

**IMAGES IN EMERGENCY MEDICINE**

## Imaging

**Elderly man with abdominal pain**Ying-Chih Ko MD  | Hooi-Nee Ong MD

Department of Emergency Medicine, National Taiwan University Hospital, Taipei, Taiwan

**Correspondence**

Hooi-Nee Ong, MD, Department of Emergency Medicine, National Taiwan University Hospital, No.7, Zhongshan S. Rd., Zhongzheng Dist., Taipei City 10002, Taipei, Taiwan.

Email: [aiden.kaze.ong@gmail.com](mailto:aiden.kaze.ong@gmail.com)**KEYWORDS**

pneumoperitoneum, point-of-care ultrasound

**1 | CASE PRESENTATION**

A 69-year-old man presented to the emergency department (ED) with a 2-day history of progressive abdominal pain and distention. He had a history of advanced pancreatic cancer and had received tumor excision with feeding jejunostomy creation earlier in the year. Physical examination of the abdomen showed diffuse tenderness and tympanic sound on percussion. Point-of-care ultrasound was performed for initial assessment (Figure 1).

**2 | DISCUSSION**

Point-of-care ultrasound under curvilinear probe revealed an enhanced peritoneal stripe sign with multiple reverberation artifacts and a clear air–fluid interface, highly suggestive of pneumoperitoneum. Computed tomography of the abdomen and pelvis showed pneumoperitoneum and pancreatic cancer with metastases, which was compatible with ultrasound findings (Figure 2). The patient was admitted to the ICU as a result of shock and respiratory distress



**FIGURE 1** Enhanced peritoneal stripe sign with multiple posterior reverberation artifacts and a clear air–fluid interface under curvilinear probe

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**FIGURE 2** Collection of air beneath the anterior abdomen and clear air–fluid level on axial view of computed tomography

caused by metabolic acidosis. A general surgeon was consulted for surgical intervention, but an operation was not available because of cancer peritonitis and perforation after evaluation. The patient decided to receive palliative care after being informed of the prognosis and passed away a few days after admission.

Pneumoperitoneum frequently indicates a perforated hollow organ that requires emergent surgical management. The initial investigation of pneumoperitoneum is an upright posterior-anterior chest radiograph or left decubitus abdominal X-ray.<sup>1,2</sup> However, radiography is not readily available under certain circumstances, in particular when the patient is in life-threatening conditions in the ED. Point-of-care ultrasound serves as a useful tool that can be performed at the bedside for rapid diagnosis. The sensitivity, specificity, positive likelihood

ratio, and negative likelihood ratio for pneumoperitoneum diagnosed by ultrasound in emergent or critical conditions are 0.91, 0.96, 22.05, and 0.10, respectively.<sup>3</sup> The right upper quadrant is the most appropriate location for probe placement as the anterior aspect of the liver is not occupied by bowel content. The key findings of pneumoperitoneum in ultrasound are an enhanced peritoneal stripe sign and posterior peritoneal stripe reverberations.<sup>4</sup> Also, fluid accumulation and a shifting air shadow along with breathing may also be noted<sup>4</sup> (Figure 3). Although computed tomography is still regarded as the gold standard in diagnosing hollow organ perforation, point-of-care ultrasound is a pivotal adjunct in the diagnosis of pneumoperitoneum during an initial evaluation in the ED.

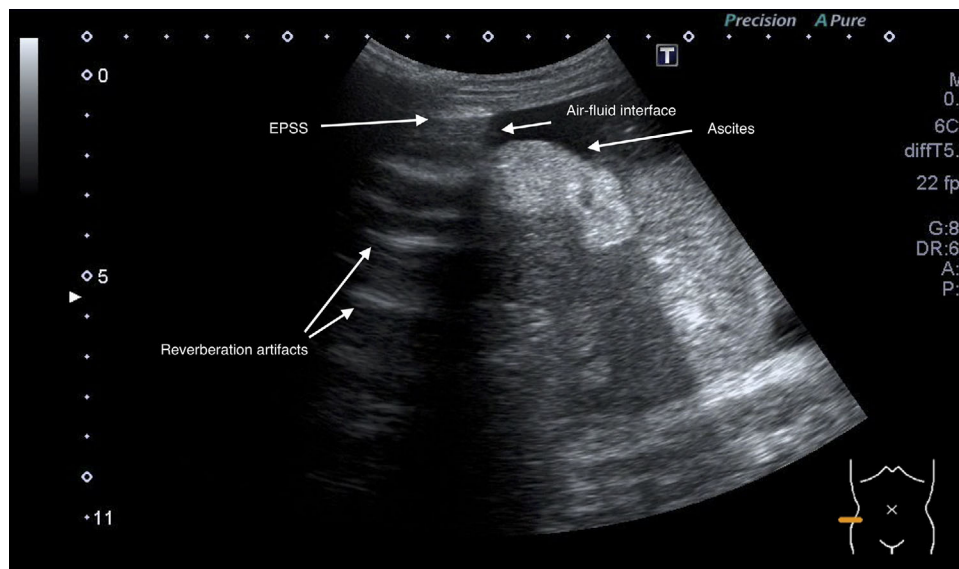
#### ORCID

Ying-Chih Ko MD  <https://orcid.org/0000-0003-0481-5111>

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**FIGURE 3** Characteristic findings of pneumoperitoneum. EPSS, enhanced peritoneal stripe sign