

Right Hepatic Artery Pseudoaneurysm Ruptured Into the Gallbladder Demonstrated by Magnetic Resonance Angiography

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Rupture of a right hepatic artery pseudoaneurysm into the gallbladder is very rare. We demonstrated a 20-mm dumbbell-shaped pseudoaneurysm in the gallbladder lumen by using contrast-enhanced magnetic resonance angiography in a 73-year-old man with acute right upper abdominal pain. Inflammation of the gallbladder caused by calculous cholecystitis, which leads to biliary leakage and erodes the right hepatic artery, could have been the cause. [*J Chin Med Assoc* 2010; 73(6):331–333]

Key Words: cholecystitis, hepatic artery pseudoaneurysm, magnetic resonance angiography

Introduction

Pseudoaneurysms of visceral arteries are uncommon but well-characterized vascular abnormalities that result from atherosclerotic change, trauma or intra-abdominal inflammation;¹ they may also result from a congenital anomaly. Pseudoaneurysms of the cystic artery caused by cholecystitis, however, have only been reported sporadically.^{2–5} Moreover, a right hepatic artery pseudoaneurysm that arises from evolved calculous cholecystitis is extremely rare. As far as we are aware, only 1 case has been reported in the English-language literature.⁶ In this case report, we describe the appearance on magnetic resonance angiography (MRA) of a right hepatic artery pseudoaneurysm associated with cholecystitis, which ruptured into the gallbladder.

Case Report

A 73-year-old man presented with episodes of acute, right upper abdominal pain of 3 days duration. On arrival at our institution, he had a high fever of 39.2°C. He had no history of hepatobiliary disease, abdominal

trauma, or abdominal surgery. Physical examination demonstrated right upper abdominal tenderness and icteric sclera. Blood analysis showed an elevated white blood cell count of 14,600/mm³, hemoglobin level of 12.9 g/dL, C-reactive protein level of 3.61 mg/dL, aspartate aminotransferase level of 161 U/L, alanine aminotransferase level of 233 U/L, total bilirubin of 6.15 mg/dL, with a direct fraction of 4.36 mg/dL, and a γ -glutamyl transpeptidase level of 385 U/L.

Non-contrast-enhanced computed tomography (CT) revealed a large gallstone in the neck of the gallbladder and a small pericholecystic fluid collection, which were suggestive of acute cholecystitis (Figure 1). The patient received conservative treatment that consisted of a 2-week course of antibiotics, and remained in a stable condition. Subsequent to referral to our department of surgery for elective cholecystectomy, he experienced recurrence of severe, right upper abdominal pain and underwent magnetic resonance cholangiography to rule out the possibility of common bile duct stones. Oblique coronal T2-weighted magnetic resonance imaging (MRI) revealed an area of low signal intensity within the gallbladder and the common bile duct, which appeared to be a blood clot or hemorrhage



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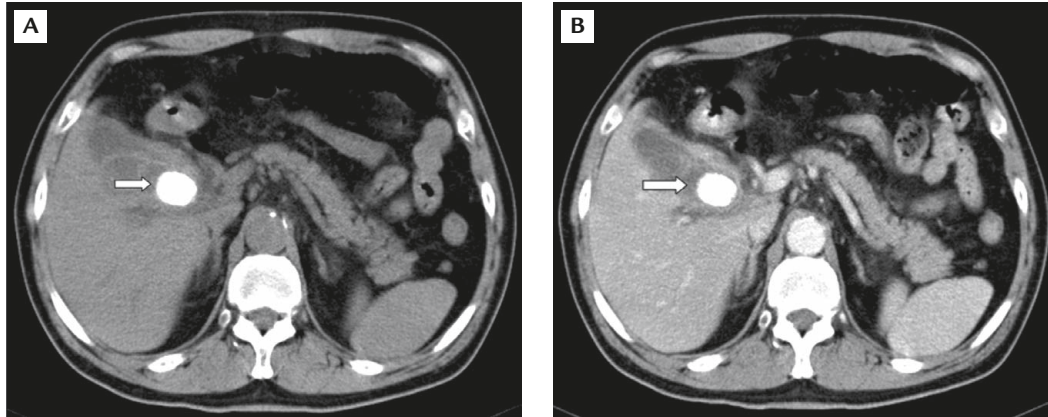


Figure 1. (A) Non-contrast-enhanced computed tomography (CT) and (B) contrast-enhanced CT demonstrated fluid collection at the gallbladder fossa and a calcified gallstone (arrow) in the neck.

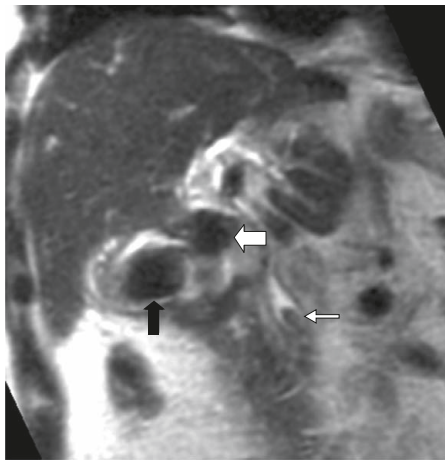


Figure 2. Oblique coronal T2-weighted magnetic resonance imaging (TR: 1,393 ms; TE: 92 ms) revealed a laterally displaced gallstone (black arrow) caused by the pseudoaneurysm (thick white arrow). A low-signal-intensity material suggestive of blood clot or hemorrhage was also noted within the gallbladder and the common bile duct (thin white arrow).

