Clinical Case Report

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Massive hemoperitoneum and upper gastrointestinal hemorrhage following liver rupture secondary to gallbladder perforation

A case report and literature review

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Abstract

Rationale: Available literature states that the common reasons for non-traumatic spontaneous liver rupture are hepatocellular carcinoma, macronodular cirrhosis, hemangioma, and other tumors; gallbladder perforation is not cited as a cause.

Patient concerns: The patient presented with sudden-onset right upper quadrant pain with tarry stool for 3 days after eating with dysphoria and increasing thirst; gradually, hemorrhagic shock developed. He had no history of trauma, no background of chronic hepatitis, and no cirrhosis.

Diagnosis: Hemorrhage secondary to spontaneous rupture of intrahepatic cholangiocarcinoma.

Interventions: Left hemihepatectomy, cholecystectomy, and common bile duct exploration were performed.

Outcomes: The patient was diagnosed with massive hemoperitoneum accompanying upper gastrointestinal hemorrhage following liver rupture secondary to gallbladder perforation. The postoperative course was uneventful and the patient was discharged after 10 days of hospitalization.

Lessons: If patients present with non-traumatic spontaneous liver rapture accompanying cholelithiasis and gallbladder hematoma, gallbladder perforation should be considered as a differential diagnosis. Misdiagnosis can lead to incorrect treatment.

Abbreviations: AFP = alpha-fetoprotein, CT = computed tomography, TACE = transcatheter hepatic arterial chemoembolization.

Keywords: gallbladder perforation, liver rupture, misdiagnosis

1. Introduction

Spontaneous rupture of intrahepatic hematoma is a life-threatening situation; it is often associated with hepatocellular carcinoma (HCC), macronodular cirrhosis, hemangioma, metastatic tumors, and pregnancy. The condition has a worldwide incidence between 2.3% and 26% and a mortality rate of 25% to 100%.[1–4] Determining the etiology of spontaneous liver rupture enables the treating physician to determine the required treatment strategy. For patients with unresectable ruptured cancers, transcatheter hepatic arterial chemoembolization (TACE) may be the only choice.[5] Here, we report a rare case of massive hemoperitoneum accompanied by upper gastrointestinal hemorrhage following liver rupture secondary to gallbladder perforation. The hematoma was initially misdiagnosed as rupture and hemorrhage of an unresectable intrahepatic cholangiocarcinoma through imaging.

2. Case report

A 53-year-old man presented with sudden-onset right upper quadrant pain accompanied by tarry stool since 3 days after eating He also had dysphoria and increasing thirst since 12 hours; he had arrived at the emergency department of our hospital in an ambulance. He denied a history of trauma or falls, chronic hepatitis, alcoholic liver disease, cirrhosis, hemangioma, other liver tumors, and cholecystolithiasis. On physical examination, the patient had a heart rate of 140 per minute, a blood pressure of 136/104 mmHg, and a respiratory rate of 20 per minute. His palpebral conjunctiva and nail plate were cadaverous. He complained of moderate abdominal distension and tenderness in the right upper quadrant. Laboratory results showed a hemoglobin of 14.0 g/dL, which dropped to 11.4 g/dL within 5 hours; a white blood cell count of 9760/uL; a platelet count of 145,000/uL; a total bilirubin level of 39.7 umol/L; a direct bilirubin level of 15.1 umol/L; an

Editor: N/A.

The patient provided his informed consent for the publication of this case report.

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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Medicine (2019) 98:11(e14729)

Received: 16 October 2018 / Received in final form: 28 January 2019 / Accepted: 5 February 2019

