Intrahepatic perforation of the gallbladder causing liver abscesses: case studies and literature review of a rare complication

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ABSTRACT

A spontaneous (non-traumatic) gallbladder perforation with gallstone disease is not common. Concomitant development of a liver abscess is a very rare complication observed in such cases. A few cases of intrahepatic gallbladder perforations with chronic liver abscesses have been described. However, a patient series summarising classical and atypical presentations, relevant imaging studies, and the role of surgical and non-surgical options are lacking. We report a short case series on this rare complication of intrahepatic gallbladder perforations and share our experience of management of this condition.

KEYWORDS

Gallbladder – Hepatic abscess – Intrahepatic perforation – Chronic Cholecystitis

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Case History 1

A 72-year-old male was admitted to hospital complaining of feeling unwell, with a reduced appetite, and generalised pain in the abdomen of 5-day duration. Clinical examination revealed the patient to be febrile, slightly icteric, with pain upon palpation on the left abdomen. Laboratory tests demonstrated leucocytosis and increased levels of C-reactive protein (CRP). Septicaemia due to *Escherichia coli* was documented on blood cultures.

Urgent computed tomography (CT) after surgical consultation was arranged to exclude a small colonic perforation and/or diverticular abscess given the patient's recent history of screening colonoscopy. CT confirmed the normal appearance of the colon and small bowel but revealed a gallbladder stone (Fig 1a) with intrahepatic biliary dilatation (Fig 1b). Management comprised broad-spectrum antibiotics (i.v.) and the patient was discharged with gastroenterology follow-up.

However, the patient was re-admitted to hospital 1-week later with constipation and abdominal distension. Upon clinical examination at this hospital admission, the patient was found to have a distended (but soft) abdomen with no evidence of peritonitis or midline/groin hernias. A plain radiograph of the abdomen revealed grossly dilated loops in the small bowel (Fig 2) with no evidence of free gas on an erect radiograph of the chest. A second CT the next day showed multiple liver abscesses in segment four and

segment five from an intrahepatic gallbladder perforation and grossly dilated small-bowel loops secondary to paralytic ileus from the inflammatory response.

Initial management comprised percutaneous drainage of liver abscesses under radiological guidance and broad-spectrum antibiotics in consultation with the hospital microbiologist. The patient responded well to initial treatment and was transferred to a local hepatobiliary unit (HBU). He had interval laparoscopic cholecystectomy and drainage of liver abscesses as part of definitive treatment. The patient made an uneventful recovery after the procedure. Histology of the gallbladder confirmed acute-on-chronic cholecystitis with no evidence of malignancy.

Case History 2

A 62-year-old female was referred by her general practitioner (GP) with a finding of perforated gallbladder upon ultrasonography. She had presented to the GP complaining of feeling unwell, along with fever accompanied by chills and rigors, dark urine, and pain in the right upper quadrant of the abdomen of 2-week duration. Ultrasonography had been ordered by the GP after initial consultation and review of symptoms in the primary-care setting. The patient had been diagnosed with gallstones in 2008 and undergone endoscopic retrograde cholangiopancreatography (ERCP) and sphincterotomy for symptomatic choledocholithiasis at

that time. However, a laparoscopic cholecystectomy after ERCP had not been carried out.

Upon hospital admission, clinical examination showed that the patient was febrile, with pain upon palpation at the right upper quadrant of the abdomen. Laboratory tests revealed leucocytosis and raised levels of CRP. Septicaemia due to *Streptococcus milleri* was documented on blood cultures. Ultrasonography of the abdomen suggested an enlarged liver, with a hypoechoic area (28 × 18 mm) in the gallbladder region highly suggestive of perforation (type-II according to the Niemeier classification) and abscess formation. Subsequent CT of the abdomen confirmed gallbladder perforation and abscess formation in the pericholecystic region (Fig 3).

Initial management comprised broad-spectrum antibiotics (i.v.) and ultrasound-guided drainage of the abscess cavity. After the initial response to treatment, she continued to be febrile and was transferred to the local HBU, where she had a cholecystectomy and drainage of the liver abscess as definitive treatment. She made an uneventful recovery and was discharged home with no further complications. Gallbladder histology displayed the features of acute and chronic cholecystitis with no evidence of malignancy or atypia.

Discussion

Spontaneous and non-traumatic perforation of the gallbladder is a relatively uncommon complication of gallstone disease. Prevalence of acute cholecystitis has been reported to be 0.8–3.8%.¹ However, data on the prevalence of gallbladder perforations in patients with chronic cholecystitis are lacking.

Acute uncomplicated cholecystitis is observed more commonly in females than in males, but gallbladder perforations are more common in males.² Of all patients with cholelithiasis, ≈10% have asymptomatic cholelithiasis, of which 2% may present with a gallbladder perforation. Mortality in patients with a perforation is 12–16%.³ Very rarely, a gallbladder perforation involves acalculous disease of the gallbladder, though patients with acute acalculous cholecystitis remain more susceptible to perforations than other patients because of sepsis and multiple comorbidities.⁴

Development of a gallbladder perforation involves a cascade of events triggered by obstruction of the cystic duct (usually by a calculus). This phenomenon leads to biliary stasis and gallbladder distension. These events are followed by an increase in intraluminal pressure, compromise of venous and lymphatic drainage, and vascular damage that result in gallbladder necrosis and, finally, a perforation.⁵ The most common site of a gallbladder perforation is the fundus because it is the most distal part of the bladder and has the lowest blood supply. The fundus is less likely to be covered by omentum. Hence, fundal perforations usually result in free biliary peritonitis and stones in the peritoneal cavity, with the risk of cholecystoenteric fistulae involving the transverse colon. Non-fundal perforations are usually sealed by an omentum or by the intestines, and the condition remains confined to the right hypochondrium.⁶