(Figure 2). After the administration of gadopentetate dimeglumine contrast material, MRI demonstrated a well-enhanced, 20-mm, dumbbell-shaped pseudoaneurysm within the lumen of the gallbladder (Figure 3). The previously found gallstone had been laterally displaced to the fundus by the pseudoaneurysm.

On day 10 of antibiotic therapy, the patient experienced a few episodes of melena; gastroscopy subsequently depicted blood coming from the papilla of Vater. Unfortunately, he developed sepsis with unstable hemodynamics, and was referred immediately to the surgical department.

Surgical exploration revealed a swollen gallbladder that was firmly adhered to the liver bed as a result of inflammation. In addition, a pseudoaneurysm of the right hepatic artery within the gallbladder lumen was

discovered. Ligation of the right hepatic artery was accomplished and cholecystectomy was performed.

The resected gallbladder contained clotted blood and a large pigmented gallstone in the fundus. Microscopically, the mucosa of the gallbladder showed hemorrhage, necrosis, and inflammatory cells in the lamina propria and muscular layer. The final diagnosis was calculous cholecystitis associated with pseudoaneurysm of the right hepatic artery, which had ruptured into the gallbladder. The patient was discharged 2 weeks later and has been well for >9 months after surgery.

Discussion

A pseudoaneurysm of the right hepatic artery caused by cholecystitis, which has ruptured into the gallbladder, is rarely encountered. To the best of our knowledge, this is the first right hepatic artery pseudoaneurysm with rupture into the gallbladder that has been demonstrated by contrast-enhanced MRA. Contrast-enhanced MRA is a useful diagnostic tool for high-accuracy vascular evaluation because there is no radiation exposure and it is minimally invasive. Although the resolution of contrast-enhanced MRA is not as high as that of conventional angiography, it is sufficient to evaluate pathological conditions in the larger vascular structures in nearly all parts of the body. As techniques improve and better understanding of parameters ensues, contrast-enhanced MRA is becoming increasingly competitive with digital angiography and contrast-enhanced CT angiography as an alternative minimally invasive method.

Our patient experienced an initial episode of acute calculous cholecystitis, and within 3 weeks, formation of a right hepatic artery aneurysm within the gallbladder lumen had occurred. The development of the

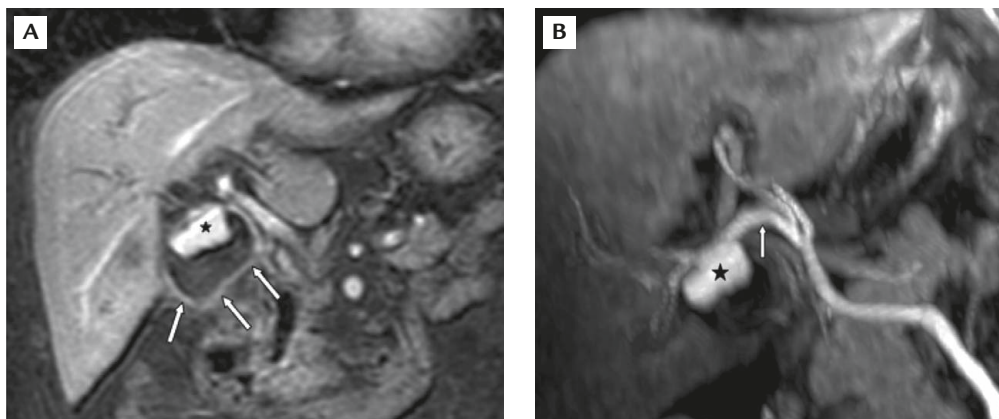


Figure 3. (A) Magnetic resonance imaging in the coronal plane and (B) maximum-intensity-projection reconstruction from the arterial phase of a dynamic contrast study performed with 3D fat-suppressed spoiled gradient echo sequence (TI: 14 ms; TR: 3.5 ms; TE: 0.9 ms) showed an engorged right hepatic artery (arrow in B) that supplied a dumbbell-shaped, wide-neck aneurysm (asterisk) in the gallbladder (arrows in A).

pseudoaneurysm of the right hepatic artery was so rapid that it was not seen on the previously obtained contrast-enhanced CT scan. Progressive development of the pseudoaneurysm occupied the gallbladder neck and body and displaced the large gallstone from the gallbladder neck to the fundus. The mechanism remains uncertain. The patient had cholelithiasis and severe cholecystitis. This suggests that bile leakage into the liver parenchyma could have occurred after the severe inflammatory reaction in the gallbladder, and the large gallstone could have eroded the wall of the right hepatic artery, thus forming a pseudoaneurysm.⁶

Hemobilia caused by a ruptured pseudoaneurysm in the gallbladder was suggested by T2-weighted MRI and validated by gastroscopy thereafter. Bleeding pseudoaneurysm is a rare but frequently fatal complication in patients with cholecystitis. The mortality rate of patients who harbor a bleeding visceral pseudoaneurysm is between 12.5% and 37%. If the patient is left untreated, the mortality rate becomes significantly higher (90%), because the incidence of spontaneous rupture reaches 50%.⁷ Nonoperative management is an appropriate treatment for vascular lesions and is indicated for patients with relatively stable hemodynamics. Successful treatment of pseudoaneurysm of the right hepatic artery, which consists of pseudoaneurysm embolization followed by elective cholecystectomy, has been reported.⁶ Unfortunately, sepsis with unstable hemodynamics was encountered before we could arrange embolization of the pseudoaneurysm for our

patient. Embolization could have simplified the subsequent surgical procedure.

In conclusion, a case of right hepatic artery pseudoaneurysm in the gallbladder, which resulted from calculous cholecystitis, was demonstrated by preoperative MRI.

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