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Porto-mesenteric venous gas as a sign of gastric mucosal damage remitted after surgery: a case report

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Abstract

Porto-mesenteric venous gas (PMVG) is a severe sign of abdominal organs damage. Imaging diagnostic criteria allow the detection of PMVG and should be applied in the presence of severe symptoms and signs of abdominal organs damage. Our case had clinical signs of epigastric pain and abdominal tenderness and ultrasonography and computed tomography evidence of PMVG and gastric cancer. The subsequent surgery, without complications, induced PMVG to disappear and the patient to be dismissed from hospital.

Keywords

Porto-mesenteric venous gas, abdominal computed tomography, abdominal ultrasonography, gastric cancer

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Introduction

Porto-mesenteric venous gas (PMVG) is a severe and often lethal entity caused by various diseases. We describe a case of PMVG unusually associated with gastric cancer, diagnosed with combined computed tomography (CT) and ultrasound (US) imaging. PMVG was described for the first time in the 1950s, using abdominal radiographic images in a child with bowel tissue necrosis, who eventually died (1). Some years later, the first descriptions in adults were reported (2–4), where only 1/6 cases survived after the diagnosis. Between the 1970s and 1980s, the first statistics on survival were formulated collecting data from several case reports and series: those findings indicated 25% survival after the diagnosis (5). At the beginning of the 2000s, <200 cases had been reported (6). When CT was introduced in the clinical work-up, the diagnosis became more frequent; retrospective analysis carried out on investigations based on large numbers of CT exams indicated that the probability of PMVG diagnosis was 1 in 15,000 on average (7,8). PMVG is associated with several pathological conditions, many of which are severe and lethal: thromboembolism linked to arteriosclerosis, especially intestinal infarction, sepsis, arterial dissections, tumors; vasculitis; bowel obstructions; abdominal trauma; tumors of various sites; severe inflammatory status of bowel and peritoneum; side effects of corrosive therapies (chemotherapy); and radiation (9). In our therapy-naïve patient, an unusual association was found with gastric cancer.

Case report

A 63-year-old woman was admitted to our Accident and Emergency Department because of epigastric pain and abdominal tenderness after an episode of hematemesis and vasovagal crisis with loss of consciousness. At the clinical examination the patient

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was visibly suffering. Rectal examination was negative for bleeding; blood test values were unremarkable except for low hemoglobin level (9.1 g/dL), mild leukocytosis (13.1 10^{-3}/uL), a peak of urea blood level (62 mg/dL), and high values of C-reactive protein (7.51 mg/dL). No abnormal hepatic enzyme levels were detected. At first, a US examination was performed, during which punctiform echogenicities along the right branch of the portal vein were detected (Fig. 1). Thereafter, a post-contrast abdomen CT was performed, revealing the presence of a large soft-tissue mass in the gastric lumen of the antrum invading the gastric wall in keeping with the tumor. Several pathologic gastric lymph nodes were also detected. In addition, there were branching radiolucencies in the peripheries of the liver; US and CT scan findings conclusively indicated the presence of HPVG. The gastric wall was characterized by the presence of some bubbles of gas within it, like a confined form of intestinal pneumatosis, although no bowel necrosis, abscess, or mesenteric vein thrombi were detected (Figs. 2a, 2b and 3). The laboratory tests had no remarkable results. A few days later, the patient underwent gastroscopy to better characterize the gastric lesion in an elective setting: the histology revealed adenocarcinoma. Owing to the presence of gas in the portal system, the patient skipped preoperative treatment with chemotherapy; she was rapidly directed to the theatre for surgical treatment. During surgery, an extensive ulcerated mass of the gastric antrum was found and completely excised (Fig. 4a, b). Our patient was able to be dismissed after a period of observation.

Discussion

We have described a case of PMVG in a patient affected by antral gastric cancer. The association with gastric

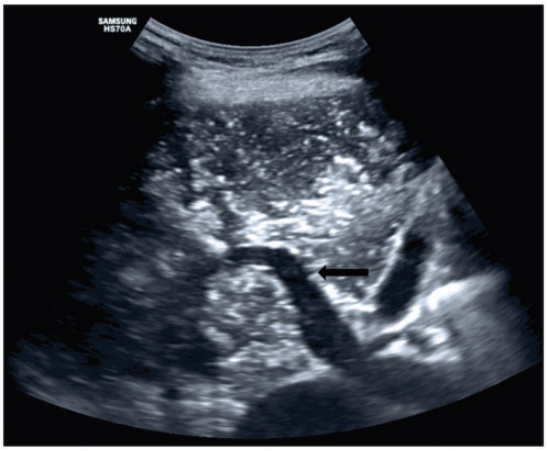

Fig. 1. Ultrasound examination demonstrates several hyperechogenicities representing multiple bubbles of gas (arrow) in the right branch of the portal vein.

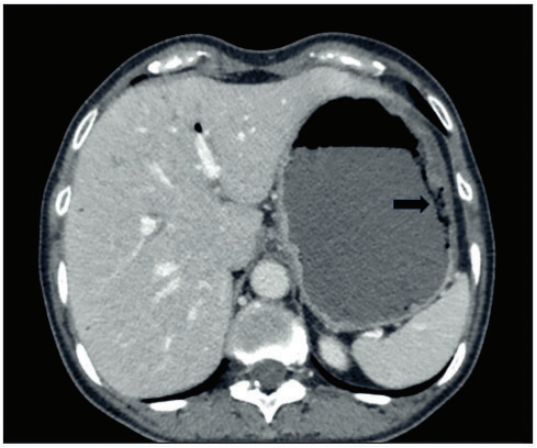

Fig. 3. CT scan shows collections of gas in the gastric wall.

