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Case Report

Extensive pneumatosis intestinalis: a benign bystander

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ABSTRACT

Pneumatosis intestinalis is a rare clinical finding detected radiologically and intraoperatively that points to an underlying benign or worrisome cause. Management of pneumatosis intestinalis poses an interesting dilemma for surgeons given the heterogeneity of its potential causes. In clinically significant pneumatosis, urgent surgical management is paramount. However, in benign causes of pneumatosis, surgical exploration is not necessary and maybe harmful. Clinical findings of peritonism, increased lactate and radiological finding porto-mesenteric venous gas are suggestive of clinically significant pneumatosis that warrants surgical management. In this case report, we described an incidental computed tomography (CT) finding of extensive pneumatosis in an elderly man with appendicitis.

Keywords: Benign, Computed tomography, Pneumatosis

INTRODUCTION

Pneumatosis intestinalis is defined as the presence of gas in the bowel wall. Du Vernoi first described it in 1783, based on cadaveric dissection. It is a not a disease in itself, but a clinical sign that points to underlying pathology, whether benign or malignant. In the past, pneumatosis intestinalis are commonly diagnosed surgically via laparotomy or laparoscopy with findings of gas-filled cysts in the bowel wall. Its detection has exponentially increased with the advancement of radiological modalities, especially multi-detector computed tomography. Clinical presentation of pneumatosis varies depending on the underlying pathology.[1-3]

CASE REPORT

An 83-year-old man presented to the Emergency Department with a three-day history of right-sided abdominal pain, exacerbated by movement and deep inspiration. This was associated with fatigue and anorexia. He had no fever, nausea or vomiting, and was otherwise systemically well. His past history was significant for an abdominal aortic aneurysm repair 25 years ago, pacemaker for sick sinus syndrome, and atrial fibrillation on warfarin. Other medical history included peripheral vascular disease, dyslipidaemia, and hypertension.

On examination, the patient was haemodynamically stable with localised peritonism over the right iliac fossa. His laboratory studies showed a normal white cell count, renal function, and lactate, with an elevated C-reactive protein of 163mg/L (normal value less than 5mg/L). A contrast computed tomography (CT) of the abdomen revealed acute appendicitis with inflammatory stranding around the appendix and surrounding fluid collection raising the possibility of an early appendiceal abscess formation (Figure 1). Marked pneumatosis intestinalis was also seen, involving the large and small intestines in the right upper quadrant and mid abdomen. There was no mural thickening, or loss of mucosal enhancement (Figure 2). There was also no free intraperitoneal gas or portal venous gas on the CT.

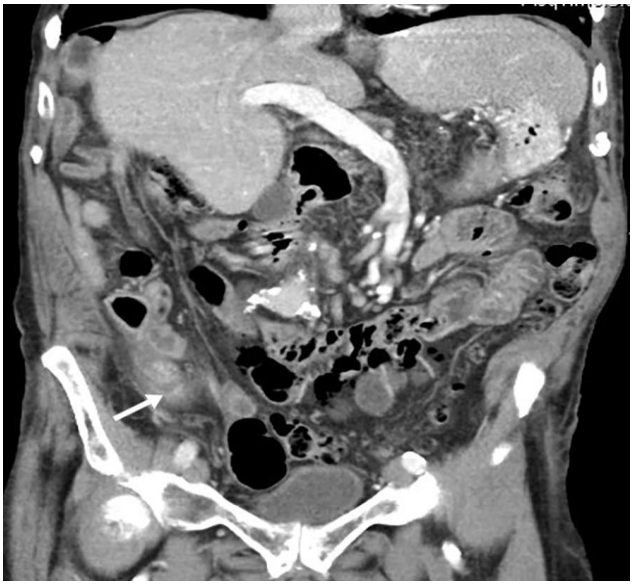

Figure 1: CT coronal image of the abdomen with oral and intravenous contrast showing acute appendicitis with inflammatory stranding around the appendix and surrounding fluid collection (arrow).

