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Gallbladder-duodenal fistula detected by ultrasound – a case report

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Abstract

Gallbladder-duodenal (cholecystoduodenal) fistula is an uncommon bilioenteric fistula between the gallbladder and the duodenum. It usually occurs following a chronic case of cholecystitis upon which the gallbladder adheres to the adjacent duodenum, and a stone penetrates through the wall. The case presented herein is that of a gallbladder-duodenal fistula detected primarily with the use of ultrasound imaging, and subsequently confirmed by computed tomography. The patient is a 54-year-old woman who was admitted with upper abdominal pain. The fistula was caused by chronic cholecystitis, however no gallstones were present in the duodenum. Surgical management was undertaken for the patient, and the recovery was uneventful.

Introduction

Intestinal fistulas involving the gallbladder are a rare complication of cholelithiasis, occurring in 5% (or less) of patients who presented with cholelithiasis⁽¹⁾. The most common bili-enteric fistula is, however, cholecystoduodenal fistula⁽²⁾.

The reported case concerns a 54-year-old female patient who presented to the emergency department with pain in the epigastric region and no signs of peritonitis. An ultrasound (US) scan suggested chronic cholecystitis and cholelithiasis. The presence of air was also noted in the gallbladder wall (pneumobilia). A hypoechoic tubular structure penetrating the gallbladder was revealed by ultrasound. A computed tomography (CT) scan confirmed the diagnosis of cholecystoduodenal fistula, the signs of which were suggested on the US. The patient was examined according to the standards of the Polish Ultrasound Society.

The patient was treated surgically, with suturing of the fistula and cholecystectomy. There were no postoperative complications, and the patient was discharged a week later.

Case history

The patient was a 54-year-old woman who presented to the emergency department with pain in the epigastric region which developed on the day before admittance. The patient had previously suffered from Ischemic Heart Disease (IHD), and mild pain in the epigastric region and abdomen, without any signs of peritonitis.

The patient was given 4 nitroglycerin tablets in order for the pain in the epigastric area to subside, but it recurred in a rapid fashion. The pain occurred two months earlier as well, which indicated its recurrent nature. There was a negative Murphy's sign, and no features of cholestasis or acute inflammation were present in the laboratory results. The patient mainly tolerated an 'oatmeal based' diet, and often had episodes of colic after meals. She had a poor tolerance of low-fat foods.

An emergency ultrasound (US) was performed, revealing gallstones, as shown in Fig. 1. The attachment of bowel loops (most likely to be the duodenum) to the gallbladder,

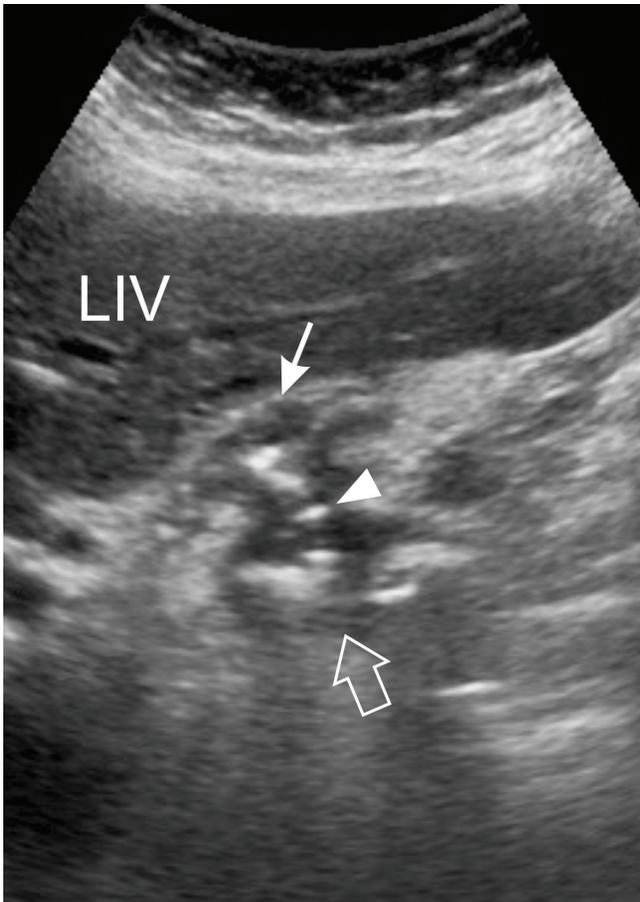


Fig. 1. US image. Gallbladder with thickened walls (arrow) and duodenum (open arrow) with gas bubbles in and between both structures. Arrowhead – gas bubble moving through fistula. Liv – liver



