

## **Pneumatosis Cystoides Coli**

Richard H. Marshak, Arthur E. Lindner, and Daniel Maklansky

Mt. Sinai School of Medicine, City University of New York, and New York University School of Medicine, New York, USA

**Abstract.** Pneumatosis cystoides coli in most cases is a disease of unknown etiology. In a few patients, it is secondary to an infarction or ulcerative colitis. Associated pulmonary emphysema is not uncommon. The gas pockets, which may be of varying size, can be identified along the contour of the bowel. The left side of the colon is more frequently involved than the right. The lesion is usually segmental. The rectum is almost always spared. Symptoms are negligible and operation is not required.

**Key words:** Pneumatosis coli – Gas cysts – Subserosal location – Colon.

---

Pneumatosis cystoides coli is a relatively uncommon condition. It is characterized by the presence of multiple gas-containing cysts in the wall of the colon. Gas cysts may also be found in the small bowel, and the condition, anywhere in the intestine, has been called pneumatosis cystoides intestinalis. Pneumatosis coli may be an incidental finding on a barium enema examination or abdominal plain film but sometimes it is associated with systemic or gastrointestinal diseases.

### **Pathology**

On gross examination, the involved bowel may feel spongy or crepitant. If the cysts are subserosal in location they are visible in the unopened specimen. On section the bowel wall is honey-combed with gas cysts. The individual cysts may be tiny or vary in size to 1 or 2 cm in diameter. Usually no communication with the lumen of the bowel can be identified. Most often the cysts are lined by a layer of endothelial cells, an observation that has led to the suggestion that the cysts may represent distended lymphatics.

---

*Address reprint requests to:* Richard H. Marshak, M.D., 1075 Park Avenue, New York, NY 10028, USA

The cyst lining may be the site of chronic inflammatory changes with multinucleated giant cells. Analysis of the gas present in the cysts has indicated a composition similar to that of atmospheric air [1], although not many studies have been offered in the literature. Such analyses have not been helpful in efforts to establish a mechanism for cyst formation.

When series of patients with pneumatosis are studied it becomes apparent that some have coexisting gastrointestinal or pulmonary disease. Associated gastrointestinal illnesses include collagen disease, diabetes, ischemia of the colon, inflammatory bowel disease, traumatic endoscopy, and polyp excision. In former years pneumatosis involving the right side of the colon due to pyloric obstruction was occasionally seen. This has become less frequent because operations for gastric outlet obstruction are performed at an earlier stage. More frequent localization of pneumatosis now is in other segments of the colon.

