CASE REPORT

PNEUMATOSIS COLI: A CASE PRESENTATION AND REVIEW OF THE LITERATURE

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The case of pneumatosis coli presented here was felt to have occurred concomitantly with chronic obstructive pulmonary disease in combination with prolonged intestinal distention. This condition usually requires no treatment because it is often self-limiting. In this case, because of radiographic and clinical findings suggestive of intestinal obstruction, the patient underwent an exploratory laparotomy and tube cecostomy for decompression and drainage of the markedly distended cecum and transverse colon.

Pneumatosis is a relatively uncommon benign condition characterized by the presence of gas in the subserosa or submucosa. It is a part of the spectrum of pneumatosis intestinalis which can involve any part of the gastrointestinal tract.[1] This condition has also been termed intestinal emphysema, bullous emphysema of the intestine, pneumatosis, gas cysts of the intestine, cystic lymphopneumatosis, and peritoneal lymphopneumatosis.

CASE REPORT

A 63-year-old man presented with a chief complaint of shortness of breath, difficult breathing, and severe coughing with occasional productive sputum. He had had a history of longstanding chronic obstructive pulmonary disease. He had been maintained on oxtriphylline and aminophyllin medications. Physical examination on admission revealed the following findings: temperature, 98°F; pulse, 90 beats per minute and irregular; and respirations, 32 per minute. Positive findings were bilateral wheezing, coarse rales, and rhonchi on auscultation of the lungs. The abdomen was not tender. There was mild hepatomegaly. The blood gases on admission were pH, 7.50; PCO_2, 37 mmHg; and PO_2, 56 mmHg. The other laboratory findings were normal except for sodium, 134 mEq/L; chloride, 87 mEq/L; CO_2, 40 mEq/L; calcium, 8.3 mg/dL; albumin, 3.1 g/dL; and total protein, 5.7 g/dL. A chest radiograph on admission showed chronic obstructive pulmonary disease and cardiomegaly. There was no acute infiltration or consolidation. An electrocardiogram study revealed sinus tachycardia, premature atrial contractions, biatrial enlargement and right ventricular hypertrophy compatible with chronic pulmonary disease and cor pulmonale. A sputum culture and sensitivity were obtained and the patient was given nasal oxygen therapy.

Several days later, during this hospital admission, the patient complained of severe abdominal discomfort. He vomited coffee-ground vomitus and expelled considerable flatus and several small liquid stools. The blood pressure was 170/105 mmHg; pulse, 130 beats per minute; and respirations, 24 per minute. The abdomen was markedly distended and firm. The lower abdomen was ten-

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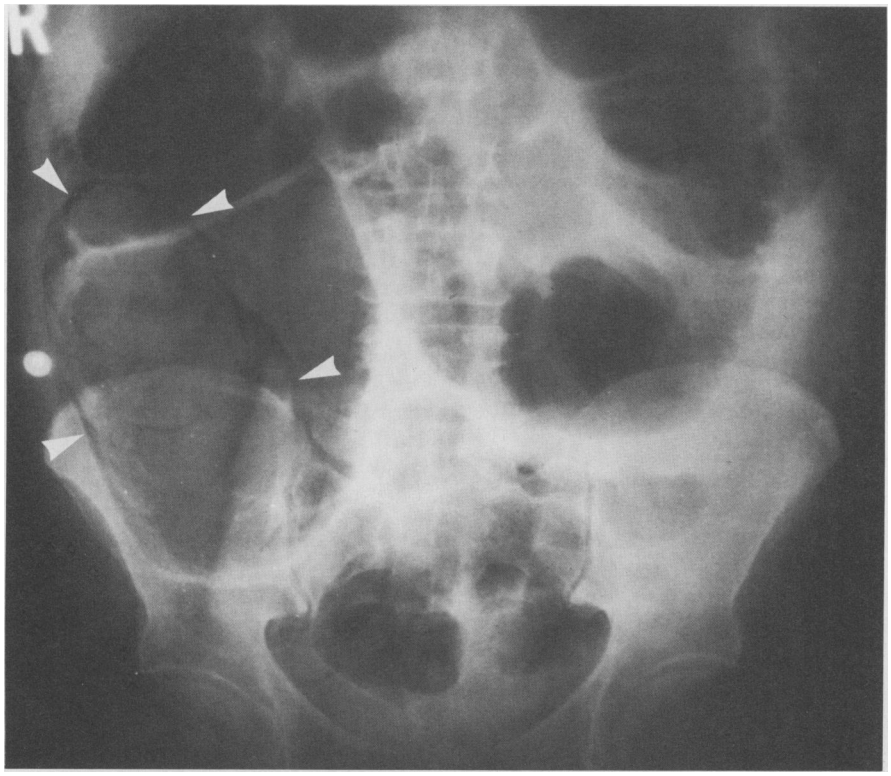