http://dx.doi.org/10.1097/MD.0000000000014729

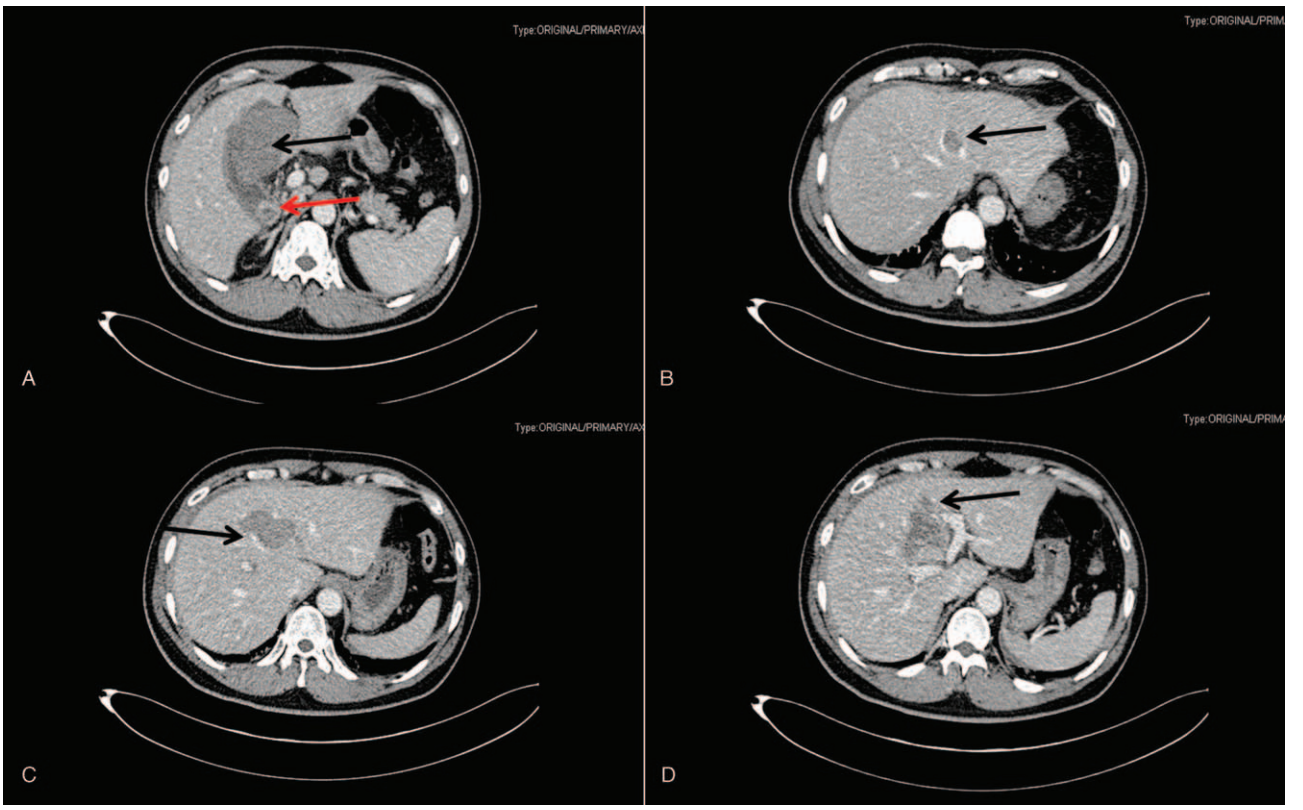

Figure 1. CT image of this patient's liver mass. A. The liver mass has "invaded" into the gall bladder (black arrow). The cholecystolithiasis is presented in CT scan (red arrow); B. The top of the liver mass has "invaded" the left hepatic vein (black arrow); C. The liver mass has "invaded" the middle hepatic vein (black arrow); D. The liver mass has "invaded" the portal vein of segment IV (black arrow).

alanine transaminase level of 259 IU/L; an aspartate aminotransferase level of 316 IU/L; an alpha-fetoprotein level (AFP) of 2.30 ng/mL; a carcinoembryonic antigen (CEA) level of 1.11 ng/mL; and a carbohydrate antigen 19-9 (CA19-9) level of 167.90 U/mL. Contrast-enhanced computed tomography (CT) showed perihepatic and flank fluid; a large hyperenhancing intrahepatic space-occupying lesion with a diameter of 10 cm × 8 cm × 5 cm was detected in segment IV. The diagnosis based on the CT scan result was rupture and hemorrhage of a biliary original carcinoma that had invaded into the gall bladder, left hepatic vein, middle hepatic vein, and portal vein of segment IV (Fig. 1A–D); cholecystolithiasis was also diagnosed (Fig. 1A).