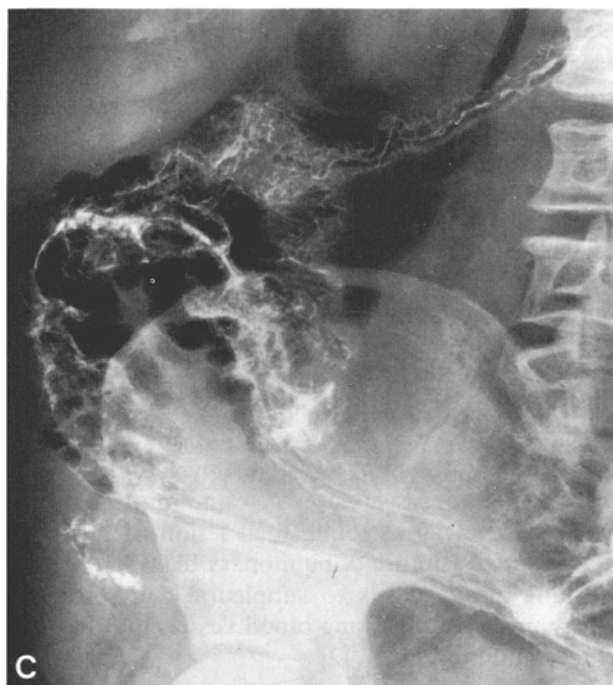
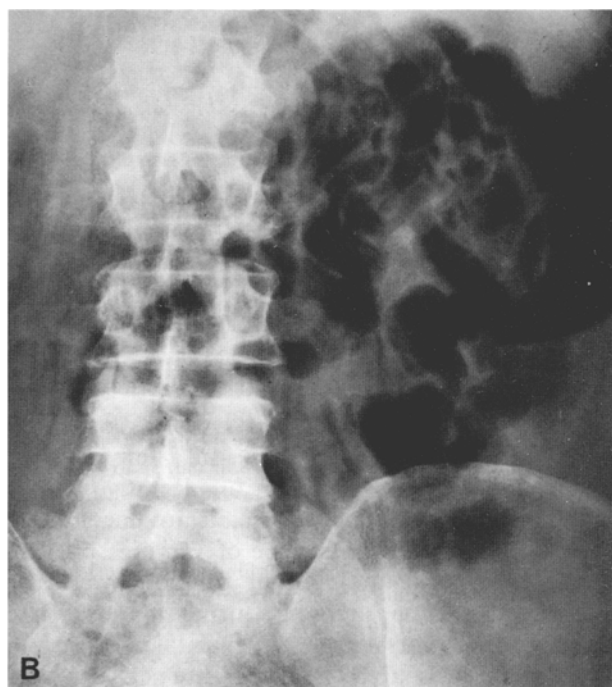
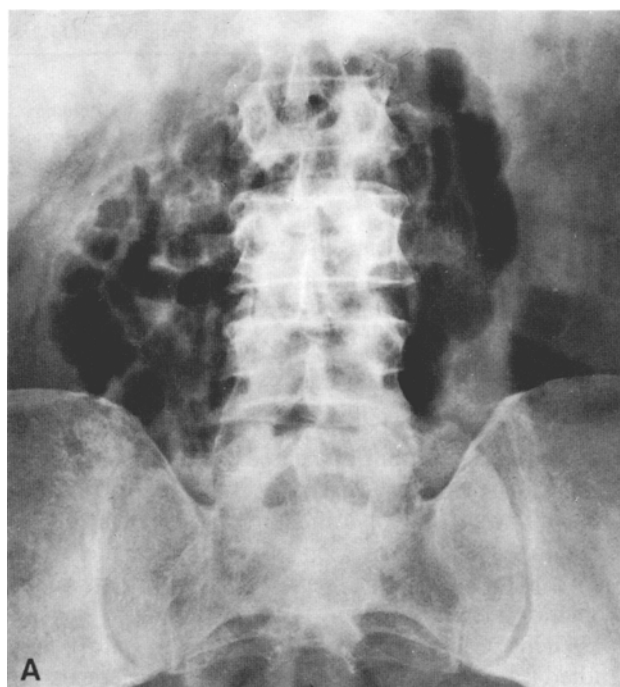
In the small bowel the cysts usually are clearly secondary to intrinsic bowel disease. Rarely they are idiopathic. In the colon, however, many cases have no known etiology.

In some cases luminal air is a reasonable source of gas for the cysts, as in perforation of a viscus or in inflammatory and vascular bowel diseases. Obstructive pulmonary disease is a common finding. In the absence of a gastrointestinal lesion, it has been proposed that rupture of pulmonary blebs in obstructive lung disease leads to subpleural and retroperitoneal air dissecting along blood vessels into the mesentery and bowel wall [2].

### **Clinical Features**

Pneumatosis cystoides coli may be discovered as an incidental finding during examination for some other illness. Abdominal cramps, diarrhea, and rectal bleeding sometimes occur.

