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ABOUT COVER

Peer Reviewer of *World Journal of Clinical Cases*, Serghei Covantsev, MD, Surgeon, Department of Clinical Research and Development, Botkin Hospital, Moscow 125284, Russia. kovantsev.s.d@gmail.com

AIMS AND SCOPE

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CASE REPORT

Mesenteric ischemia with intrasplenic gas: A case report

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Abstract

BACKGROUND

Acute mesenteric ischemia is a life-threatening disease. Intrasplenic gas is an extremely rare finding in such cases.

CASE SUMMARY

We report a case of a 79-year-old woman with a history of end-stage renal disease on hemodialysis for approximately 20 years, type 2 diabetes mellitus, and atrial fibrillation who presented with two days of epigastric pain. A computed tomography scan of the abdomen revealed intraperitoneal free air and significant intrasplenic gas. Laparoscopy revealed diffuse intestinal gangrene, and acute superior mesenteric ischemia was diagnosed. The patient died within 24 hours owing to profound shock.

CONCLUSION

Intrasplenic gas is an extremely rare finding on computed tomography imaging in cases of acute mesenteric ischemia.

Key Words: Acute mesenteric ischemia; Spleen; Hepatic portal venous gas; Pneumatosis cystoides intestinalis; Prognosis; Case report

Core Tip: Acute mesenteric ischemia is a life-threatening condition with a high mortality rate. Early diagnosis and timely surgical intervention are critical for improving patient outcomes. Pneumatosis intestinalis and hepatic portal venous gas are typical imaging findings. Intrasplenic gas, although rare, indicates a critical situation that clinicians must recognize. We presented this case with intrasplenic gas being detected in the computed tomography, while acute mesenteric ischemia was diagnosed in the beginning, to remind all the clinicians about this rare image finding.

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INTRODUCTION

Acute mesenteric ischemia is a life-threatening condition, with mortality rates ranging between 60% and 80% because of bowel ischemia and subsequent sepsis[1]. Immediate surgical intervention is needed once bowel ischemia is detected, underscoring the importance of early diagnosis. Pneumatosis intestinalis (PI) and hepatic portal venous gas (HPVG) are common imaging findings in approximately 70% of mesenteric ischemia patients, often indicating intestinal infarction and the need for emergency surgery[2]. However, atypical presentations can make diagnosis challenging. Herein, we present a case of intrasplenic gas, a rare finding in acute mesenteric ischemia, to highlight this unusual presentation.

CASE PRESENTATION

Chief complaints

A 79-year-old Chinese woman presented with progressive epigastric pain for two days.

History of present illness

The patient had experienced dull epigastric pain for two days, with symptoms worsening over time. She also presented with nausea and vomiting for one day and denied diarrhea. The patient had no difficulty breathing on arrival.

History of past illness

The patient had a history of end-stage renal disease that required hemodialysis for approximately 20 years, type 2 diabetes mellitus, and atrial fibrillation, which was managed with medication. Her Eastern Cooperative Oncology Group performance score was 3, and she had been mostly bedridden for the past seven years.

Personal and family history

The patient denied any family history of malignancy.

Physical examination

The vital signs on admission were as follows: The body temperature, 37.2 °C; blood pressure, 104/50 mmHg; pulse rate, 89 beats per minute; and respiratory rate, 20 breaths per minute. Diffuse abdominal tenderness and involuntary muscle guarding were noted. Two grade III pressure sores were observed over the sacral and right hip regions, with no signs of acute infection. No dyspnea or respiratory distress was found. Her breathing sound was clear, and no rales or crackles were detected on auscultation. Her oxygen saturation was 96% under room air.

Laboratory examinations

The laboratory results revealed hyperglycemia (37.1 mmol/L), elevated serum osmolality (361 mmol/kg), elevated serum ketones (0.8 mmol/L), elevated lactate (16.91 mmol/L), metabolic acidosis (venous blood gas: pH = 7.22, HCO_3 11.9 mmol/L, pCO_2 29.8 mmHg), leukocytosis (39.6 × 10^9/L) with neutrophil predominance (94%), and elevated C-reactive protein (168.7 mg/L).

Imaging examinations

An abdominal computed tomography scan revealed significant intraperitoneal free air; severe calcification of the celiac trunk, splenic artery, and common hepatic artery; and substantial intrasplenic gas (Figure 1).

FINAL DIAGNOSIS

The patient was diagnosed with hollow organ perforation complicated by diabetic ketoacidosis (DKA) and sepsis.