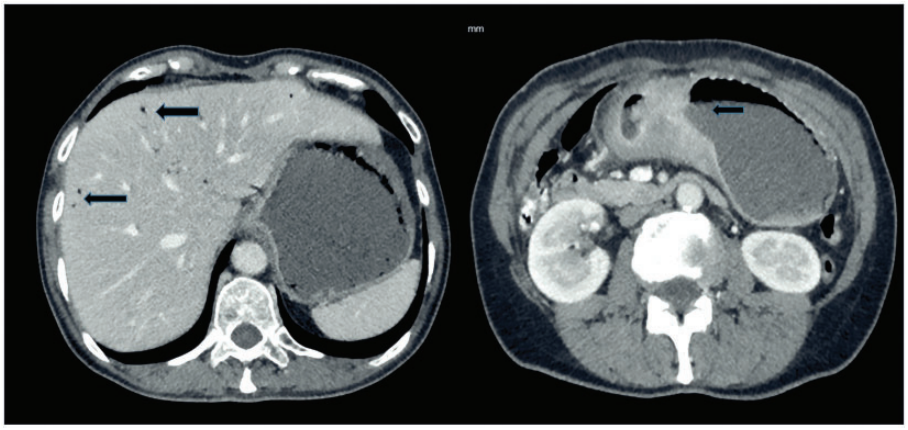

Fig. 2. (a) Computed tomography (CT) scan demonstrates collections of gas (arrow) in the branches of the portal vein. (b) CT scan shows a large soft-tissue mass in the gastric antrum abutting the lumen (arrow).

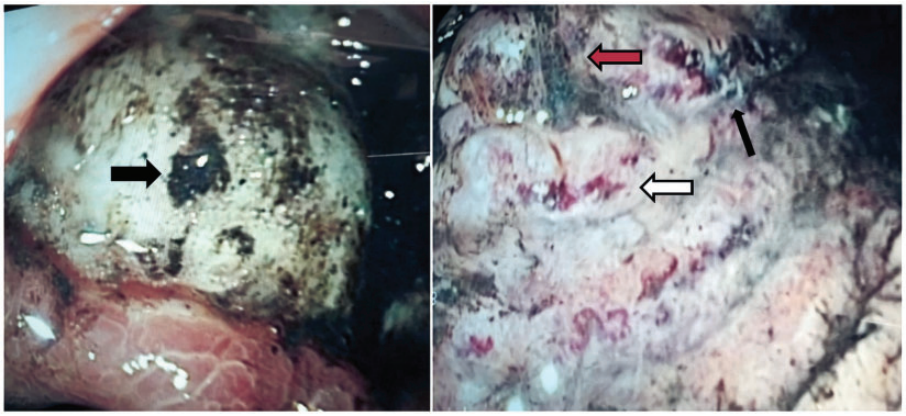

Fig. 4. (a) Gastroscopic view of the gastric antrum. Note the giant, infiltrating, and ulcerated mass occupying the antro-pyloric region extended up to the angulus. In addition, multiple black clots are also observed (black arrow). (b) Large and deep ulcer floor covered with fibrin. The picture shows extremely irregular surfaces with traces of active bleeding (white arrow) and the presence of black coats (black arrow). An endoscopic clip has been applied on the main source of bleeding (red arrow).

cancer that we are reporting has been previously described only once (10). Literature reviews report the presence of PMVG associated with another gastric pathology (peptic ulcer) in 3% of cases, on average (9). In one recent report, the gas was seen after a hypertrophic pyloric stenosis in a newborn, indicating a functional link with the increase in intra-gastric pressure (11). In the present case report, there might be an analogy with peptic ulcer cases, where pathophysiology may suggest a severe damage of the gastroduodenal mucosa.

This case report highlights the rarity of this entity and the importance of investigating both the bowel and gastroduodenal tract. A careful evaluation of the patient's clinical history together with appropriate US and CT imaging interpretations should be made by clinicians and radiologists to identify the localization of the primary lesion to select the most appropriate diagnostic and therapeutic approach. The underlying disease associated with PMVG determines the clinical features and prognosis of the patients. The treatment of patients with PMVG should be directed to the underlying disease. The diagnostic criteria in abdominal US is represented by the presence of multiple punctiform echogenicities in the portal vessels, as described in our patient; in some cases, this finding is accentuated until a picture known as "meteor sign" appears (12). When abdominal radiograms are used, the decreased attenuation of tubular areas in the liver periphery is the pathognomonic sign (13,14). The most sensitive radiologic exam for this diagnosis is an abdominal CT scan—widely accepted in its contrast procedure as the standard exam—in which air bubbles are localized in the liver periphery (2); this scenario needs to be differentiated from biliary tract gas, where the air bubbles are pushed toward the center on the liver by the centripetal bile flow.

Air bubbles in the portal vein are a sign of a pneumatosis intestinalis, whose pathophysiology includes several mechanisms implying the failure of barriers due the mucosa alterations and immune system impairment (9,15,16).

In conclusion, the present case report points out that PMVG detection through imaging in the Emergency Department requires immediate attention but is not necessarily associated to acute lethal conditions such as mesenteric infarction. The underlying cause may be any other pathologic condition involving gastrointestinal mucosal damage, which can be afforded removing the cause. In our case the surgical action was the solution, although the continuous monitoring of the patient may be the choice in other conditions. We are confident that our experience will help give the right attention to PMVG in order to improve significantly prognosis.

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