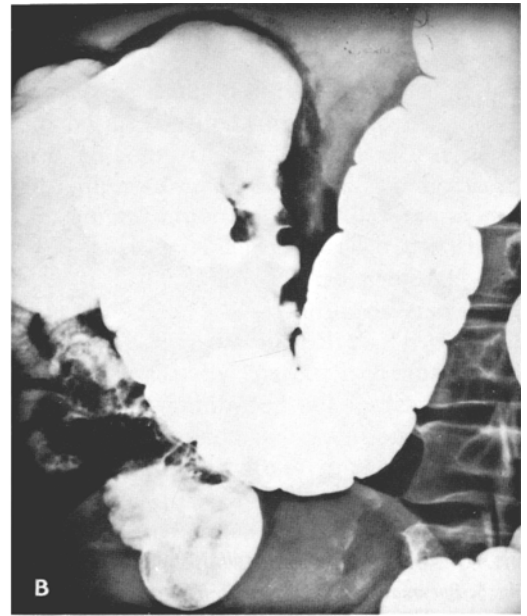
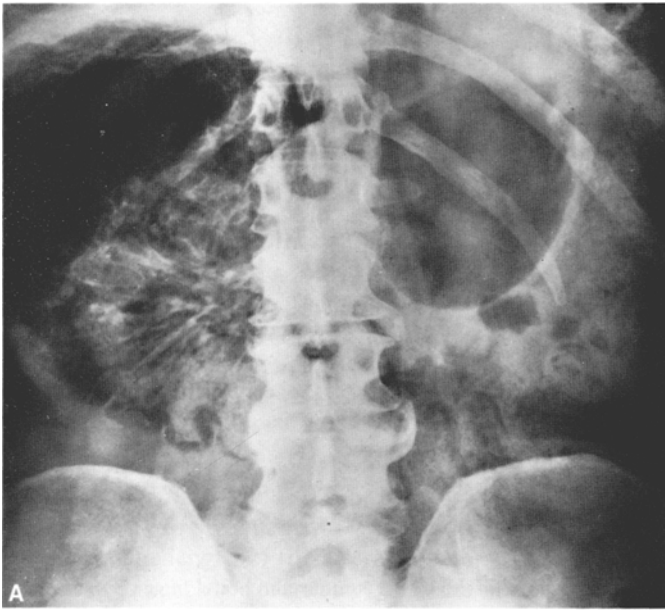
When pneumatosis involves the sigmoid, diagnosis can be made by sigmoidoscopy [3, 4]. The cysts pro-



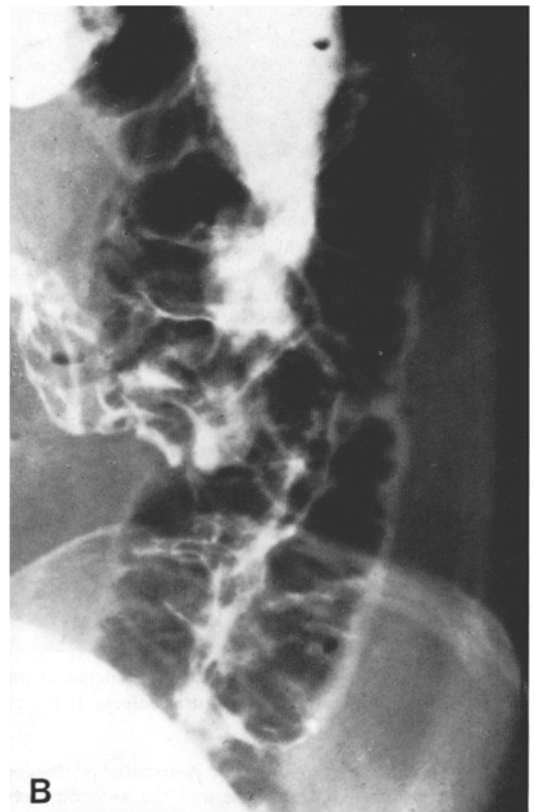
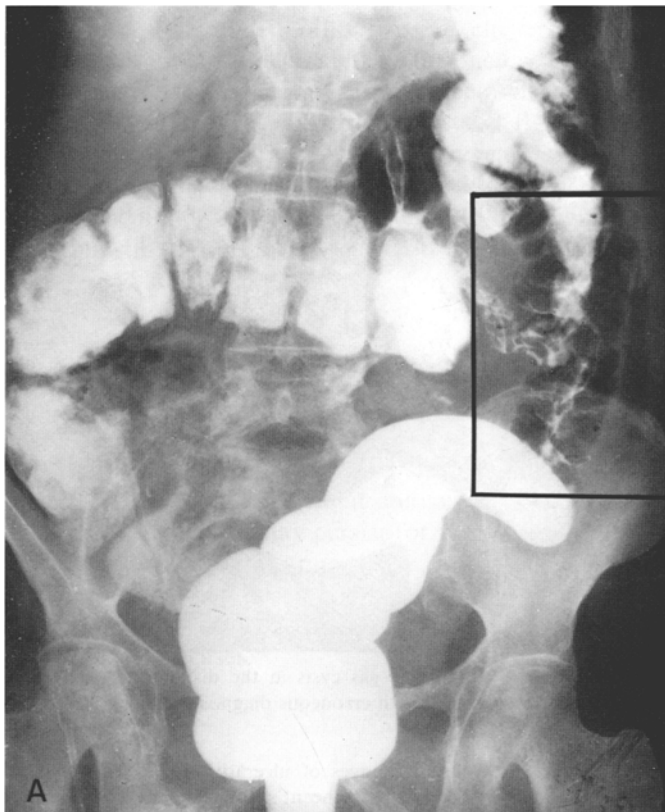
**Fig. 1.** **A** *Pneumatosis cystoides coli*. A grape-like cluster of gas is identified in the midportion of the abdomen. **B** Several days later these gas shadows are found in the left upper abdomen. **C** Barium enema study reveals these gas shadows to be situated in the wall of a redundant sigmoid, which has a long mesentery and is located in the right upper quadrant

