Acute gallbladder perforation with gallstones spillage in a cirrhotic patient

Costanza Chiapponi*1, Stephan Wirth2 and Matthias Siebeck1

Abstract
Gallbladder perforation is a rare complication of cholecystitis and cholelithiasis. The high morbidity and mortality rates associated with this condition are due to delays in diagnosis and treatment since signs and symptoms of perforation do not differ significantly from those of uncomplicated cholecystitis. We report on a patient who was affected by Child-Pugh A alcoholic liver cirrhosis and who developed an acute gallbladder perforation with spillage of stones into the peritoneal cavity and give a review of the current literature.

Introduction
Asymptomatic cholelithiasis is a frequent condition which affects up to 10% of the adult population in wealthy nations. Acute cholecystitis develops in up to 2% of patients affected by asymptomatic cholelithiasis. Gallbladder perforation occurs in 2 to 11% of acute cholecystitis cases. Due to the high mortality that can be caused by a delay in the correct diagnosis and following adequate surgical treatment, gallbladder perforation presents a special diagnostic and surgical challenge [1].

According to Niemeier (1934), perforations are classified into three categories: type I includes patients with free perforation into the peritoneal cavity, type II describes patients with localized perforation and type III patients with cholecysto-enteric fistulas. Less frequent forms include cholecysto-biliary fistula and more complex fistula formations [2]. Cases of intrahepatic perforation of the gallbladder with liver abscess and cholecysto-hepatic communication have also been reported [3].

Case Report
A 49-year-old man with liver cirrhosis and a history of esophageal varices presented to a clinic with upper abdominal pain. He described colicky pain radiating to the back. He denied nausea, vomiting, diarrhea or obstipation. There was no history of gallbladder disease, no prior episode of abdominal discomfort, no medication - especially no NSAIDs - and no history of trauma. A distended abdomen with normal bowel sounds, tenderness in the right upper quadrant and signs of beginning peritoneal irritation were present. The laboratory studies showed a slightly elevated white cell count (12 G/L). All other findings were within the normal limits, including lipase and amylase, bilirubin, liver enzymes and coagulation parameters. Sonography revealed no abnormalities but failed to visualize the gallbladder. Gastroscopy confirmed the presence of type I esophageal varices. No signs of gastritis and no ulcers were reported. Computed tomography of the abdomen revealed several calcified stones in a thick-walled gallbladder and a tumorous mass of the liver. Considering the patient’s history of alcoholic liver cirrhosis this was thought to be a hepatocellular carcinoma. The patient was then referred to our surgical department for further evaluation.

On admission he had no elevated temperature (35.9°C), was hypotensive (80/40 mmHg) and tachycardic (120-140 beats/minute). He complained of upper abdominal pain persisting for about twenty-four hours. He had been treated with analgesics in the other clinic but with no relief. The physical examination confirmed tenderness of the right upper quadrant with initial signs of peritoneal irritation. At this point the laboratory studies revealed a significantly elevated white cell count (25 G/L) but once again no other abnormalities. The urine analysis showed elevated urobilinogen levels (2.0 mg/L). Sonography was repeated and it revealed a 7 × 6 cm conglomerate tumor of the gallbladder suspected of being an empyema, blood or a gallbladder carcinoma. Ascites was noticed around the liver (Fig. 1).
The external CT was only available as nondiagnostic paper prints of axial slices using soft tissue windowing without both the possibility to perform attenuation measurements and the visualization in another plane or window. For this reason it was decided to repeat the CT scan around ten hours after the first one with a 64-row Scanner. The second scan confirmed the presence of the pre-described pericholecystic mass consistent with blood or pus (55 Hounsfield units). The diagnosis of a perforation was obvious since the gallstones were now found outside the gallbladder (Fig. 2 and 3).

The patient received parenteral fluids, analgesics and antibiotics. Two hours later he was taken to the operating room for open cholecystectomy. A large quantity of blood and stones (Fig. 4) as well as the gallbladder which was perforated at the fundus site were removed (Fig. 5). After haemostasis and lavage, an Easy-Flow-Drain was placed in situ and the abdomen was closed. The patient was admitted to the ICU postoperatively and was transferred to a surgical ward twenty-four hours later. He recovered well and was discharged one week later.

**Discussion**

Perforation can develop early in the course of acute cholecystitis (one or two days) or it may even occur several weeks after onset. The most common site of perforation is the fundus, presumably because of its poor blood supply (60% of the cases in the study of Derici et al. [1]). If
the perforation locates at the fundus, it is less likely to be
covered by the omentum thus bile and stones are likely to
drain into the peritoneal space, as it happened in this
case. If the perforation occurs at the isthmus or ductus, it
is more easily sealed off by the omentum or the intestines
and the condition remains limited to the right upper
quadrant with formation of local inflammation and peric-
holecystic fluid.

Since there are no classical symptoms and signs of per-
foration diagnosis is challenging. Right upper quadrant
pain, palpable right upper quadrant tenderness or high
fever may indicate an acute onset. On the other hand
patients may also show weakness, malaise and a palpable
right upper quadrant mass, mimicking a malignancy. As
most of these features are also present in acute cholecys-
titis, it is difficult to discriminate clinically between
patients with perforated gallbladder and those with
uncomplicated acute cholecystitis. A sudden decrease in

Figure 4 Intraoperative picture of the fluid from the patient’s ab-
domen containing stones and clotted blood.

Figure 5 Intraoperative picture: the perforated gallbladder.

pain intensity caused by the relief of high intracholecystic
pressure might herald the perforation according to Chen
et al. [4]. Gore et al [5] suggest that perforation and
abscess formation should be suspected in those patients
with acute cholecystitis who suddenly become toxic and
whose clinical condition is found to deteriorate rapidly.
Tsai et al. [6] propose to consider gallbladder perforation
particularly in patients who are older than 70 years and
have a high segmented neutrophil count (>80%).

Also the sonographic appearances of gallbladder perfo-
ration are diverse and nonspecific. They include wall
thickening (>3 mm), distension (largest diameter >3.5-4.0
cm), gallstones, coarse intracholecystic echogenic debris
and bile duct dilatation. Distention of the gallbladder and
edema of its wall may be the earliest detectable signs of
imminent perforation. The 'hole sign' (a defect in the gal-
bladder wall) is the most specific finding [7]. An intrahe-
patic perforation is suggested by the presence of a liver
abscess with direct continuity into the gallbladder or con-
taining echogenic stones in the absence of a pericholecys-
tic abscess. Also the impossibility to visualize the
gallbladder in the presence of a liver abscess is highly sug-
gestive of an intrahepatic perforation[8].

Although ultrasound remains the preferred initial
examination for evaluation of suspected gallbladder per-
foration, unfortunately it often fails to demonstrate the
perforation because of increased intestinal gas and pain.
In the current case the blood in and around the gallblad-
ner led to a misinterpretation of the sonographic image.
In contrast, CT imaging is the most sensitive tool to diag-
nose gallbladder perforation [7,8]. CT scan findings can
be divided into primary gallbladder changes, perichole-
cystic changes and findings of extra-gallbladder organs.
Primary gallbladder changes include wall thickening, wall
enhancement, wall defect, intramural abscess, intramural
gas, mural hemorrhage, presence of gallstones, common
bile duct stones or cystic duct stones, intraluminal mem-
brane and intraluminal gas. Pericholecystic changes
include pericholecystic fat stranding, pericholecystic
fluid collection, pericholecystic abscess or biloma forma-
tion and presence of extraluminal stones. Findings in
organs other than the gallbladder consist of pericholecys-
tic liver enhancement, liver abscess, portal vein thrombo-
sis, reactive mural thickening of adjacent hollow organ
(hepatic flexure of colon and duodenum), presence of
lymph nodes, intraperitoneal free air, ascites, ileus and
Mirizzi syndrome [8]. The gallbladder perforation signs
can be divided into direct and indirect signs: the demon-
stration of either calculi outside the gallbladder or a rup-
tured segment of the gallbladder wall are direct indicators
according to Pedrosa et al [9]. Indirect indicators include
the presence of an abscess outside the gallbladder and the
presence of gallstones together with thickening of the
gallbladder wall. In the current case the best diagnostic
clue of the first CT scan was the misinterpreted hyperdense fluid surrounding the gallbladder, the liver and the spleen. Measurement of the attenuation values should have led to the diagnosis of blood in as well as around the gallbladder, supporting the correct diagnosis.

Early diagnosis and surgical intervention are the key factors to decrease mortality and morbidity in the management of acute cholecystitis with gallbladder perforation. Both have significantly improved over the last few decades. This is partly due to shifting treatment paradigms in recent years with a larger number of cholecystectomies being performed for symptomatic cholelithiasis compared to the past but also the result of better diagnostic possibilities through the use of CT scans.