TREATMENT

Laparoscopic examination was performed because of suspected hollow organ perforation. Severe ischemic changes and necrosis of the entire small bowel, ascending and traversing the entire transverse colon to the splenic flexure, were observed intraoperatively (Figure 2). Acute superior mesenteric ischemia was confirmed. The patient developed shock

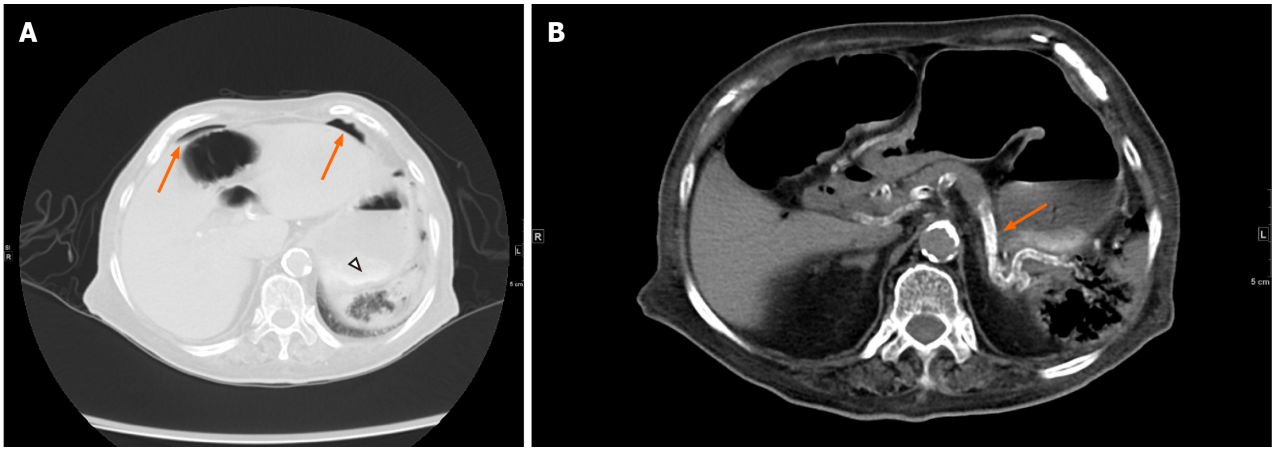

Figure 1 An abdominal computed tomography scan revealed significant intraperitoneal free air. A: Intra-peritoneal free air (arrow) and intra-splenic gas (arrowhead); B: Intra-splenic gas and calcification of celiac trunk, splenic artery and common hepatic artery (arrow).

Figure 2 Intestinal ischemia from Treitz ligament to splenic flexture transverse colon.

during surgery and required vasopressors. Given her poor overall condition and prognosis, surgery was aborted, and the wound was closed without bowel resection.

OUTCOME AND FOLLOW-UP

The patient died within 24 hours. The blood culture grew *Escherichia coli,* and the ascites culture grew *Escherichia coli* and *Staphylococcus caprae*.

DISCUSSION

Acute mesenteric ischemia is a life-threatening and rapidly progressing disease. PI and HPVG are well-established positive findings on radiological exams in most cases of mesenteric ischemia[2]. However, HPVG can also be observed in nonfatal conditions, such as digestive tract dilation, intraperitoneal abscesses, ulcerative colitis, gastric ulcers, Crohn's disease, complications from endoscopic procedures, intraperitoneal tumors, and enemas[3]. The exact pathogenesis of HPVG remains unclear, although three primary mechanisms are generally accepted. First, gas from the intestines can dissect through the damaged intestinal mucosa and submucosa and enter the portomesenteric venous system[4]. Second,

bacteria associated with sepsis can produce gas in the portomesenteric venous system[4]. The third explanation is a combination of these two mechanisms. A unique finding in this case was the presence of intrasplenic gas without PI or HPVG, which is a rare occurrence in mesenteric ischemia. A search of PubMed revealed only two previous case reports documenting this condition[5,6]. Two main hypotheses may explain this rare finding. The first, proposed by Frola *et al*[6] suggests that gas from necrotic bowel tissue initially enters the portomesenteric venous system. During a shock state, the depleted intravascular volume allows the gas to overcome resistance and spread to the spleen. The second hypothesis is that gas forms after the spleen becomes infarcted[7].

In this case, the initial impression was not of mesenteric ischemia. Emergency surgery was performed under the suspicion of hollow organ perforation. However, during surgery, extensive intestinal ischemia was discovered, confirming a diagnosis of mesenteric ischemia. The patient had also developed DKA preoperatively, which may have induced nonocclusive mesenteric ischemia through microvascular hypoperfusion and vasoconstriction[8]. Several risk factors, including end-stage renal disease on hemodialysis, vascular calcification, thromboembolism due to atrial fibrillation, volume depletion caused by DKA, and septic shock, may have contributed to mesenteric ischemia and acted synergistically to exacerbate ischemia. Unfortunately, a computed tomography scan of the abdomen was performed without contrast, and therefore, occlusive mesenteric ischemia could not be definitively ruled out. Therefore, the precise cause of mesenteric ischemia in this case remains uncertain.

CONCLUSION

This case represents a rare instance of mesenteric ischemia with intrasplenic gas but without PI or HPVG, a finding that indicates a poor prognosis.

FOOTNOTES

Author contributions: Tsang HY and Wang HP contributed to manuscript writing, editing, and data collection; Yong CC and Wang HP contributed to conceptualization and supervision; and all authors have read and approved the final manuscript.

Informed consent statement: As the patient had passed away, informed written consent for the publication of this report and any accompanying images was obtained from the patient's daughter.

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