

## Background

**Gallbladder perforation is a rare, life threatening complication of acute cholecystitis or cholelithiasis. The following cases series illustrate how time to diagnosis, treatment intervention and patient autonomy regarding medical care can be determining factors in outcome.**

An 89-year-old chronically ill male (**Figure 1**) patient with a history of atrial fibrillation with severe right atrial dilation, heart failure with reduced ejection fraction of 35%, and CAD with ICD presented to the ED with worsening shortness of breath. He was initially afebrile, hypotensive and tachycardic. Heparin infusion was started for NSTEMI. An abdominal ultrasound showed discontinuity involving the body of the gallbladder wall with suggestion of a 5 mm defect. General Surgery was consulted however given the patient's age and comorbidities, the patient declined all interventions. He was transferred to the ICU and completed a 5 day course of antibiotics without significant improvement. This patient unfortunately succumbed to multi-organ failure secondary to septic shock.

A 43-year-old female (**Figure 2**) with a history of COPD and non-insulin dependent diabetes, presented to the ED with intermittent sharp abdominal pain for the past four days. She was initially afebrile but tachycardic at 105. CT of the abdomen and pelvis on admission showed pericholecystic fat stranding and cholelithiasis with a large adjacent region intrahepatic hypoattenuation involving the inferior aspect of the right hepatic lobe suggestive of intrahepatic rupture with possible abscess. She underwent emergent cholecystectomy which demonstrated hemorrhagic debris secondary to rupture of the gallbladder and a large amount of abscess over the right lobe of the liver and near the gallbladder. She subsequently underwent drainage of the liver abscess without further complications.

A 77-year-old female (**Figure 3**) with a history of heart failure with reduced EF of 35%, atrial fibrillation and severe right atrium dilation presented to the ED with acute onset epigastric pain 10/10 intensity. She was afebrile but tachycardic at 102. An US of the abdomen showed an intrahepatic fluid collection adjacent to the gallbladder contiguous with area of discontinuity suggestive of rupture. An ERCP performed within 48 hours showed distal filling defects on cholangiogram compatible with choledocholithiasis and the obstructing stone was subsequently removed. IR performed post percutaneous cholecystostomy within 72 hours of admission with perihepatic drain placement for acute cholecystitis and perihepatic abscess. She completed an antibiotic course and had no further complications.

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## Imaging



Figure 1

**Figure 1:** There are intraluminal hyperdensities the gallbladder likely representing gallbladder sludge with possible cholelithiasis. There is discontinuity involving the body of the gallbladder wall with suggestion of a 5 mm defect. There is hepatic hypoattenuation adjacent to this region.



Figure 2

**Figure 2:** There is pericholecystic fat stranding and cholelithiasis suggestive of acute calculous cholecystitis. There is a large adjacent region of intrahepatic hypoattenuation involving the inferior aspect of the right hepatic lobe concerning for intrahepatic rupture with secondary hepatic abscess.



Figure 3

**Figure 3:** There is a fluid collection adjacent to the gallbladder, that appears continuous with an area of discontinuity involving the gallbladder wall.

## Discussion

This is a case series of three patients who all have had spontaneous rupture of the gallbladder, a serious but rare complication of acute cholecystitis. Rupture is associated with a 10.8% mortality rate, and is closely associated with existing cholelithiasis, with one study with 198 patients showing approximately 86% of patients having stones. [1]

**Our case series highlights several important concepts in the diagnosis and treatment of gallbladder rupture.** Firstly, A highly specific gallbladder mural defect, such as the ones seen in our case series, is only seen in approximately 53.8% of cases by CT imaging, and much less frequently on CT. However, our 89 year old male and 77 year old female had mural defects that were specifically noted by ultrasound and not on the corresponding sameday CT. While research had initially indicated a superiority of CT to ultrasound characterization of this mural defect, there is a recent study suggesting equivalence of ultrasound compared to CT for this purpose. [3] Our series would suggest an even greater sensitivity with ultrasound, which may be related to improved technology and the experience of our department's sonographers.

Furthermore, there are three main categories of gallbladder rupture, defined by the Niemeier classification; Type 1: acute perforation into the peritoneal cavity, Type 2: subacute perforation with abscess formation, Type 3: chronic perforation with fistula formation into another visceral organ such as the Liver. [2] Having an understanding not only of the diagnosis of gallbladder rupture but of the specific type can help predict mortality and urgency of repair.

A Type 1 perforation with free fluid within the peritoneal cavity is associated with the highest mortality rate (28.5%), and was noted with Figure 1 and Figure 3. Figure 2 appears most compatible with a Type 2 perforation, which is the most common form of gallbladder rupture. Management in all cases is, ideally, open or laparoscopic cholecystectomy. However in patients who refuse or cannot undergo more invasive surgery, percutaneous drainage by interventional radiology can be a treatment option.

## References

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