Despite this development, the management of cirrhotic patients with gallbladder perforation - as in this case - remains a greater challenge. Edema of the gallbladder wall, leukopenia caused by hypersplenism and the presence of ascites that predispose to spontaneous bacterial peritonitis make the diagnosis of gallbladder perforation more difficult than in the general population [10]. In addition cirrhotic patients have a higher rate of intraoperative and postoperative complications. In Child-Pugh A and B cirrhotic patients who undergo laparoscopic cholecystectomy, the overall mortality does not statistically differ from that of the general population. On the other hand the overall morbidity rate was found to be 21% compared with 8% for the general population in the meta-analysis of Silva et al. [11]. In patients with Child-Pugh C cirrhosis the mortality rate after cholecystectomy for acute cholecystitis is as high as 17%-25% [12]. For this reason less invasive treatments such as percutaneous gallbladder aspiration and cholecystostomy drainage have been recommended for advanced liver cirrhosis [10,11]. The 49-year-old man of the current case had Child-Pugh A alcoholic liver cirrhosis. He underwent open cholecystectomy and had no postoperative complications.

In conclusion gallbladder perforation is a rare but very serious condition and should be diagnosed and treated as soon as possible to decrease morbidity and mortality. The most important diagnostic tool is an early CT scan, followed by cholecystectomy on an emergency basis.

Competing interests
The authors declare that they have no competing interests.

Authors’ contributions
CC (surgical resident) and MS (surgical attending) examined the patient in the ER, SW (radiology attending) diagnosed gallbladder perforation. CC and MS operated on the patient and took the photographs. All authors read and approved the final manuscript.

Author Details
1. Department of Surgery, Hospital of the Ludwig-Maximilians-University, Nussbaumstr. 20, 80336 Munich, Germany and 2. Department of Clinical Radiology, Hospital of the Ludwig-Maximilians-University, Ziemssenstr. 1, 80336 Munich, Germany

Received: 5 January 2010 Accepted: 25 April 2010

Published: 25 April 2010

References
1. Derici H, Kara C, Bozdag AD, Nazli O, Tansug T, Akca E: Diagnosis and treatment of gallbladder perforation. World J Gastroenterol 2006, 12:7832-7836.
2. Anderson BB, Nazem A: Perforations of the gallbladder and cholecystobiliary fistulae: a review of management and a new classification. J Natl Med Assoc 1987, 79:393-399.
3. Bakalakos EB, Melvin WS, Kirkpatrick R: Liver abscess secondary to intrahepatic perforation of the gallbladder, presenting as a liver mass. Am J Gastroenterol 1996, 91:1644-1646.
4. Chen JJ, Lin HH, Chiu CT, Lin DY: Gallbladder perforation with intrahepatic abscess formation. J Clin Ultrasound 1990, 18:43-45.
5. Gore RM, Gharahmani GG, Joseph AE, Nemcek AA Jr, Mann CS, Vogelzang RL: Acquired malposition of the colon and gallbladder in patients with cirrhosis: CT findings and clinical implications. Radiology 1989, 171:739-742.
6. Tsai MJ, Chen JD, Tiu CM, Chou YH, Hu SC, Chang CY: Can acute cholecystitis with gallbladder perforation be detected preoperatively by computed tomography in ED? Correlation with clinical data and computed tomography features. Am J Emerg Med 2009, 27:574-581.
7. Sood BP, Kalra N, Gupta S, Sidhu R, Gulati M, Khandelwal N, Suri S: Role of sonography in the diagnosis of gallbladder perforation. J Clin Ultrasound 2002, 30:270-274.
8. Kochar K, Vallance K, Mathew G, JadHAV V: Intrahepatic perforation of the gall bladder presenting as liver abscess: case report, review of literature and Niemeier’s classification. Eur J Gastroenterol Hepatol 2008, 20:240-244.
9. Pedrosa CS, Casanova R, Rodriguez R: CT findings in subacute perforation of the gallbladder: report on 5 cases. Eur J Radiol 1981, 1:37-142.
10. Alijiffy W, Walsh M, Petekian K, Malinini M: Type II gall bladder perforation with abdominal wall abscess in a cirrhotic patient: case report and review of the literature. J Surg Educ 2008, 65:367-371.
11. Silva MA, Wong T: Gallstones in chronic liver disease. J Gastrointest Surg 2005, 9:739-746.
12. Puggioni A, Wong LL: A metaanalysis of laparoscopic cholecystectomy in patients with cirrhosis. J Am Coll Surg 2003, 197:921-926.
13. Curro G, Cucinotta P: Percutaneous gall bladder aspiration as an alternative to laparoscopic cholecystectomy in Child-Pugh C cirrhotic patients with acute cholecystitis. Gut 2006, 55:898-899.

Cite this article as: Chiapponi et al., Acute gallbladder perforation with gallstones spillage in a cirrhotic patient World Journal of Emergency Surgery 2010, 5:11

Submit your next manuscript to BioMed Central and take full advantage of:
• Convenient online submission
• Thorough peer review
• No space constraints or color figure charges
• Immediate publication on acceptance
• Inclusion in PubMed, CAS, Scopus and Google Scholar
• Research which is freely available for redistribution

Submit your manuscript at www.biomedcentral.com/submit