Pneumatosis Intestinalis of the Small Bowel; Radiological and Intra-operative findings

Authors: Duncan Light, Amy Robinson and Colm Hennessy
Location: North Tees and Hartlepool NHS Foundation Trust, Stockton on Tees, UK
Citation: Light D, Robinson A, Hennessy C. Pneumatosis Intestinalis of the Small Bowel; Radiological and Intra-operative findings. JSCR. 2010 3:3

ABSTRACT

Pneumatosis Intestinalis is defined as the infiltration of gas into the bowel wall. It is a radiological and intra-operative finding of varying aetiology which varies from benign to life threatening conditions. We describe here a case of a 67 year old woman who presented with diffuse abdominal pain and was found to have Pneumatosis Intestinalis.

INTRODUCTION

Pneumatosis Intestinalis is defined as the infiltration of gas into the bowel wall. It is a radiological and intra-operative finding of varying aetiology which varies from benign to life threatening conditions. (1)

CASE REPORT

A 67 year old lady was admitted with diffuse abdominal pain and absence of bowel motion of 1 week duration. She had a past medical history of chronic obstructive pulmonary disease and polymyalgia Rheumatica. Her medication included regular low dose of oral corticosteroid. Previous surgery included an abdominal hysterectomy. On examination the patient was obese with a soft abdomen and generalised abdominal tenderness. No abdominal mass was palpable and bowel sounds were normal. A provisional diagnosis of constipation with secondary obstruction was made. No significant biochemical or haematological abnormalities were found. A plain abdominal radiograph showed no signs of intestinal obstruction.

The patient was admitted and treated with intravenous fluids and analgesia. Over 24 hours here pain increased and a contrast computed tomography (CT) was performed which revealed disseminated Pneumatosis Intestinalis of the small bowel along with a small bowel volvulus (Fig. 1 and 2).
A mid-line laparotomy was performed which revealed wide spread Pneumatosis Intestinalis of the small bowel and omentum (Fig 3 and 4). A small area extended into the caecum and ascending colon. No adhesions were found. The small bowel volvulus was confirmed and a segment of ischaemic small bowel was resected.
The patient was admitted to intensive care post operatively. Unfortunately over the coming 48 hours she developed increasing respiratory failure and died on the third post-operative day. An autopsy confirmed the presence of Pneumatosis Intestinalis secondary to small bowel ischaemia. No perforation or ruptured pulmonary bullae was identified.

DISCUSSION

Pneumatosis Intestinalis can be sub-divided into primary and secondary form. Primary Pneumatosis Intestinalis (15% of cases) is a benign idiopathic condition associated with multiple thin walled cysts in the sub-mucosa or sub-serosa of the bowel. This condition is usually asymptomatic and is often an incidental radiological or endoscopic finding.

Secondary Pneumatosis Intestinalis (85% of cases) may be further sub-divided into the aetiology from necrotic gastrointestinal disease, non-necrotic intestinal disease and pulmonary disease. Necrotic bowel disorders associated include necrotising enterocolitis (NEC) and mesenteric ischemia. A wide range of non-necrotic bowel disorders are linked to the formation of secondary Pneumatosis Intestinalis. These include bowel obstruction, inflammatory bowel disease, vasculitis, abdominal trauma causing mucosal disruption and iatrogenic causes (endoscopy). (2)

A number of infective causes are also associated with the formation of pneumatosis. These include Human Immunodeficiency Virus, Cytomegalovirus, Rotavirus and Clostridium Difficile.

The major pulmonary cause is chronic obstructive pulmonary disease. The condition may be associated as an incidental finding in such patients or arise from the spontaneous rupture of pulmonary bullae leading to air dissecting into the retroperitoneum.

The patho-physiology of the condition is not completely understood but a number of concepts may be implicated in the formation of Pneumatosis Intestinalis. Loss of mucosal integrity and raised intra-luminal pressure are likely to be strong causative factors. The infiltration of bacteria into the bowel wall is also likely to be a further step in the process. This is supported by the presence of hydrogen in the cysts. Any agent leading to an increase in mucosal permeability may be associated with Pneumatosis Intestinalis including steroids, other immuno-suppressants and chemotherapeutic agents.
Primary Pneumatosis Intestinalis is most often seen in the descending colon. Secondary Pneumatosis Intestinalis commonly occurs in the small bowel but may be seen in any region of the bowel depending on causality.

A number of studies have shown that when the finding of Pneumatosis Intestinalis is confirmed the treatment must be guided on the underlying cause. Surgery be considered in patients with evidence of obstruction, acute abdomen or signs of ischaemia.(3) The presence of pneumatosis in intestinal ischaemia confers a high mortality and surgery should be considered in these patients. Morris et al investigated the outcomes for patients diagnosed with CT and showed the overall mortality to be 22%.(4)

The finding of Pneumatosis Intestinalis may be seen on plain abdominal radiograph however it is best seen on CT images.

In this patient the underlying cause was an acute intestinal ischaemia secondary to small bowel volvulus leading to Pneumatosis Intestinalis, on a background history of long term steroid intake and COAD which may have been contributing factors

REFERENCES

1. Ho LM, Paulson EK, Thompson WM. Pneumatosis intestinalis in the adult: benign to life-threatening causes. Am J Roentgenol. Jun 2007;188(6):1604-13
2. Khalil PN, Huber-Wagner S, Ladurner R, Kleespies A, Siebeck M, Mutschler W, et al. Natural history, clinical pattern, and surgical considerations of pneumatosis intestinalis. Eur J Med Res. Jun 18 2009;14(6):231-9
3. Wiesner W, Mortelé KJ, Glickman JN, et al. Pneumatosis intestinalis and portomesenteric venous gas in intestinal ischemia: correlation of CT findings with severity of ischemia and clinical outcome. Am J Roentgenol. Dec 2001;177(6):1319-23
4. Morris MS, Gee AC, Cho SD, Limbaugh K, Underwood S, Ham B, et al. Management and outcome of pneumatosis intestinalis. Am J Surg. May 2008;195(5):679-82; discussion 682-3