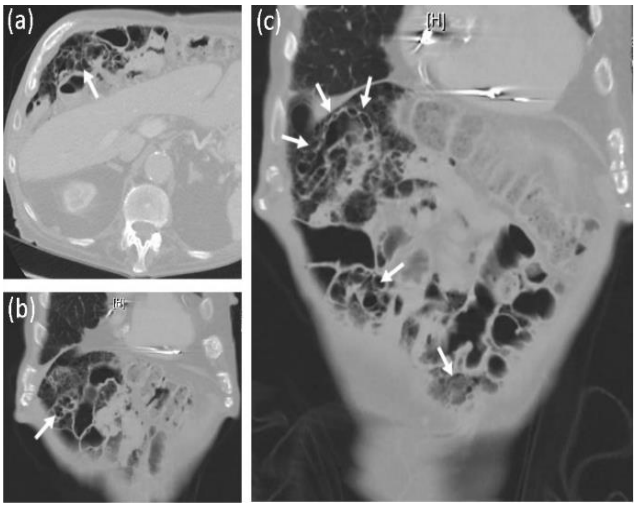

Figure 2: CT images of marked pneumatosis intestinalis (arrows) involving the large and small intestines in the right upper quadrant and mid abdomen. (a) transverse view. (b and c) coronal view.

Intravenous antibiotics were instituted, and the patient proceeded to urgent laparoscopy. Intraoperative findings revealed perforated appendicitis with minimal intraabdominal contamination. Widespread pneumatosis of the small bowel was also noted, without any features of inflammation, perforation or ischaemia *(Figure 3).* Laparoscopic appendicectomy was performed without complication.

Post-operatively, the patient recovered well and was discharged the following day. Histopathology confirmed the diagnosis of acute appendicitis. He remained well when reviewed four weeks after the operation.

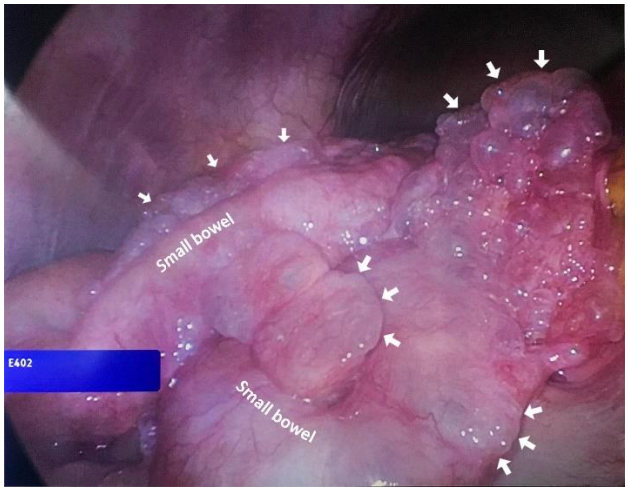

Figure 3: Laparoscopic view of pneumatosis of the small bowel in the right upper quadrant without features of inflammation, perforation or ischaemia (arrows).

DISCUSSION

Primary or idiopathic pneumatosis intestinalis occurs in 15% of all cases. In the past, secondary pneumatosis intestinalis in adults was considered a cardinal sign of intestinal ischaemia. However, it has been increasingly recognised in many other conditions, both dangerous and benign. Such causes range from clinically significant aetiologies, such as intestinal ischaemia, bowel obstruction, intra-abdominal abscess or colitis, to benign causes such as post-colonoscopy, chronic obstructive pulmonary disease and collagen vascular disease.**Error! Reference source not found.**

Multiple theories have been postulated to explain this phenomenon. The mechanical theory suggests that intraluminal gas is pushed out in the bowel wall via direct transfer or lymphatic channels due to high intraluminal pressure, with or without predisposing mucosal injury or compromise. This theory could explain pneumatosis secondary to causes such as bowel obstruction or post colonoscopy. Second theory proposed is the bacterial theory, whereby fermenting and gas-forming organisms translocated into the submucosal layer leads to formation of gas-filled cysts in the submucosa and the lymphatic channels. This theory is supported by a few studies suggesting resolution of these cysts after antibiotic and hyperbaric treatment. Lastly, the pulmonary theory suggests the rupture of alveoli cause gas to travel through the mediastinum and retroperitoneal space and into the mesentery and perivascular space of the bowel wall. This theory is supported by findings of pneumatosis intestinalis in patients with respiratory diseases such as chronic obstructive pulmonary disease and asthma.[3,4]

The challenge is in differentiating life-threatening pneumatosis intestinalis from benign cases, given its wide range of pathogenesis. In clinically significant

pneumatosis, urgent surgical management is critical. However, in patients with benign pneumatosis, surgical exploration is unnecessary, and may even be harmful. Hence, many studies have been dedicated to establishing predictive clinical, biochemical and radiological markers of clinically significant pneumatosis. Based on multicentre studies, The American Association for the Surgery of Trauma (AAST) recommends surgical exploration in patient with pneumatosis with associated peritonitis and lactate of 2.0 mmol/L or greater.[5,6] Nonetheless, clinical history and signs of peritonism may not be reliable in intubated or unconscious patients.

Various studies have examined the ability of radiological findings to predict clinically significant pneumatosis with mixed results. A few patterns of pneumatosis on CT have been described. Bubble-like cystic patterns are more commonly observed in primary pneumatosis, whereas linear or circumferential patterns are associated with secondary forms of pneumatosis. However, there is significant crossover and all three patterns may be seen at the same time.[1] Moreover, ischaemic causes of pneumatosis may be associated with decreased bowel wall contrast enhancement, as well as porto-mesenteric venous gas.[1,2,4-8] However, a large multicentre study in Baltimore by Hani et al failed to definitively correlate ischaemia with these traditionally-associated CT finding.[9]

CONCLUSION

Management of pneumatosis intestinalis poses an interesting challenge for surgeon. This case report highlights a case of incidental benign pneumatosis intestinalis in a patient with focal peritonitis secondary to acute appendicitis. It emphasises the importance of careful consideration of all clinical, biochemical and radiological features in determining significance and appropriate management of pneumatosis intestinalis.

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REFERENCES

1. Lassandro F, Valente T, Rea G, Lassandro G, Golia E, Brunese L, et al. Imaging assessment and clinical significance of pneumatosis in adult patients. La radiologia medica. 2015 Jan 1;120(1):96-104.
2. Treyaud, M, Duran, R, Zins, M, Knebel, J, Meuli, R, Schmidt, S. Clinical significance of pneumatosis intestinalis - correlation of MDCT-findings with treatment and outcome. Eur Radiol. 2017;27:70-9.
3. Azzaroli, F, Turo, L, Galloni, S, Buonfiglioli, F, Calvanese, C, Mazzella, G. Pneumatosis cystoides intestinalis. World J Gastroenterol. 2011;17(44):4932-6.
4. St. Peter, S, Abbas, M, Kelly, K. The spectrum of pneumatosis intestinalis.Arch Surg. 2003;138:68-75.
5. DuBose JJ, Lissauer M, Maung AA, Piper GL, O'Callaghan TA, Luo-Owen X, et al. Pneumatosis Intestinalis Predictive Evaluation Study (PIPES): a multicenter epidemiologic study of the Eastern Association for the Surgery of Trauma. Journal of Trauma and Acute Care Surgery. 2013 Jul 1;75(1):15-23.
6. Ferrada P, Callcut R, Bauza G, O'Bosky KR, Luo-Owen X, Mansfield NJ, et al. Pneumatosis Intestinalis Predictive Evaluation Study: A multicenter epidemiologic study of the American Association for the Surgery of Trauma. Journal of Trauma and Acute Care Surgery. 2017 Mar 1;82(3):451-60.
7. Goyal, R, Lee, H, Akerman, M, Mui, L. Clnical and imaging features indicative of clinically worrisome pneumatosis: key components to identifying proper medical intervention. Emerg Radiol. 2017;24:341-6.
8. Lee, H, Cho, Y, Kim, K, Lee, J, Lee, S, Yang, S. A simple score for predicting mortality in patients with pneumatosis intestinalis. European Journal of Radiology. 2014;83:639-45.
9. Hani MB, Kamangar F, Goldberg S, Greenspon J, Shah P, Volpe C, et al. Pneumatosis and portal venous gas: do CT findings reassure?. Journal of Surgical Research. 2013 Dec 1;185(2):581-6.

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