His blood pressure declined gradually in the hours following admission. However, considering the invasiveness of his "tumor", there was a difference of opinion whether only TACE should be performed or a laparotomy should be conducted. Finally, left hemihepatectomy, cholecystectomy, and common bile duct exploration was performed. Substantial clots intermixing with non-congealable blood were found in the abdominal cavity. The so-called tumor was located in segment IV. A slit in segment IVB after which an inflamed gallbladder was identified (Fig. 2A). During the process of cholecystectomy, we found an orificium fistula between the gallbladder and liver parenchyma on the gallbladder wall (Fig. 2A). The "tumor" was actually determined to be a hematoma (Fig. 2B), which was also confirmed through pathological examination (Fig. 3). Large clots and non-congealable blood were found in the cavity of the gallbladder and bile duct. The postoperative course was uneventful, and the patient was discharged after 10 days of hospitalization. The patient was found to be completely healthy at the 6-month follow-up.

3. Discussion

Spontaneous liver rupture is a potentially life-threatening emergency. Diagnosis may be difficult, particularly in the absence of known liver cirrhosis or tumor. Liver rupture secondary to gallbladder perforation is a rare complication. A review of available literature reveals only 5 case reports in the past several decades (Table 1). Eide et al[6] first presented a case of gallbladder perforation causing liver rupture and massive intraperitoneal hemorrhage after surgery for acute gastric erosion. They stated that the antibiotic treatment administered for his urinary infection may have altered the clinical course of his cholecystitis, allowing a silent perforation to occur and present in the form of a latent liver rupture. Another 4 cases had a similar course of the disease: patients with known cholelithiasis who developed sudden abdominal pain and consequently collapsed with abrupt hypotension or hypovolemic shock. Finally, they underwent urgent laparotomy and were found to have liver rupture, gallbladder perforation, massive hemoperitoneum, and even free gallstone spillage in the peritoneal cavity.[7–10] They were all older patients without primary liver disease (e.g., hepatitis, cirrhosis, or tumors) but had a history of cholelithiasis. In another case of transhepatic gallbladder perforation, biliary peritonitis, not massive hemoperitoneum, was identified.[11] Two patients were diagnosed with hepatic subcapsular biloma[12] and abscess,[13] respectively, and a third patient was diagnosed

