Occult gallbladder perforation: sonographic diagnosis
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Case Type: Clinical Cases
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Patient: 92 years, female

Clinical History:
Heart disease and treatment for acute pancreatitis, improving until the 5th day, when she presented an intense pain in epigastrium and further worsening of her general condition.

Imaging Findings:
Patient with severe heart disease and low level of consciousness was presented to emergency radiology department due to abdominal discomfort, vomiting and fever (T: 38°C). Based on the clinical and laboratory findings, the diagnosis of acute pancreatitis was established and treated with nasogastric intubation and broad-spectrum antibiotic administration. The patient was improving until the 5th day, when she presented an intense pain in epigastrium, further elevation of leucocytes, abnormal liver function tests and decrease of hematocrit.

US examination revealed a moderate irregular thickening of gallbladder (GB) wall in the absence of gallstones (fig 1a). A small amount of pericholecystic fluid collection, with fine echogenic material and thin septae within, was also noted (fig 1a, fig 1b). The collection was in communication with the content of the GB, via a wall defect of about 1 cm (fig 2a, fig 2b). Color Doppler was applied, that revealed weak signal in the GB wall suggesting ischemia, without evidence of to-and-fro flow signal between the pericholecystic fluid collection and the GB content (fig 3). The pancreatic parenchyma was found inhomogeneous with dilated pancreatic duct. No evidence of ascites was present. Clinical and sonographic findings established the diagnosis of perforated acalculous cholecystitis, confirmed in laparotomy and histological examination of the resected GB. The patient underwent sepsis and died on the 7th postoperative day, of cardiac complications.

Discussion:
Acalculous cholecystitis is present in about the 5% of acute cholecystitis. Predisposing factors include diabetes, immunosupression, and debilitated patients. Presumably it is due to stasis of bile, causing distention of the walls leading to ischemia, as well as changes in the chemical structure of the content, irritating the GB mucosa. The signs and symptoms are identical to acute cholecystitis, with rapid evolution and high risk of complications, like gangrene, perforation or empyema. Perforation of GB is the most common and severe, associated with high mortality rates.

Clinical symptoms depend on the size and site of the wall defect, while the onset is vague and not well differentiated. GB perforation on US examination may be suspected if there is presence of free peritoneal fluid, confined pericholecystic fluid collection or presence of pneumobilia due to cholecystoenteric fistula, along with GB wall thickening. The diagnosis however may be impeded by the presence of ascitic fluid, peritonitis or pancreatitis as described by both Kim PN & al, and Konno K. & al, in their articles about comparison of CT and US, and the use of Doppler in gallbladder perforation, respectively.

The special interest of this case is the demonstration of the wall defect (hole sign), first described by Chau et al. in
1988, which is rarely seen in US. This is mainly because of the difficulty in discriminating echogenic GB wall from adhesions with omental or mesenteric fat, and from pseudoseptation in pericholecystic fluid. The same sign is also depicted in CT, but its presence depends on the partial volume effect of the thinned GB wall around the perforated site and motion artifacts.

Other tests are currently under evaluation for their use in early diagnosis of GB perforation. A recent report by Konno et al introduces the use of color Doppler, demonstrating a very clear to-and-fro flow color signal passing through the GB wall in two cases of surgically proven GB perforation. In our case however, because of the confined and thick pericholecystic fluid collection, no such a signal was detected.

**Differential Diagnosis List:** Occult gallbladder perforation

**Final Diagnosis:** Occult gallbladder perforation

**References:**


**Figure 1**

*Description:* Longitudinal section through GB: Irregular thickening of GB wall. Pericholecystic fluid collection with presence of pseudoseptations. *Origin:*
**Description:** Echogenic material and thin septae within the pericholecystic collection (arrow), are best revealed in this oblique section, also depicting part of GB. **Origin:**
Figure 2

**Description:** Longitudinal section through GB: The communication of the thick pericholecystic collection and the GB content, via the wall defect. **Origin:**

**Description:** Cross section through the wall defect. **Origin:**
Figure 3

Description: Weak blood flow of the inflamed GB wall without evidence of flow signal passing through the perforation site. Origin: