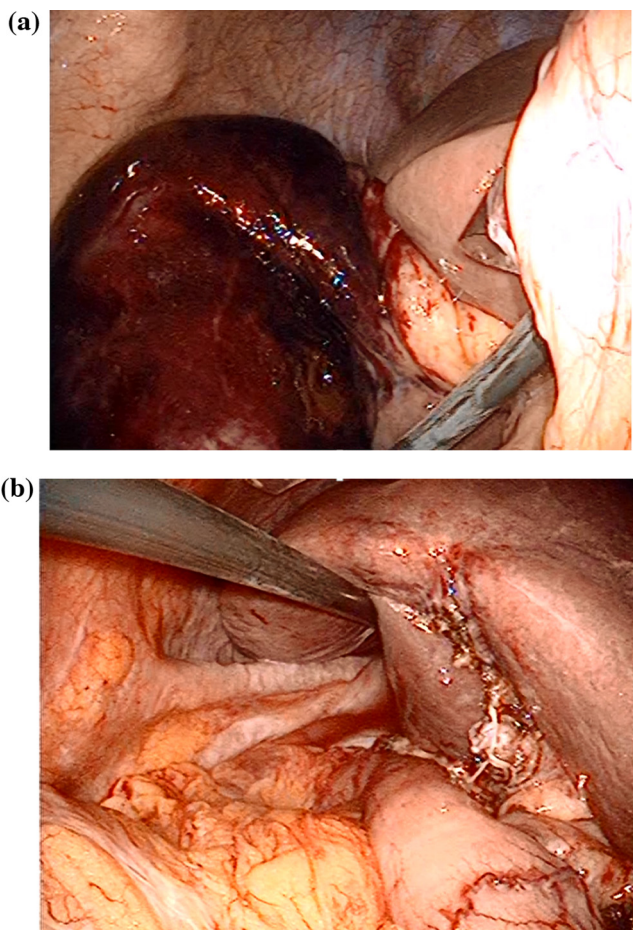


Fig. 4. Intraoperative findings.

- (a) Dark-red swollen gallbladder that is twisted by 360° in a counterclockwise rotation.
 (b) Picture showing that the gallbladder was successfully removed.

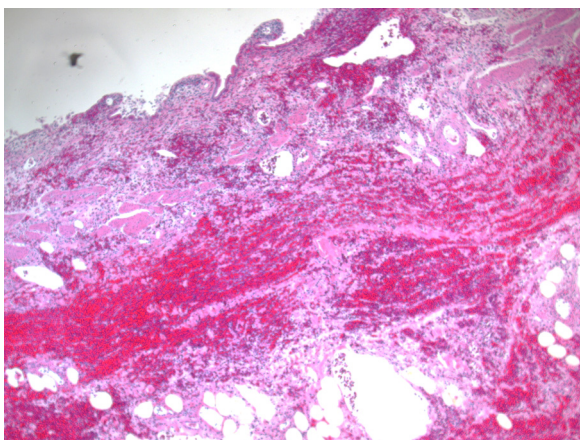


Fig. 5. Histopathologic findings.

Histopathologic findings of the gallbladder showing acute and chronic cholecystitis with massive hemorrhage.

the detachment of the gallbladder from the liver bed, is often associated with torsion. This is why the long mesentery can be easily turned along its axis. Gallbladder torsion is classified into type I or II according to Gross classification [3]. This disease is also categorized into two types based on the degree of rotation: incomplete (<180°) and complete (>180°) [1]. Type I is associated with attachment that ranges from the gallbladder body to the cystic duct. This type often

involves incomplete torsion of the gallbladder with maintenance of blood flow to the gallbladder wall. Conversely, type II involves only attachment of the cystic duct to the under surface of the liver. This type presents with complete torsion, and the onset is sudden with severe upper right quadrant pain and vomiting due to gangrenous cholecystitis. Notably, our case had type I torsion but involved gallbladder twisting by 180° in a counterclockwise direction at two separate locations, the gallbladder neck and cystic duct. Once rotation became irreversible, the gallbladder underwent necrosis.

Compared with acute cholecystitis, laboratory data of gallbladder torsion often indicate elevated inflammatory response but with normal liver function and biliary enzyme levels [7] because the common bile duct is usually unobstructed [8]. Similar to previously reported cases, our case demonstrated that only the inflammation response, and not biliary and liver function, increased.