Fig. 2. US image. Gallbladder with thickened walls (arrowhead), filled with numerous gallstones (white filled arrow) and bowel gas (open arrow). LIV – liver. The presence of bowel gas was suspected due to its bright reflective surface with long ring-down artifacts and its movement in an anti-gravitational direction to the most elevated area of the gallbladder. The presence of gallstones was suspected due to its hyperechoic surface with dark acoustic shadowing and its lower position on the gallbladder wall.

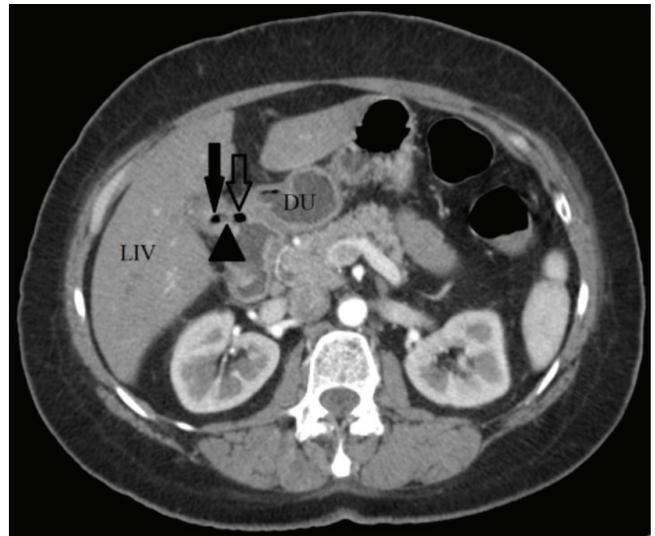


Fig. 3. CT image. Fistula canal (arrowhead). Air bubbles in the gallbladder (black arrow) and in the duodenum (open arrow). Gallbladder with a thickened wall. LIV – liver; DU – duodenum

and the image of air bubbles moving between the gallbladder and duodenum were visible. The US image was overall indicative of a perforation, suggesting a fistula between the gallbladder and the duodenum. A CT was then requested as the next step in the diagnostic work-up.

A planned ultrasound was conducted three days later, showing thickened gallbladder walls and multiple stones (Fig. 2), as well as the presence of air inside the wall of the gallbladder. From the US findings, it could be concluded that the patient had chronic cholecystitis, pneumobilia, and segmental thinning of the bladder wall. A CT scan was conducted on the same day, revealing air in the biliary tracts, dilated common bile duct and a visible fistula canal (Fig. 3). The findings of the CT scan matched those obtained by US imaging. The patient was a candidate for cholecystectomy, which took place 12 days later. The surgery involved suturing the fistula and removing the gallbladder. The patient was discharged a week later without any complications, and her condition was generally good.

Discussion

The development of a fistula in the gallbladder is associated with cholelithiasis in 90% of cases, as demonstrated in our case. In 384 cases of biliary fistula collected by Courvoisier and Naunyn, 93 cases were gallbladder-duodenal fistulas where the opening is commonly in the first or upper part of the second portion of the duodenum⁽³⁾.

Patients with a biliary-enteric fistula are often seen with non-specific signs and symptoms that mimic those of chronic cholecystitis⁽⁴⁾. Nonetheless, chronic cholecystitis with gallstones is usually the main predisposing factor in about 75% of cholecystoenteric fistulas. In addition to gallstones, some of the other risk

factors include obesity and a positive family history⁽⁵⁾. The diagnosis is usually difficult because of varied symptoms and non-specific results of examinations. In terms of differential diagnosis, if gas was identified and situated in the highest point within the cavity, the following could also be considered: incompetent sphincter of Oddi, gastrointestinal obstruction, biliary-enteric surgical anastomosis, liver abscess, emphysematous cholecystitis, and iatrogenic pneumobilia (e.g. due to sphincterotomy)⁽⁶⁾.