Figure 1. A preliminary film of the abdomen shows linear radiolucent areas in the cecum, which is suggestive of intramural gas in the cecum

der to palpation. On digital examination the rectal ampulla was empty. Radiographs of the abdomen and chest were obtained and plain films of the abdomen revealed linear radiolucent areas in the cecum which were suggestive of intramural air (Figure 1). There was marked distention of the ascending and transverse colon, and multiple air-fluid levels were seen in the abdomen on the lateral decubitus film (Figure 2). There was a paucity of air in the rectal ampulla. These findings suggested intestinal obstruction. The chest radiograph showed a decrease in aeration of the left lung base suggestive of atelectasis or pneumonitis. Otherwise, there was no change from the previous chest film taken on admission. A sigmoidoscopy was performed and it was negative for a mass lesion. A rectal tube was inserted and fixed in place for drainage. A nasogastric tube was inserted into the stomach and connected to a suction device. The patient's condition did not improve. Several repeated radiographs of the abdomen, taken at different time intervals, showed marked distention of the large bowel loops with multiple air fluid levels without significant change. Despite conservative and supportive therapy the patient became febrile and his white blood count became elevated. The abdominal distention and discomfort became more intense thus necessitating an exploratory laparotomy to rule out intestinal obstruction. At the time of surgery, there was no evidence of mechanical obstruction and a tube cecostomy was performed to allow decompression and drainage of the markedly distended cecum and transverse colon. The patient tolerated the surgery and tube cecostomy well. A postsurgical film was taken and the ascending colon and transverse colon were no longer distended and there were no air fluid levels (Figure 3). A barium study of the colon was performed several weeks following surgery and it was normal. The cecostomy tube was removed and the patient was later discharged.

DISCUSSION AND REVIEW OF THE LITERATURE

Pneumatosis has been divided into two general forms—primary and secondary. The disease is

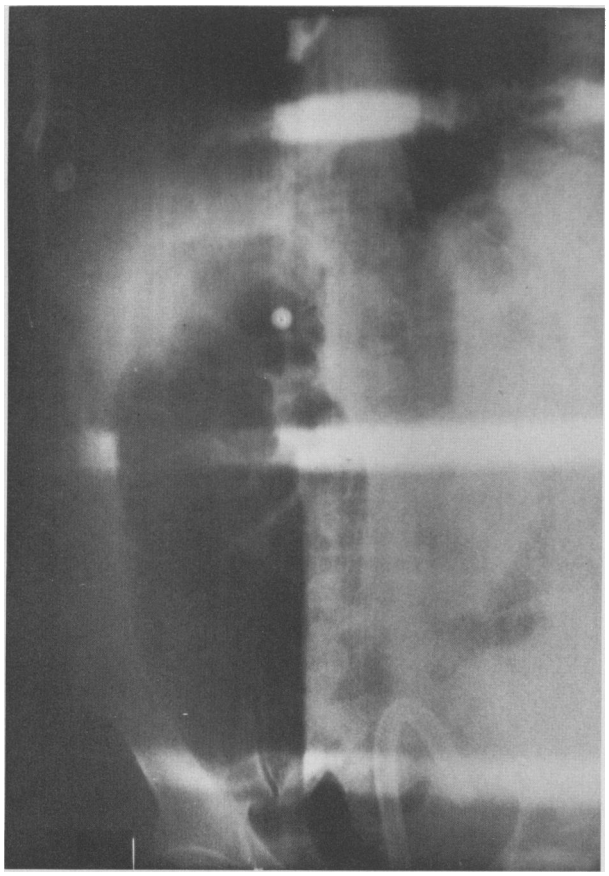

Figure 2. The ascending colon and transverse colon are markedly distended. Multiple air fluid levels are seen on the left lateral decubitus film of the abdomen, which is suggestive of intestinal obstruction

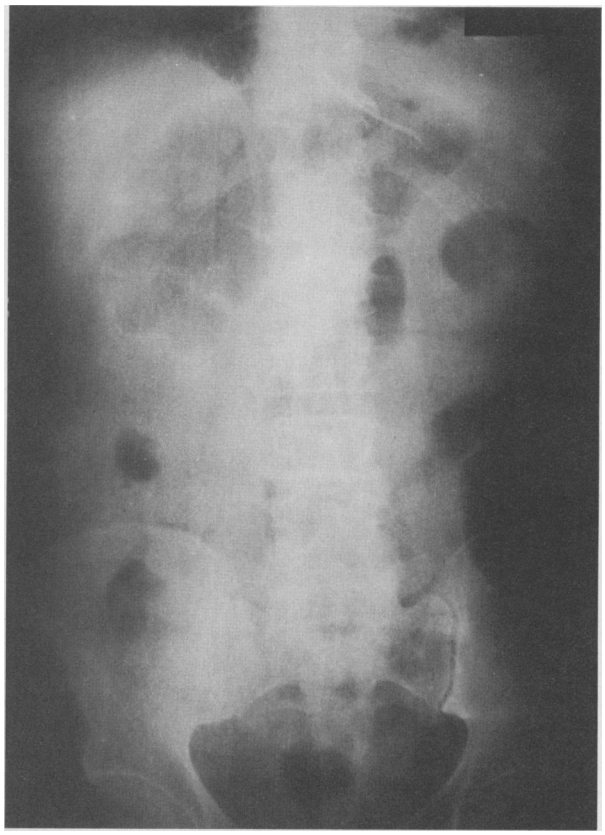

Figure 3. Following surgery and the tube cecostomy the ascending colon and transverse colon were decompressed and there were no air fluid levels

considered primary or idiopathic if there is no coexisting disease of the gastrointestinal tract or the pulmonary organs.[2] The majority of pneumatosis cases (approximately 85 percent) are secondary to the coexistence of associated disorders of the gastrointestinal tract or respiratory system. The secondary form of pneumatosis is associated with a variety of gastrointestinal disorders including stenotic lesions of the esophagus or the pylorus, peptic ulcer disease, inflammatory bowel diseases, collagen diseases, intestinal obstruction, cystic fibrosis of the pancreas, intestinal parasites, end-to-end surgical anastomosis, ischemia, acute and chronic leukemia, Whipple's disease, nontropical sprue, chronic diarrheal disorder, intestinal mucosal ulceration caused by certain chemotherapeutic agents, and mucosal perforation caused by trauma from sigmoidoscopy procedures or rectal polypectomy.[3] Pneumatosis of the intestine may occur concomitantly with chronic obstructive pulmonary disease including emphysema, chronic asthma, chronic bronchitis, and atelectasis.

The etiology of this condition is not entirely clear and a single mechanism cannot account for all cases. Several theories have evolved to help explain the etiology. Of these, the mechanical and bacterial theories are the most plausible.

The mechanical theory suggests that an increase in intrapulmonary pressure from a ruptured alveolar or a pulmonary bleb in patients with chronic pulmonary disease with coughing can either elevate intraluminal pressures causing intramural dissection of air, or it can cause a pneumomediastinum with dissection of air retroperitoneally along vascular routes of the subserosal and submucosal areas of the bowel wall.

Prolonged intestinal distention may cause ab-

normal intraluminal pressure, ischemic mucosal changes, and disordered peristalsis. Prolonged distention alone or in combination with alveolar rupture could have allowed for intramural introduction of gas in this case.

The bacterial theory has been supported by Yale,[4] who injected germ-free rats with Clostridium perfringens. The gas forming bacteria produced pneumatosis in the rats by promoting the dissection of gas through tissue planes and lymphatics of the gastrointestinal tract. Chronic use of steroid therapy has been associated with pneumatosis; however, this is uncertain.

Pneumatosis intestinalis is usually found in adults, but children may be affected.[5] It occurs more frequently in adult males between the ages of 30 and 50, with the ratio to females being approximately 3.5 to 1.

It is frequently difficult to diagnose pneumatosis intestinalis because this condition is usually asymptomatic. Except for occasional gastrointestinal complaints, such as abdominal cramps which are associated with increased constipation, diarrhea, or small stools, the clinical features are nonspecific.[6] Ordinarily, in adults, it is a benign disease which undergoes spontaneous regression although the diagnosis of coexisting disease is usually evident.[7] In children it is a more serious condition that is usually secondary to necrotizing enterocolitis and is associated with a high mortality.

The majority of these cases are identified incidentally on x-ray examination of the abdomen. Intraluminal gas is usually linear or parallel to the long axis of the lumen of the intestine.[8] In this case plain films of the abdomen revealed linear intramural gas in the cecum (Figure 1). There were distended large bowel loops present throughout the abdomen with multiple air fluid levels and an absence of gas in the rectal ampulla (Figure 2).

Preliminary films of the abdomen may also show clusters of small radiolucent gas filled cysts along the outer margins of the bowel. Barium studies will show these air-density cysts to be located on the peripheral margins of the bowel. There are several other diseases which may simulate this condition such as multiple polyposis, pseudopolyposis, colitis cystica profunda, lymphoma, lymphoid hyperplasia, and multiple lipomas.[9] However, during a sigmoidoscopy procedure with biopsy, the air filled cysts will burst and therefore cannot be mistaken for polyps, lymphoma, or lipoma. A chest radiograph may give the appearance of free air underneath the diaphragm in an asymptomatic patient which is actually large subserosal cysts of pneumatosis intestinalis.

Usually no treatment is necessary and the pneumatosis may disappear spontaneously, persist for many years, or there may be recurrence after treatment. Frequently, this condition remains asymptomatic. However, treatment may need to be directed to an underlying disease.

Recently, properly administered oxygen therapy with regular monitoring of the vital capacity has proven an effective and safe method of treating pneumatosis coli. Oxygen therapy should not, however, be administered to patients with severe airway obstruction.

Several pneumatosis cases are discovered incidentally at the time of surgery. However, surgery should be reserved for complications such as hemorrhage, obstruction, perforation, or sepsis, rather than the disease itself. Only the affected portion of bowel that is intractable and/or life threatening should be resected. In lieu of bowel resection, it is possible that proximal diversion of the fecal stream and drainage may be the best approach in selected cases of pneumatosis coli.

Literature Cited

1. Gefter WB, Evers KA, Malet PF, Kressel HY. Nontropical sprue with pneumatosis coli. AJR 1981; 137:624-625.

2. Bochus HL. Gastroenterology, ed 3. Philadelphia: Saunders, 1976, pp 1097-1101.

3. Shindelman LE, Geller SA, Wish N, Bauer JJ. Pneumatosis cystoides intestinalis. Am J Gastroenterol 1981; 75:270-274.

4. Yale GE. Etiology of pneumatosis cystoides intestinalis. Surg Clin North Am 1975; 55:1297-1302.

5. Bogoch A. Gastroenterology. St. Louis: McGraw Hill, 1973, p 589.

6. Spiro HM. Clinical Gastroenterology, ed 2. New York: MacMillan, 1970, pp 669-700.

7. Yan K, Pigott P. Pneumatosis coli. Med J Aust 1981; 2:360-361.

8. Olmsted WW, Madewell JE. Pneumatosis cystoides intestinalis: A pathophysiologic explanation of the roentgenographic signs. Gastrointest Radiol 1976; 1:177-181.

9. Nelson S. Extraluminal gas collections. Am J Roentgenol 1972; 115:225-248.