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Portomesenteric venous gas: A late complication of pneumatosis intestinalis

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ABSTRACT

BACKGROUND: The pneumatosis intestinalis is an entity with multiple aetiologies and may be associated with a fatal outcome when present on plain radiographs. When associated with the presence of portomesenteric venous gas (PMVG) it is typically the result of bowel ischaemia.
METHODS AND RESULTS: We are presenting a case of a 43 year old male who presented with a two days history of haematemesis, generalised abdominal pain and distension.

Computed tomography (CT) scan revealed a gross amount of air within the portal venous system and small bowel dilatation to the level of distal ileum was also seen with associated pneumatosis intestinalis. Emergency laparotomy was conducted which demonstrated a simple band adhesion resulting in bowel ischaemia. The patient was making a good post-operative recovery complicated only by sub-therapeutic treatment of schizophrenia.
CONCLUSION: The presence of gas within the portal venous system and PI in adults can indicate severe life-threatening disease. This requires early surgical intervention in those patients with a clinical suspicion of bowel ischaemia, and with radiological signs. This may avoid significant mortality.

1. Introduction

Pneumatosis intestinalis (PI) was first described by DuVeroni in 1730 and was later defined as the presence of gas within an abnormal area of the body.[1] This definition refers to a diverse group of presentations ranging from innocuous forms of this disorder to severe cases involving mucosal disruption and bowel ischaemia. Within the literature, pneumatosis is referred to with a number of titles including pneumatosis intestinalis coli, pneumatosis intestinalis cystoids and pneumatosis intestinorum cystoided hominus.[2]

While pneumatosis intestinalis is often a rare and uncommon condition, when associated with the presence of portomesenteric venous gas (PMVG) it is typically the result of bowel ischaemia. If detected on plain radiographs this is associated with a mortality rate of 75%, but outcomes have improved with the early use of computed tomography (CT).[3] We present a case of pneumatosis intestinalis with massive portomesenteric venous gas (PMVG) in the absence of bowel necrosis due to a band adhesion.

2. Case report

A 43 year old male presented to the emergency department with a two days history of haematemesis, generalised abdominal pain and distension. In addition, the patient admitted to not having opened his bowels over the same period. A past medical history of treated schizophrenia and appendectomy at age 8 was also noted.

Clinical examination revealed significant abdominal distension, associated with mild tenderness throughout the abdomen but especially in the right upper quadrant. Digital rectal examination demonstrated an empty rectum.

Laboratory investigations were as follow: hematocrit 25%, creatinine: 0.3 mg/dl and C-reactive protein: 138.5. Liver function tests and amylase levels were all within normal range.

An arterial blood gas on 35% O_2 reflected the degree of dehydration but also ischaemia: pH 7.436; pO_2: 4.18 kPa; pO_2: 15.8 kPa; HCO_3: 20.7; BE: −1.4; Lactate: 4.5.

An erect chest radiograph established the absence of pneumoperitoneum, while a plain abdominal radiograph demonstrated dilated small and large bowel loops.

Computed tomography scan revealed a gross amount of gas within the portal venous system, with gas throughout the

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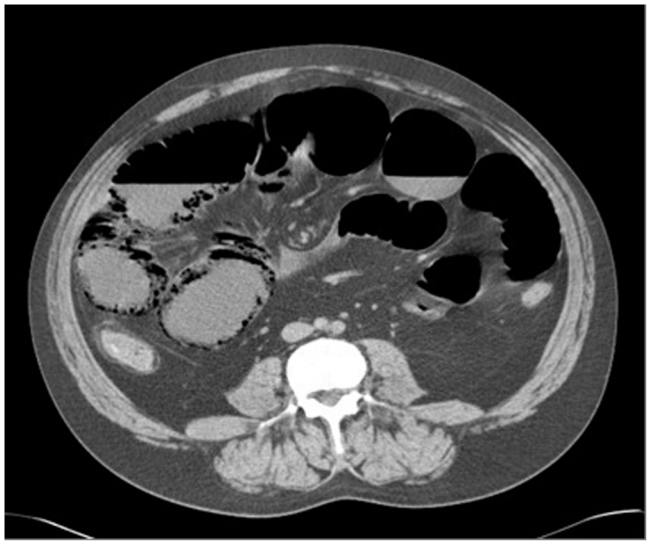

Fig. 1. CT Image demonstrating the linear variant of pneumatosis intestinalis in the wall of the small bowel.

Fig. 2. CT Image demonstrating large amount of gas within the hepatic portal venous system.

intrahepatic portal venous system (Fig. 2). In addition, gas was also demonstrated in the superior mesenteric vein and its tributaries. Small bowel dilatation to the level of distal ileum was also seen with associated pneumatosis intestinalis.

Emergency laparotomy was conducted which demonstrated a simple band adhesion which was cut with no need of any bowel resection. The patient was making a good post-operative recovery complicated only by sub-therapeutic treatment of schizophrenia.

3. Discussion

Pneumatosis intestinalis (PI) can occur at any age, affect any part of the small or large bowel and can be either localised or extensive. The pathogenesis of portomesenteric venous gas is also poorly understood with changes in intraluminal pressure, mucosal integrity, bacterial flora and intraluminal gas all thought to contribute to this pathology.[7] The origin of the gas in PI is a subject of much debate and it has been postulated that this varies depending on the organisation and distribution of the gas.

The gas pattern seen in PI can be divided into three key categories: (a) microvesicular, (b) cystic and (c) linear variants.[4]

Microvesicular PI is a histological diagnosis which typically follows invasive procedures. It is characterised by the presence of collections of gas (<100 μm in diameter) within the lamina propria. Cystic PI is associated with the presence of macroscopic submucosal cysts varying in size from a few millimetres to several centimetres. These protrude into the bowel lumen creating characteristic indentations that can be seen endoscopically and radiologically. A number of theories have been postulated as a cause for this variant of PI including air from ruptured alveoli tracking into the retroperitoneal tissues, mesentery and then the bowel wall.[5]

Linear PI (as in this case) is characterised by the presence of a streaking, linear or bubbly patch that is parallel to the bowel wall, plicae circulares or haustra (Fig. 1). Although it can originate from benign aetiologies, linear PI is associated with bowel ischaemia or infarction. In fact, in the presence of PMVG, and when associated with bowel ischaemia, mortality rates are as high as 83%.[6]

PMVG almost always is associated with intestinal ischaemia and necrosis, with a high potential for perforation, but may also be associated with endoscopy, barium enema and hepatic transplantation.[8] Therefore, in the former group of patients immediate laparotomy is advised, especially as the finding of PVMG with co-existing disease is associated with 40% mortality.[9] However, in healthy patients with a known aetiology of PMVG, a few clinicians suggest close observation and conservative management is suggested.[10]

In this case, the CT scan showed a massive amount of PMVG and PI. The aetiology of these two entities is thought to have arisen from a simple band adhesion wrapped around the small bowel.

In conclusion, the presence of HPVG and PI in adults can indicate severe life-threatening disease. This requires early surgical intervention in those patients with a clinical suspicion of bowel ischaemia, with the extent of gas present on the radiological study signs. This may avoid significant mortality.

Conflict of interest

The authors declare that they have no conflict of interest.

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Ethical approval

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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