Despite the US imaging methods used in our study it was not possible to visualize the fistula directly. Our study has shown that the attachment of bowel loops to a thick-walled gallbladder and short hyperechoic echoes with posterior shadowing representing probably gas bubbles traveling between the gallbladder and the duodenum, seen on US imaging, might indicate an underlying biliary fistula. Generally, US and CT evaluation offers prompt and rapid diagnosis of chronic cholecystitis, but no obvious signs of a fistula may be present.

In most cases, the diagnosis is as follows, the first step being US imaging used to screen the abdomen. Confirmation of pneumobilia can be carried out using contrast CT which can also be used to rule out hepatic portal venous gas (HPVG). MRI or MRCP can also be done to diagnose intrahepatic pneumobilia. The presence of pneumobilia raises the suspicion of a fistula. Endoscopic ultrasound (EUS) can be employed to confirm the presence of a biliary enteric fistula, while CT and MRCP can be performed non-invasively. It is crucial to identify the cause of the fistula, which could be due to gallstones. If gallstones are absent, then inflammatory conditions and neoplasia should be considered by performing CT or ERCP.

Gallstones from the gallbladder or the common duct may enter the intestinal tract through a biliary fistula causing gallstone ileus, a complication which can occur when one of the stones is sufficiently big, usually exceeding 2–3 cm in size. Gallstones are a major cause of fistulas between the gallbladder and the duodenum. The median prevalence of gallstones across Europe ranges from 5.9–21.9%, and they are predominantly found in women⁽⁷⁾.

Gallstone ileus occurs in 0.4–1.5% of patients with cholelithiasis, and in 6–14% of patients with bilioenteric fistulas. Intestinal obstruction due to gallstone ileus is rare, occurring in less than 6/1000 cases of cholelithiasis, however 25% of simple obstructions in patients over 70 years old are gallstone ileus^(8,9). The wall of the gallbladder becomes necrotic and inflamed when a large gallstone puts pressure on it. The gallstone ulcerates the wall of the gallbladder to form a fistula with a hollow surrounding viscus, commonly the duodenum⁽⁸⁾. The viscus of a communicating biliary fistula, if infected, is fatal. Acute perforation of the gallbladder into free peritoneal cavity is rare, but it can be lethal due to its septic contents⁽¹⁰⁾. In this particular case, there was no intestinal obstruction, however across the board gallstone ileus plays a key role in the development of cholecystoduodenal fistulas.

Generally, CT is a more accurate imaging modality than US in such cases⁽¹¹⁾. Hence, the use of ultrasound scanning to diagnose this type of fistula was a rare occurrence, more so than even the presence of the fistula itself. A major advantage of US over CT is that it is a repeatable imaging technique. Its non-radiating, inexpensive, rapid and convenient nature makes US a patient-friendly option in the evaluation of biliary fistulas⁽¹²⁾. Despite US imaging being a more efficient first-line diagnostic technique for biliary fistulas, there is little data available for the use of US in such cases. Few authors have published the parameters for fistula identification. This includes Maconi and Gasche who defined fistulas as a hypoechoic or anechoic duct between the intestinal loops and other structures (bladder, skin or as in this case – gallbladder), which may contain fluid or air presenting as internal echoic spots^(13,14).

The drawbacks of US include operator dependency and difficulty of evaluating certain parts of the small intestines, often limited in obese patients and by intestinal air⁽¹⁵⁾.

Laparoscopic surgery is a less invasive procedure available for the treatment of primary biliary fistulas. However, it could be responsible for iatrogenic biliary fistulas in non-favorable conditions. Hence, cholecystectomy with choledochoplasty is a frequent choice for the treatment of primary biliary fistulas.

Conclusion

The case presented here concerns a 54-year-old female with cholecystoduodenal fistula associated with the presence of gallstones. US and CT scans were conducted, both of which showed the presence of gallstones, based on the image of air bubbles observed between the gallbladder and duodenum in ultrasound images, a suspicion of a vesicular-duodenal fistula was raised, which was then confirmed by CT. The patient was treated with surgery involving gallbladder removal and suturing the fistula, which is the most common choice of treatment. The unique nature of this case ascertains the importance of ultrasonography, as it was the primary technique in the diagnosis of this patient's condition. While CT imaging was useful in the confirmation of the diagnosis, it was ultrasonography which suggested this diagnostic possibility in the first place.

Conflict of interest

Authors do not report any financial or personal connections with other persons or organizations, which might negatively affect the contents of this publication and/or claim authorship rights to this publication.

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