**Case 12876**

**Portomesenteric venous gas in diverticular disease**

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Section: Abdominal imaging

Area of Interest: Liver Abdomen

Procedure: Diagnostic procedure

Imaging Technique: Ultrasound

Imaging Technique: CT

Special Focus: Acute Diverticula

Case Type: Clinical Cases

Authors: Margarita Wilson, Simon Lowes, Maaz Ghouri, Richard Cooper, Lance Cope

Patient: 68 years, male

**Clinical History:**

A 68-year-old male patient presented with severe sepsis and acute kidney injury, and was initially treated for suspected urosepsis. There was no abdominal pain or tenderness. Blood results showed raised CRP and white cell count and a mildly elevated bilirubin, ALP, and ALT.

**Imaging Findings:**

Abdominal ultrasound showed multiple tiny hyperechoic foci within the non-dependent aspect of the liver suggestive of intrahepatic gas (Fig. 1).

CT abdomen confirmed extensive intrahepatic gas in a branching pattern consistent with portal venous gas (Fig. 2). There was also extensive gas in the inferior mesenteric vein leading from the sigmoid colon (Fig. 3).

Intravenous contrast was withheld because of the acute kidney injury so it was not possible to assess bowel enhancement, however, there were no other indicators of mesenteric ischaemia: no significant atheromatous disease within the abdominal vessels, no evidence of hyperdense thrombus within the mesenteric arteries, no pneumatosis intestinalis, and no bowel wall thickening.

Extensive diverticulosis was seen throughout the sigmoid colon (Fig. 3), however, other than mild non-specific stranding within the mesentery there were no associated periolic inflammatory changes to support acute diverticulitis, no collection and no extraluminal gas.

**Discussion:**

Portomesenteric gas has numerous recognised causes. The commonest and most life threatening is bowel ischaemia and necrosis. [1] Imaging findings supporting this diagnosis include the presence of thrombus within the mesenteric arteries or veins, reduced bowel wall enhancement, bowel wall thickening, pneumatosis intestinalis, and other end organ infarcts.

A less common association with portomesenteric gas is intrabdominal sepsis, the causes of which include diverticulitis, abdominal abscess, cholecystitis, and appendicitis. [2] The exact pathogenesis of the portomesenteric
gas associated with sepsis is under debate. There are theories that the venous gas results from: septicaemia in branches of the mesenteric and portal veins; increased intraluminal fermentation of carbohydrates due to bacteria; or mesocolic abscess causing inframesocolic perforation that dissects between the peritoneal leaflets of the mesocolon and into the mesocolic veins. [2] Very rarely, inflammatory involvement of the inferior mesenteric vein complicating sigmoid diverticulitis can result in septic thrombophlebitis and gas within the vein. [2]

Other conditions associated with portomesenteric gas include those that breach the integrity of the bowel wall such as perforated ulcers and tumours, epithelial sloughing caused by inflammatory bowel disease, or benign pneumatosis intestinalis. Any condition or procedure leading to bowel dilatation could also potentially cause portomesenteric gas, for example bowel obstruction, colonic air insufflation (colonoscopy, CT colonography), or ERCP. Blunt abdominal trauma is another recognised cause due to the rapid intraluminal pressure change.

On ultrasound, intrahepatic portal venous gas is seen as hyperreflective foci within the liver parenchyma. The differential diagnosis for this finding is either pneumobilia or flecks of calcification, and further clarification should be sought using CT.

CT typically shows intrahepatic portal venous gas as tubular, branching areas of low attenuation in a peripheral distribution. Gas within the biliary tree on the other hand tends to be distributed more centrally within the liver in accordance with the direction of bile flow. It is commonly stated that portal venous gas may be seen extending to within 2 cm of the liver capsule, whereas biliary gas should not. [1, 2]

In our case, despite the absence of percolic inflammatory change the patient was treated for presumed diverticulitis and managed conservatively with antibiotics. Blood cultures subsequently isolated Bacteroides fragilis, an anaerobic Gram negative rod present in gut flora with a recognised association with bacteraemia and abdominal sepsis, supporting the diagnosis. The patient made a rapid and uneventful recovery.

Differential Diagnosis List: Portomesenteric gas secondary to presumed diverticulitis, Mesenteric ischaemia, Septic thrombophlebitis secondary to diverticulitis, Perforated diverticulum with gas dissecting into the mesocolon and mesenteric veins

Final Diagnosis: Portomesenteric gas secondary to presumed diverticulitis

References:


Description: Non-contrast CT showed a low attenuation branching pattern in the periphery of the liver consistent with portal venous gas. Origin: Department of Radiology, South Tyneside District Hospital, UK
Description: This stack of coronal CT images demonstrates extensive sigmoid diverticulosis (solid white arrow), gas in the inferior mesenteric vein (open arrow), and intrahepatic portal venous gas (dashed arrows) Origin: Department of Radiology, South Tyneside District Hospital, UK
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Description: Hyperechoic foci within the liver (arrow) corresponded to portal venous gas. Origin: Department of Radiology, South Tyneside District Hospital, UK