Gallbladder perforations were first classified using the Niemeier proposal of 1934 based on findings in acute cholecystitis:⁷ acute (type-I) free gallbladder perforation with generalised biliary peritonitis; subacute (type-II) pericholecystic

Table 1 Niemeier classification of gallbladder perforations

Clinical type	Type of perforation
I	Acute: associated with generalised biliary peritonitis
II	Subacute: fluid localisation at sites of perforation, pericholecystic abscess and localised peritonitis
III	Chronic: formation of internal/external fistulae

abscess with localised peritonitis; chronic (type-III) cholecystoenteric fistulae (Table 1). Roslyn and colleague reported that type-I and -II gallbladder perforations are seen mostly in younger patients (<50 years), and type-III are seen in elderly subjects with a long history of stone disease. However, the Niemeier classification does not include and/or represent the entire pathological spectrum of the disease, such as concomitant development of abscesses or intrahepatic bilomas ('cholecystohepatic communication').^{2–5} Development of an intrahepatic abscess with an intrahepatic perforation represents a rare complication, and only a few cases have been reported (Table 2).

Presentation of a gallbladder perforation can be very non-specific and includes fever, acute pain in the abdomen, jaundice, a palpable mass in the right upper quadrant with tenderness. An increased level of liver enzymes (especially alkaline phosphatase) is a common finding.⁸ Most cases reported in the literature suggest rupture of biliary contents into the peritoneal cavity, but development of an intrahepatic abscess with an intrahepatic perforation is a very uncommon complication.²

Although extremely rare, carcinoma of the duodenal papilla can be associated with gallbladder perforations and display acute manifestations. In the case of a gallbladder perforation without cholelithiasis, an ampullary tumour should be considered to be the possible underlying condition.⁹ If suspicion of malignancy is raised on abnormal radiological findings, patients should be discussed in a

Table 2 Cases of intrahepatic gallbladder perforation with liver abscesses in the literature

Authors	Publication year	Patient age (years)	Presentation	Diagnostic method		Treatment
				Ultrasound	CT	
Singla <i>et al.</i>	1998	65	Acute (fever)	–	Yes	Open cholecystectomy and abscess drainage
Bhatwal <i>et al.</i>	2012	60	Acute (abdominal pain)	Yes	Yes	Open cholecystectomy and abscess drainage
Kamlesh <i>et al.</i>	2012	70	Acute (abdominal pain)	Yes	Yes	Ultrasound-guided percutaneous drainage and laparoscopic cholecystectomy
Singh <i>et al.</i>	2013	60	Chronic (abdominal pain)	–	Yes	Open cholecystectomy and abscess drainage
de Hollanda <i>et al.</i>	2013	50	Acute (abdominal pain)	Yes	Yes	Open cholecystectomy and abscess drainage
Jethwani <i>et al.</i>	2013	58	Acute (abdominal pain)	Yes	–	Open cholecystectomy and abscess drainage
Donati <i>et al.</i>	2014	62	Chronic (intermittent fever)	Yes	Yes	Open cholecystectomy and abscess drainage

specialist multidisciplinary team meeting and further management should be at a regional HBU.

Ultrasonography is first-line imaging for patients presenting with the typical symptoms of acute cholecystitis, and does not differ greatly if a gallbladder perforation is present. Initial ultrasound findings can vary from thickening of the gallbladder wall (largest diameter, >3 mm) to only gallbladder distension (largest diameter, >5.5–4.0 cm). Reliable confirmation of perforation on ultrasound is the 'hole sign', in which a defect in the gallbladder is visualised.¹⁰ CT is needed in case of discrepancies between symptoms and ultrasound findings, or if ultrasound fails to establish the diagnosis. CT carried out after a perforation has been confirmed by ultrasound can also be a useful tool for surgical planning (as in our patients). CT is more sensitive than ultrasound for the diagnosis of a perforation.¹¹ There is evidence to suggest that biliary imaging (eg percutaneous transhepatic cholangiography, ERCP, or imaging using dimethyl iminodiacetic acid) may have a role in the diagnosis of gallbladder perforations.¹² However, employing such imaging, usually for the diagnosis of a gallbladder perforation, is not common in the UK, thereby limiting their use in diagnostically challenging cases.

Initial management of type-I gallbladder perforations is cholecystectomy-based drainage of an abscess (if present) and abdominal lavage. A gallbladder perforation with formation of an intrahepatic abscess is rare, so standardised management of this condition is not available. A laparoscopic cholecystectomy can be undertaken after infection has been relieved by ultrasound-guided percutaneous drainage in type-II gallbladder perforations. The intrahepatic nature of the gallbladder perforation can lead to difficulties in laparoscopic cholecystectomy, with a high prevalence of conversion to an open cholecystectomy.^{12–13} However, initial management of pyogenic liver abscesses is antibiotic therapy and percutaneous drainage, especially in abscesses of biliary origin because they often fail to respond to medical therapy (as in our case).¹⁴ However, in type-III gallbladder perforations, a cholecystectomy may be difficult and additional surgical procedures (eg fistulae repair) may be required.

Conclusions

Gallbladder perforations that lead to liver abscesses are rare complications of acute and chronic disease of the gallbladder, and their intrahepatic perforations are even rarer. Prevalence of mortality associated with this complication is high, even after aggressive management and multiple interventions, thereby making it a diagnostic and surgical challenge. An early diagnosis can be made with ultrasound and CT. Initial management can be conservative with antibiotics and percutaneous drainage followed by interval cholecystectomy.

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