

An unusual case of pneumatosis intestinalis due to acute appendicitis.

Published on 01.07.2015

DOI: 10.1594/EURORAD/CASE.12782

ISSN: 1563-4086

Section: Abdominal imaging

Area of Interest: Abdominal wall Abdomen

Procedure: Diagnostic procedure

Procedure: Computer Applications-Detection, diagnosis

Procedure: Imaging sequences

Imaging Technique: CT

Special Focus: Acute Inflammation Case Type: Clinical Cases

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Patient: 73 years, male

Clinical History:

A man with a history of peripheral vascular disease was admitted to the hospital. Two days later the patient started to develop abdominal pain. Plain film radiographs demonstrated mildly distended small bowel loops. Laboratory results revealed a white blood cell count of 18,500/mm³ and no evidence of acidosis.

Imaging Findings:

A CT of the abdomen with contrast was performed. The CT examination revealed distention of the stomach and marked dilatation of the small bowel, with a band of low density in the gastric wall representing a large amount of intramural gas called pneumatosis intestinalis (PI). Additionally, radiolucencies were present in the intrahepatic portal radicles, suggestive of portal venous gas (HPVG) (Fig. 1, 2). There was no free air in the peritoneum or mass lesion. The superior mesenteric artery was patent. The appendix was enlarged with the presence of a small appendicolith and moderate surrounding fat stranding consistent with gangrenous appendicitis (Fig. 3).

Discussion:

There are 3 possible aetiologies to explain the development of Pneumatosis Intestinalis (PI) [1]:

Bacterial aetiology: Bowel mucosal damage is caused by gas-forming organisms. These bacteria generate a large amount of gas that penetrates the intestinal mucosa/submucosa.

Mechanical aetiology: intestinal obstruction of any type causes the development of increased hydrostatic pressure within the bowel, resulting in mucosal damage, with air dissecting into the intestinal mucosal/submucosal layer.

Chronic obstructive pulmonary disease: Narrowing of the airways in patients with reactive and obstructive pulmonary disease leads to the development of increased pressure in the pulmonary airways, which causes air to dissect down the mediastinum into the gastric and small bowel wall.

The case presented in this article correlates well with the mechanical aetiologies for the development of

pneumatosis. Mucosal damage due to appendicitis caused intraluminal air to dissect into the inflamed/injured appendiceal mucosa/submucosa and travel in a retrograde fashion through the small bowel into the stomach wall. This fact, coupled with stomach mucosa injury due to the placement of a nasogastric tube to decompress a distended stomach, caused intraluminal stomach air to dissect into the wall, further contributing to gastric pneumatosis.

In addition to PI, portal vein gas (HPVG) can also be seen in cases of pneumatosis. The factors that predispose to it are mucosal damage, bowel distention and sepsis. The radiographic pattern of HPVG must be differentiated from that seen in the biliary system (pneumobilia). In the former, air is seen at the periphery of the liver (centrifugal blood flow) while in the latter gas travels in a centripetal pattern and is located mostly centrally in the region of the porta hepatis. Biliary air appears predominantly in the left lobe of the liver on CT examination [2].

The most common and serious cause of porto-mesenteric venous gas is bowel ischaemia with a mortality rate of more than 75%. However, more recent articles have suggested that the clinical significance of these findings depends on the individual clinical setting in which they are observed as it may also be the result of non-ischaemic conditions which often have a more favourable prognosis without the need to perform surgery. Both ischaemic and non-ischaemic bowel ischaemia may be associated with the presence of PI [3].

Because of the reasons stated above, portomesenteric vein gas seen on plain film, ultrasound and computed tomography examinations should be carefully evaluated in the appropriate clinical context prior to making decisions regarding therapy and follow-up.

Differential Diagnosis List: Exploratory surgery was performed revealing a gangrenous appendicitis., Mesenteric ischaemia, Parasitic infestation (abdominal inflammation)

Final Diagnosis: Exploratory surgery was performed revealing a gangrenous appendicitis.

References:

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Figure 1

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Description: Contrast-enhanced CT demonstrates multiple tubular or branched areas of decreased attenuation in the stomach.

The nasogastric tube can also be seen. **Origin:** Diagnostic Imaging Department. Hospital Universitario de Canarias, La Laguna, Spain.

Figure 2

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Description: Computed Tomography of the abdomen showing hepatic portal venous gas. **Origin:** Diagnostic Imaging Department. Hospital Universitario de Canarias, La Laguna, Spain.

Figure 3

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Description: Gas in the small mesenteric veins appears as tubular or branched areas of decreased attenuation in the mesenteric border of the bowel.

The appendix contains a small appendicolith.

Note minimal periappendiceal fat stranding. **Origin:** Department of Radiology, HUNSC, Sta. Cruz de Tenerife