

# Hepatic portal vein gas associated with intestinal ischemia and acute gastric dilatation

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## Case Report

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# Abstract

## Background

Hepatic portal vein gas is a rare and alarming radiographic finding for patients especially those who had intestinal ischemia. It often indicates a very serious infection and could result in infectious shock even death in a very short period of time, even though the mortality of hepatic portal vein gas went down with the increased use of computed tomography and ultrasound in the patient which allows early and highly sensitive detection of such severe illnesses.

## Case presentation

Here a case was described in which the patient who had hepatic portal vein gas associated with intestinal ischemia and acute gastric dilatation died in a short time.

## Conclusions

Attention must be paid closely to the patient who has hepatic portal vein gas associated with intestinal ischemia, and something must be done because it often indicates a life-threatening acute abdomen.

## Background

Hepatic portal vein gas is a rare phenomenon and seen by some senior surgeon first time in his career of over 10 years. The diagnosis of hepatic portal vein gas is usually made by plain abdominal radiography, sonography, color Doppler flow imaging, or computed tomography. Computed tomography has higher sensitivity for the diagnosis of hepatic portal vein gas (HPVG) as compared to sonography and plain radiography.<sup>1</sup> In the computed tomography, hepatic portal vein gas appears as linear or branching image in the tiny branch of portal vein because gas is transported to the liver edge along with the blood flow.<sup>2</sup> It mainly presents in the liver parenchyma within 2 centimeters of the Glisson's capsule, especially in the case of left lobe.<sup>3,4</sup> While gas within the intrahepatic biliary channels often locates in the central liver parenchyma, which could help identification between them. The first hepatic portal vein gas was reported in 1955 by Wolfe and Evans.<sup>5</sup> HPVG often appear with intestinal ischemia and necrosis, but is also seen sometimes in other abdominal conditions such as gastric dilatation, gastric ulcer, ulcerative colitis, diverticulitis, pelvic abscess, necrotizing enterocolitis, intra-peritoneal tumor, Crohn's disease, cholangitis, pancreatitis and even after endoscopic procedures.<sup>6</sup>

## Case Presentation

An 84-year-old man was admitted to emergency department for vomiting and abdominal distension. The patient began to vomit after eating an apple three days ago and then he had abdominal distension two

days later. His medical history included coronary heart disease, hypertension and type 2 diabetes previously. The temperature was 36.7 degrees Celsius, the pulse was 120 beats per minute, the respiratory rate was 18 beats per minute and the blood pressure was 130/80 mmHg. Physical examination showed a grossly distended abdomen while his abdomen was soft, no tenderness or rebound tenderness. Blood test showed a white blood cell count of 11,100 per cubic millimeter (reference range, 4000 to 10,000 per cubic millimeter), a c reactive protein of 170 mg per liter (reference range, 0 to 5 mg per liter). A computed tomography showed massive hepatic portal vein gas (HPVG) and small bowel obstruction and gastric dilatation (Fig. 1). A nasogastric tube was intubated immediately to decompress the pressure. And then a contrast-enhanced computed tomography was arranged to see if the patient had intestinal ischemic necrosis. And the contrast-enhanced CT indeed showed intestinal ischemia but no necrosis (Fig. 2). Then the patient was hospitalized, treated with intravenous antibiotics, and then intubated an ileus tube via X-ray guided interventional therapy. However, he had an infectious shock and cardiac arrest several hours later, and he was given cardiopulmonary resuscitation immediately and then transferred to intensive care unit for further treatment. Unfortunately, his condition deteriorated rapidly, progressing to organ dysfunction and failure and died after another two days.

## Discussion And Conclusions

Hepatic portal vein gas is an alarming radiographic finding for surgeons. It often indicates a very serious infection and could result in infectious shock in a very short period of time. Early studies have shown that the mortality of hepatic portal vein gas is up to an alarming mortality rate of 75%,<sup>5</sup> while a literature survey in 2001 found a total mortality of only 39% explained by an increased detection of benign cases with the increased use of CT scan and ultrasound in the patient which allows early and highly sensitive detection of such severe illnesses.<sup>7</sup> However in this case the time was six days from initial symptoms to death, and only three days from discovery of HPVG to death, even the patient was diagnosed without delay and had been treated since he entered hospital.

The reason was not clear, while three hypotheses may explain the relation between them. Firstly, the gas-producing bacteria in vein ducts produce gas. Secondly, the intestinal mucous is damaged and then gas or gas-producing bacteria go into the portal vein. Thirdly, the mixed type.<sup>8</sup> In this case, the patient had intestinal ischemia and mucosal barrier function was damaged, which most likely leading to the gas-producing bacteria come into the portal vein to produce massive gas. And infection was out of control once the intestinal mucosal barrier was damaged, which caused shock and even death.

Hepatic portal vein gas is a rare and alarming radiographic finding for doctors. And attention must be paid closely to the patient who has HPVG associated with intestinal ischemia. Once seeing this phenomenon, something must be done because it often indicates a life-threatening acute abdomen.

## Abbreviations

HPVG

## Declarations

### Ethics approval and consent to participate

Not applicable.

### Consent for publication

Written informed consent for publication of the clinical details and clinical images was obtained from the patient's daughter.

### Availability of data and materials

The datasets used and analysed during the current study are available from the corresponding author on reasonable request.

### Competing interests

The author declares that he has no competing interests.

## Funding

Not applicable.

## Authors' contributions

Not applicable.

## Acknowledgement

Not applicable.

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## Figures

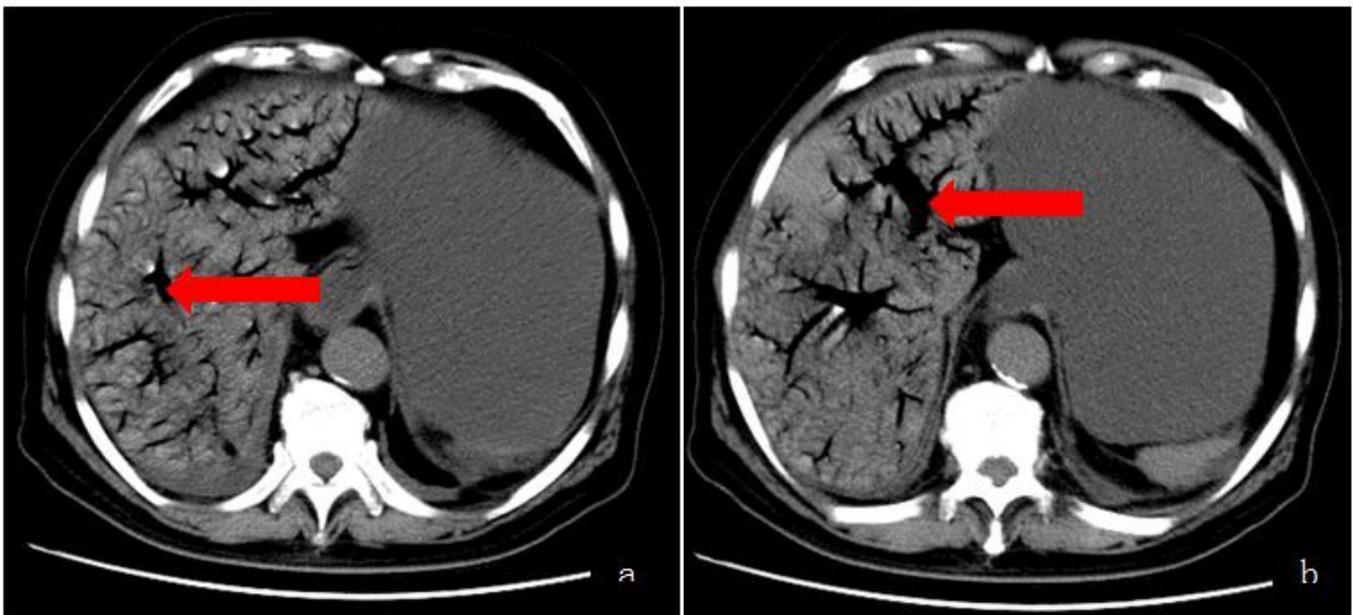


Figure 1

CT demonstrated massive gas in hepatic portal vein (arrow) and gastric dilatation.

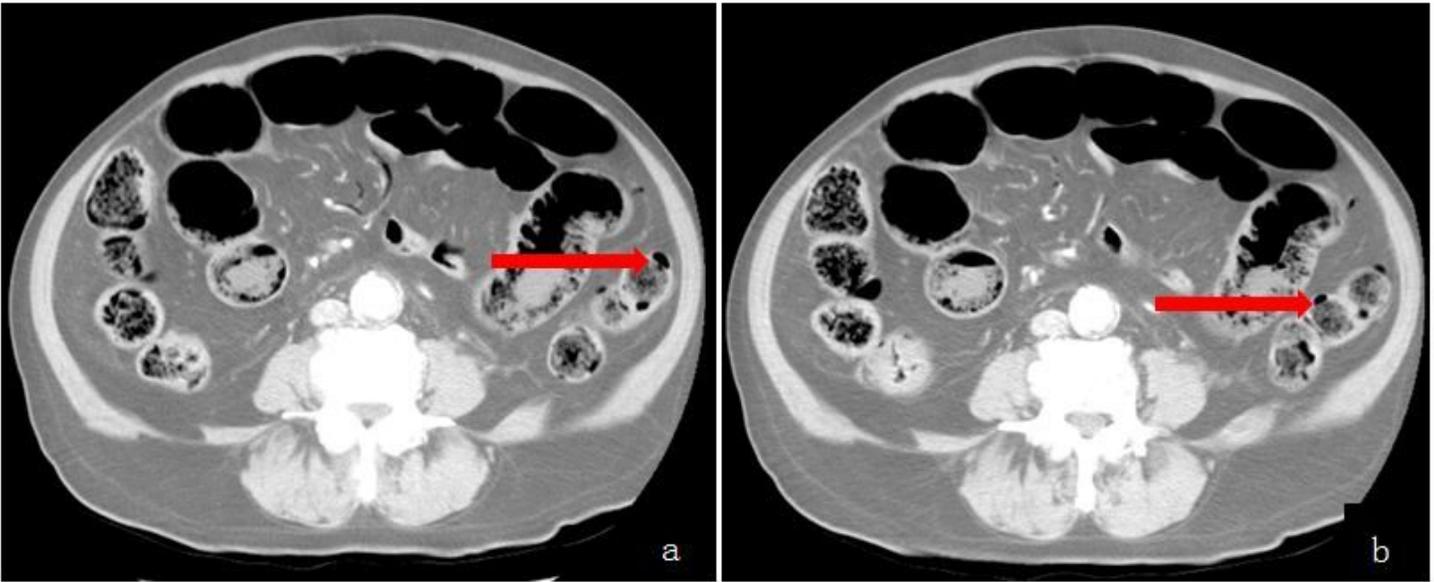


Figure 2

CT demonstrated intestinal ischemia (arrow).