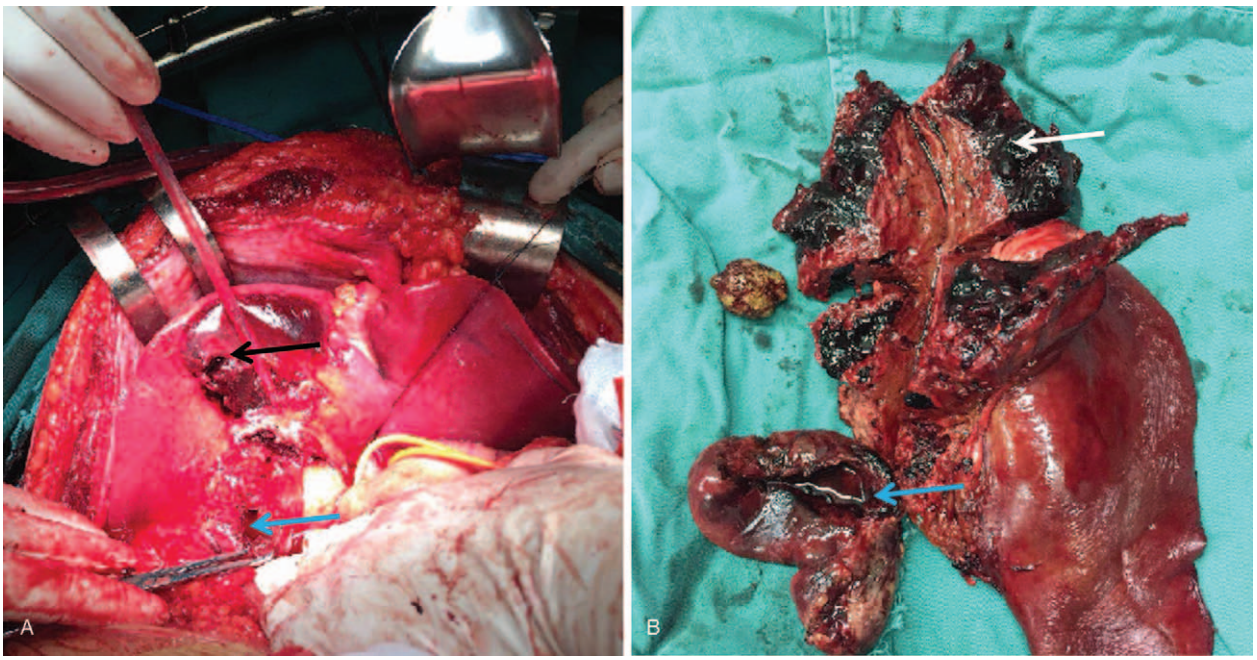

Figure 2. Laparotomy. A. A slit in segment IVB (black arrow) and an orificium fistula between gallbladder and liver parenchyma on the gall bladder wall (blue arrow); B. The "liver mass" was actually a hematoma (white arrow) and the perforation of gallbladder was clearly identified (blue arrow).

with rupture of hepatic hemangioma due to gallbladder perforation.[14]

In our case, sudden abdominal pain and tarry stool was the initial symptom and presentation. A history of cholecystolithiasis was denied by the patient and his family but was confirmed via abdominal contrast-enhanced CT. He had no history of any type of hepatitis, alcoholic liver disease, cirrhosis, or hemangioma. Because of the high level of CA-199 and the enhanced development of arterial phase of the intrahepatic hematoma, the initial diagnosis of this patient was spontaneous rupture and hemorrhage of intrahepatic cholangiocarcinoma. In the preoperative conference, we believed that the "cancer" had invaded the left portal vein, middle hepatic vein, left hepatic vein, and gallbladder cavity, based on the contrast-enhanced CT, and the

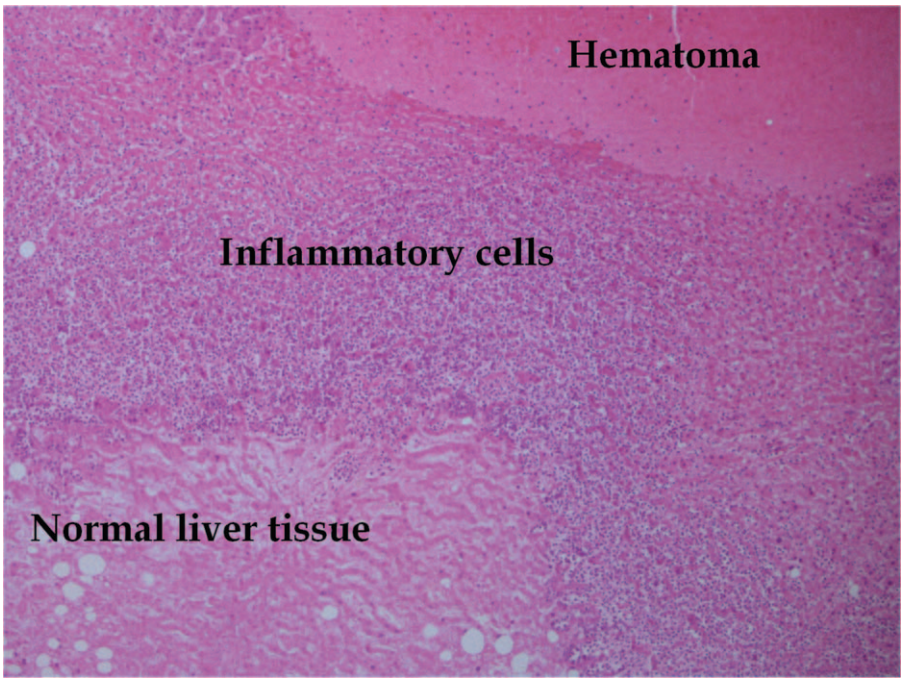

Figure 3. The microscopical structure of the resected "tumor" under hematoxylin-eosin staining (×100): The so-called "tumor" actually consisted of hematoma, inflammatory cells and normal liver tissue. No aberrant or tumor cells were identified.

Table 1

A review of available literatures.

