

Non-invasive diagnosis of acute ischemic bowel disease detected as hepatic portal venous gas during intra-aortic balloon percutaneous counterpulsation

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The authors report a very unusual case of non-invasive diagnosis of acute ischemic bowel disease detected as hepatic portal venous gas during intra-aortic balloon percutaneous counterpulsation. A 64-year-old man with acute ST-elevation myocardial infarction complicated by cardiogenic shock was treated with percutaneous angioplasty and intra-aortic balloon percutaneous counterpulsation. The post-procedural period was complicated by severe abdominal pain. Abdominal computed tomography revealed hepatic portal venous gas. Multiple kidney and splenic ischemic areas were also identified. Colonoscopy showed signs referring to acute ischemic colitis. Computed tomography detection of hepatic portal venous gas has permitted the non-invasive diagnosis of bowel necrosis.

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Introduction

The diagnosis of acute mesenteric vascular occlusion, usually done by emergency laparotomy, may be a diagnostic challenge in patients with hemodynamic instability. We report a very unusual case of non-invasive diagnosis of multiple embolic lesions detected with computed tomography (CT) during intra-aortic balloon percutaneous counterpulsation.

Case report

A 64-year-old man was referred to the Policlinico Hospital of Modena, Italy, with acute ST-elevation myocardial infarction complicated by cardiogenic shock, treated with a successful primary coronary angioplasty on the right coronary artery. An intra-aortic balloon pump (IABP) was positioned. The first post-procedural day was complicated by severe abdominal pain with involuntary guarding and rebound tenderness. Laboratory data were not specific. CT revealed multiple small tubular lucencies in the liver periphery (Fig. 1A). Multiple kidney and splenic ischemic areas (Fig. 1B) with associated necrotic bowel signs (pneumatosis intestinalis, Fig. 1C) were also

identified. Angio-CT confirmed the presence of multiple embolic lesions (Fig. 1D). The IABP was removed. Colonoscopy showed signs referring to acute ischemic colitis. Subsequently, the patient presented diarrhea and rectorragies with acute anemia, treated with conservative management. Twenty days after the patient was discharged.

Discussion

To our knowledge, this is the first case report of non-invasive diagnosis of acute ischemic bowel disease detected as hepatic portal venous gas (HPVG) during IABP. Although IABP-related morbidity rates are declining in recent years, they are still associated with substantial thromboembolic complications¹. In particular, acute mesenteric vascular occlusion may be a diagnostic challenge. Recently, many authors have reported HPVG in patients with bowel infarction^{2,3}. The number of reported cases has increased because of improvements in diagnostic methods, including CT⁴. HPVG is diagnosed by the appearance of branching lucencies within 2 cm of the liver capsule on plain abdominal radiography or CT, whereas biliary

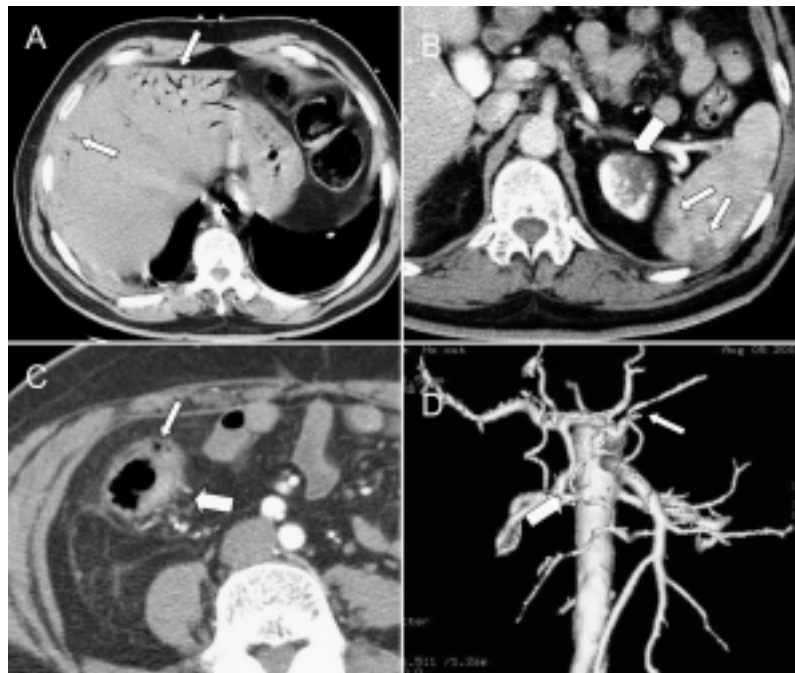


Figure 1. Panel A: unenhanced computed tomography showing tubular areas of decreased attenuation in the periphery of both hepatic lobes (arrows), consistent with the presence of gas in the peripheral branches of the portal vein. Panel B: multiple splenic (small arrows) and renal infarcts (large arrow) are also visible. Panel C: enhanced computed tomography depicting mural thickening of the colon and gas collection inside the walls (small arrow) associated with mesenteric edema (large arrow), consistent with pneumatosis intestinalis. Panel D: three-dimensional reconstruction of computed tomography images showing proximal occlusion of the splenic artery (small arrow). The inferior mesenteric artery is not visible due to thrombotic occlusion (large arrow).

gas is usually found within the central portion of the liver more than 2 cm from the liver capsule. Gas in the portal venous system is likely transported to the small peripheral branches in the liver by the centrifugal flow of portal venous blood, whereas gas in the biliary tree is prevented from migrating peripherally by the centripetal flow of bile. CT has a higher sensitivity for the detection of HPVG than plain radiography and ultrasonography⁴. Furthermore, signs of pneumatosis intestinalis are more specific on CT scan than with ultrasonography⁵. However, HPVG occurred in different clinical scenarios^{2,3} and does not allow a clear-cut diagnosis. The pathogenesis is not fully understood. Two sources of its origin have been proposed: an escape of gas from an increased pressure in the bowel lumen and then circulation into the liver or the presence of gas-forming bacteria in the portal venous system and passage of gas into the circulation⁴.

From our case with conservative management, it appeared that survival is dependent on prompt and adequate treatment of the underlying disease associated with HPVG. HPVG is not predictive of its severity when caused by intestinal ischemia and has even been observed with reversible ischemia⁵. However, the mortality is still high (75%) without any statistical differ-

ence between the operated and non-operated cases in previous cumulative reviews⁵.

In conclusion, CT has permitted a rapid and non-invasive diagnosis of acute ischemic bowel disease during IABP, without emergency laparotomy. This finding may have important clinical implications in patients with hemodynamic instability.

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