



# Acute Limb Pain with New Onset Abdominal Pain

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## Case Presentation

An 38-year-old man presented initially for the complaint of right lower limb pain. He had no past surgical history and no comorbidities and was a habitual drinker. He revealed a history of trauma to right ankle. He also reported occasional epigastric pain that had been recurrent 2-3 times in the past month. He denied having any fever, chills, nausea, vomitings. He had previously seen his primary care physician for limb pain. His physician prescribed him a trial of antibiotics and NSAIDs. Because of severe pain he resorted to binge alcohol intake for pain relief. The patient reported his lower limb pain was getting more severe and persistent, which prompted an ED visit. On arrival, he was tachycardic with a heart rate of 112/mt, mildly hypertensive with blood pressure 148/91, had an oral temperature of 100.4 F, and was saturating at 99% on room air with unlabored respirations of 22. His physical exam was notable for right lower limb swelling with erythema and increased temperature. Based on the physical exam, the ED physician performed a lower limb POCUS which was s/o cellulitis. The patient was transferred to the ICU for further treatment. During the 3<sup>rd</sup> day of his ICU stay

## Abstract

A pneumoperitoneum because of a hollow viscous perforation is a life-threatening diagnosis that is more commonly diagnosed in the ER. We present a case of acute pneumoperitoneum in a 28-year-old man who presented to the Emergency Department (ED) with right lower limb pain, which was diagnosed as right lower limb cellulitis during examination. Patient later complained of pain in right lower chest radiating upper abdomen. POCUS showed the presence of pneumoperitoneum, which could not be visualised in the chest x-ray.

he complained of right lower chest pain which was evaluated initially with a Chest X ray (Figure 1), which was not diagnostic of any pulmonary pathology. He soon complained of pain radiating to his upper right abdomen, following which POCUS was done which revealed the presence of a gut point sign (Video 1), indicating a transition zone between free intraperitoneal air and abdominal contents, enhanced peritoneal stripe sign and reverberation artefacts (Video 2) and also free-floating debris in RUQ (Video 3). An emergency CT scan of abdomen confirmed the presence of pneumoperitoneum (Figure 4). The patient's family was counselled about the need for explorative laparotomy.

## Diagnosis

Pneumoperitoneum because of hollow viscous perforation.

## Abdominal sliding and "gut point"

For POCUS operators familiar with lung ultrasound, a "gut point" is analogous to a "lung point" found in pneumothorax [1]. In healthy individuals, a slight sliding or shimmering is observed along the peritoneal line, demonstrating that the vis-



ceral and parietal peritoneum are closely apposed. The pathologic presence of intraabdominal air separates these structures, abolishing this artifact if free air abuts the peritoneum (Video 1) [2]. Sliding helps distinguish pathologic abdominal free air from physiologic bowel gas; both cause similar repeating horizontal artifacts resembling A-lines.

### EPSS: Enhanced peritoneal stripe sign

Typically, the peritoneal stripe appears as a thin, echogenic line demarcating the anterior abdominal wall from the organs or peritoneal fluid beneath. When air interferes, the interface between the gas and the soft tissue scatters the sound waves, resulting in an “enhanced” peritoneal stripe (Video 2) [3].

### Reverberation artifacts

A substantial accumulation of free air in the abdomen may also generate echogenic reflections, known as reverberation artifacts (Video 2), which closely resemble the “A-lines” commonly observed in normal lung ultrasound.

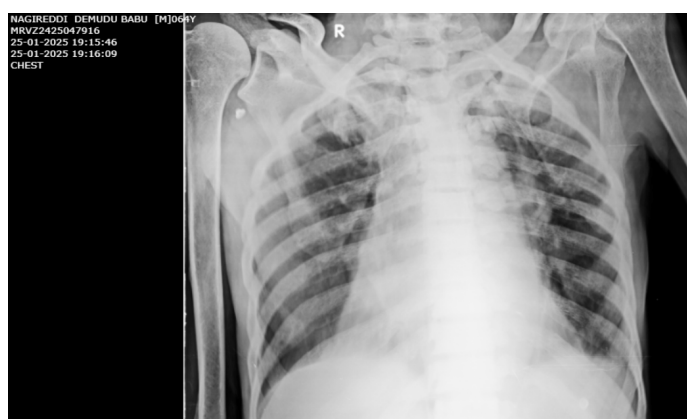


Figure 1

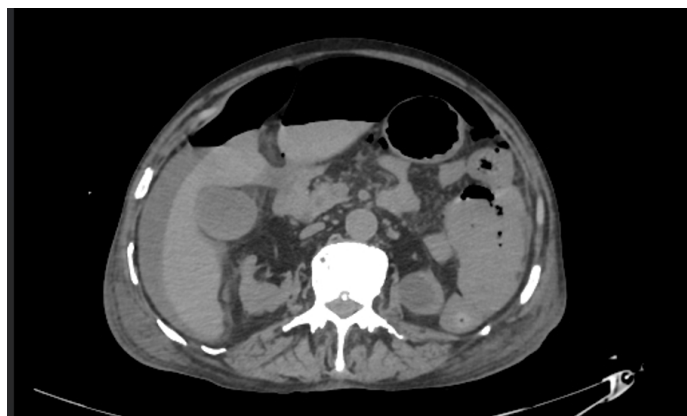


Figure 2

## Discussion

Pneumoperitoneum has diverse origins, encompassing both operative and non-operative contexts. Although the specific mechanisms vary, a perforated hollow viscus underlies pneumoperitoneum in the vast majority (85–90%) of instances [4].

CT remains the diagnostic gold standard; however, its use is often delayed due to long wait times and unnecessary radiation exposure. In a study involving 188 patients by Chen and colleagues, Point-of-Care Ultrasound (POCUS) proved to be more sensitive and diagnostically accurate for detecting pneumoperitoneum than abdominal radiography. Overall, ultrasound achieved a sensitivity of 92% compared to 78% for radiography, while both methods had a specificity of 53%. When a large volume of abdominal free air was present, both radiography and ultrasound nearly reached a 100% detection rate, but for small amounts of free air from pathologic micro-perforations, ultrasound showed superior accuracy [5]. One significant limitation of POCUS is its heavy dependence on the operator’s technical expertise. In a prospective observational study, four experienced ultrasound physicians and two internal medicine residents with no ultrasound background were tasked with interpreting ultrasound and radiographic images—without prior context—from patients with and without pneumoperitoneum. The results showed that while ultrasound was more sensitive for detecting pneumoperitoneum (95.5% versus 72.2%), its specificity was lower (81.8% versus 92.5%) [6].

Intensivists should consider pneumoperitoneum in patients with undifferentiated abdominal pain, and they can rapidly identify life-threatening pneumoperitoneum using POCUS as a diagnostic tool.

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