Year	Author	Age/sex	Previous and trauma history	Presentation	Initial treatment	Outcome
1975	Eide J, et al[7]	70/male	Cholecystolithiasis, acute gastric erosion	Massive intraperitoneal haemorrhage	Hepatectomy+cholecystectomy	Recovery
2012	Coulier B, et al[8]	68/male	Cholecystolithiasis	Retrosternal and epigastric pain, hypotensive syncope	Hepatectomy+cholecystectomy	Recovery
2007	Nural MS, et al[9]	73/male	Cholecystolithiasis, COPD, CAD,	Acute abdominal pain, deteriorating general condition	Rupture mending+cholecystectomy	Recovery
2006	Kolder D, et al[10]	70/male	Cholecystolithiasis	Abdominal pain	Hepatectomy+cholecystectomy	Recovery
1989	Syme RG, et al[11]	74/female	Cholelithiasis	Mild abdominal pain, abrupt hypotension	Rupture mending+cholecystectomy	Recovery
2010	Shakya VC, et al[12]	60/male	Cholecystolithiasis	Abdominal pain, vomiting, hypotension (biliary peritonitis)	Rupture mending+cholecystectomy	Recovery
2010	Tsai MC, et al[13]	66/male	Cholecystolithiasis COPD, CKD	Right upper quadrant pain, progressive dyspnea	Percutaneous drainage+ENBD	Recovery
2014	Cristian D, et al[14]	76/male	Cholecystolithiasis	Low grade fever, anorexia, nausea and right-sided abdominal pain	Cholecystectomy+drainage	Recovery
2017	Ke QH, et al[15]	44/male	Cholecystolithiasis, hemangioma	Right upper quadrant abdominal pain	Hepatectomy+cholecystectomy	Recovery

CAD = coronary artery disease, CKD = chronic kidney disease, COPD = chronic obstructive pulmonary disease, ENBD = endoscopic nasobiliary drainage.

latter was the reason for his tarry stool. Based on the "high invasiveness" and "unresectability" of his "intrahepatic cholangiocarcinoma", there was a debate on whether we should perform TACE or laparotomy involved.

For the treatment and management of spontaneously ruptured liver tumors, there is still a debate on whether emergency hepatectomy should be performed. Based on a review of existing literature on this topic, most surgeons have agreed that a curative emergency resection should be the objective of treatment. This ensures better long-term tumor-free-survival and overall survival.[15–18] However, curative emergency resection requires that the following conditions be met: Child-Pugh class A patients without decompensated liver cirrhosis and portal vein tumor thrombosis/metastasis, T1-T2 disease or tumor $\leq$10 cm only, and AFP $<$200 ng/mL.[19–22] Furthermore, recent studies revealed that staged liver resection after emergency TACE treatment had an advantage of prognosis comparing with only emergency hepatectomy.[23,24] Emergency TACE is a minimally invasive treatment that has a high success rate for hemostasis.[5,25] Therefore, the course of action for such patients depends completely on the pre-operative diagnosis, especially according to the imaging findings. The CT findings of ruptured HCC may include hemoperitoneum, HCC with surrounding perihepatic hematoma, active extravasation of contrast material, or the enucleation sign.[26] Generally, intrahepatic hematoma presents a homogeneous enhancement that could differentiate it from ruptured HCC. However, some benign disease-related ruptures mimic HCC.[27,28] Fortunately, a laparotomy was performed for this patient.

Through the review of related literature and our case, we conclude that if patients who develop spontaneous liver rupture fulfill the following criteria, liver rupture secondary to gallbladder perforation should be considered:

1. no history of trauma, no background of chronic hepatitis, cirrhosis, alcoholic liver disease, or hemangioma;
2. a history of cholecystolithiasis and the abdominal pain is induced by fatty food or repeated cholecystitis;
3. intrahepatic hematoma is close to gall bladder;
4. patients with or without hemobilia or upper gastrointestinal hemorrhage.

Patients who develop spontaneous liver rupture secondary to gallbladder perforation can benefit from surgery (hepatectomy + cholecystectomy) rather than TACE only. Therefore, acquiring an accurate diagnosis before operation is imperative.

Furthermore, the most common liver complication of gallbladder perforation is intrahepatic abscess. In case of silent perforation without massive intraperitoneal hemorrhage, patients cannot perceive it until they develop fever and abdominal pain.[29,30] We may conclude that if we had chosen TACE as the first treatment for our patient, he might have developed liver abscess in the following months.

Author contributions

Author contributions: Xiang Lan MD and Yuanyuan Xiang MD contributed equally to this study and participated in the research design and preparation of the manuscript; Fei Liu MD and Hua Zhang MD performed the Data curation; Bo Li PhD revised this article and Yonggang Wei PhD performed the operation of this patient and edition of this manuscript.
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