Enhanced CT and magnetic resonance imaging often indicate a lack of blood flow to the gallbladder, an abnormal anatomical position of the gallbladder, and gallbladder wall thickening [4,10,11]. Similarly, use of MRCP to observe cystic duct traction, V-shaped distortion of the extrahepatic bile duct, as well as twisting and a tapered interruption of the cystic duct is valuable [5,6]. The prevalence of gallstones in such cases is approximately 20% [6,12,13]. Similar to previous cases, our case demonstrated typical findings of gallbladder torsion, which facilitated the precise diagnosis of the condition.

Several reports since 2008 have demonstrated preoperative diagnosis and treatment of gallbladder torsion, using laparoscopic cholecystectomy, as shown in Table 1 [14–19]. The characteristics of these seven cases were as follows: three and six cases were type II torsion and gallbladder deviation, respectively, which are useful radiographic findings. US and CT have often been the primary methods for diagnosing the condition. The mean age of these seven patients with gallbladder torsion was 73 years (range; 11–86 years), with a female-to-male prevalence ratio of 5:2. An elevation in liver function and biliary enzyme levels did not appear during the early stage of this disease. Type II cases often result in complete torsion, which can interrupt the blood flow through the gallbladder. Rather than appearing as a laboratory abnormality, radiological findings provide the key for precise diagnosis. While the case presented herein was type I gallbladder torsion, the sudden onset of symptoms was caused by complete torsion, which resulted in necrosis of the gallbladder. Preoperatively diagnosing torsion of the gallbladder is difficult because the physical findings are similar to those of acute cholecystitis [20]. Laparoscopic cholecystectomy is the appropriate treatment for this disease, because the presence of a long mesentery and the separation of the gallbladder from the liver bed make the laparoscopic approach much easier. Moreover, the laparoscopic approach is minimally invasive and allows early postoperative recovery. Once the gallbladder is already completely twisted, it progresses to a necrotic status more rapidly than in the case of acute cholecystitis. Considering the anatomical characteristics and the short interval from torsion to necrosis, a precise preoperative diagnosis is extremely important. Delaying diagnosis and treatment can result in bilious peritonitis, which would increase the mortality associated with the condition to approximately 5% [21]. In particular, because our case was at the early stage of the torsion and laboratory data did not show any abnormality, radiological characteristics were the only key features to make the preoperative diagnosis. Within 2 h from admission, laparoscopic cholecystectomy was safely performed in our patient. The interval from admission to surgery was not described by previous reports; however, suspicion for and knowledge about this disease make its diagnosis possible. Early diagnosis of gallbladder torsion is crucial to avoid perforation and facilitate postoperative recovery.

Table 1
Review of cases of preoperatively diagnosed gallbladder torsion.

Case No.	Year of Publication	Author	Patient Age	Sex	Gross Classification	Gallbladder deviation	Gallbladder swollen	Elevated inflammation	Abnormal liver function and biliary enzyme
1	2008	Kimura [13]	11	M	II	+	+	+	–
2	2011	Yokoi [14]	81	F	II	+	+	–	–
3	2012	Koyanagi [15]	84	F	unknown	+	+	–	–
4	2014	Pu [16]	73	M	II	+	+	–	–
5	2015	Dasyam [17]	87	F	unknown	+	+	unknown	unknown
6	2015	Shikhare [18]	86	F	unknown	unknown	+	+	–
7	2016	Our case	84	F	I	+	+	+	–

Abbreviation: M, Male; F, Female; +, detected; –, not detected.

4. Conclusion

In conclusion, it is important to achieve a correct diagnosis of gallbladder torsion. Once an early diagnosis is made, laparoscopic cholecystectomy can be used as the gold standard treatment option.

Author contribution

All authors in this manuscript contributed to the interpretation of data, and drafting and writing of this manuscript. Tomoaki Bekki is first author of this paper. Tomoyuki Abe is corresponding author of this paper. Tomoaki Bekki, Tomoyuki Abe and Hironobu Amano conceived and designed the study and drafted the manuscript. Tomoyuki Abe first diagnosed. Tomoaki Bekki, Tomoyuki Abe, Hironobu Amano and Masahiro Nakahara were engaged in patient’s care in our hospital including surgery.

Tsuyoshi Kobayashi contributed to study concept, and review of the final manuscript and submission of the paper. All the authors read and approved the final manuscript.

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Ethical approval

Onomichi general hospital.
OJH-201629.

Conflict of interest statement

We declare no conflicts of interest for this article.

Consent

Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

Guarantor

Tomoyuki Abe.

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