trude into the lumen as pale, soft masses that rather resemble sessile polyps. The wall can be biopsied, collapsing the cyst, without complications. Submucosal cysts in the more proximal colon can be visualized by colonoscopy [5]. Usually, however, the roentgen findings on plain abdominal films and barium enema examination are quite adequate for diagnosis.

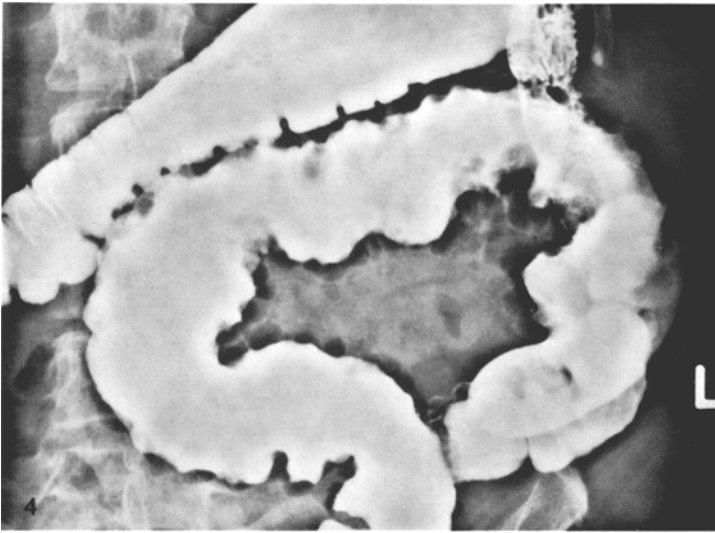
Ordinarily no treatment is required and pneumatosis cystoides coli resolves spontaneously or with appropriate management of associated disease. In recent years attempts have been made to treat the few cases of symptomatic pneumatosis by oxygen breathing in order to facilitate diffusion of gas from the cysts [6, 7].



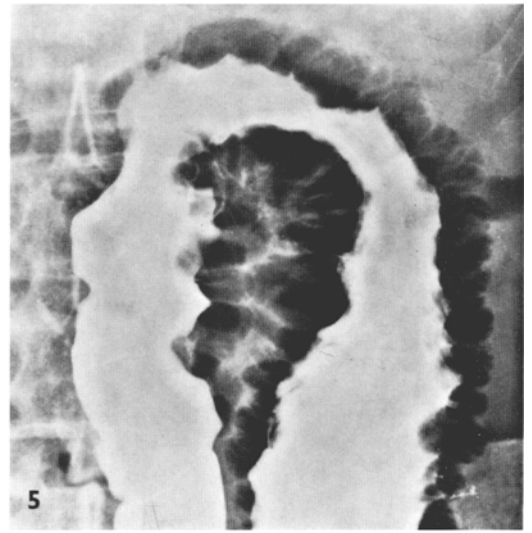
**Fig. 2. A** *Pneumatosis cystoides coli*. A plain film of the abdomen reveals a large lobulated gas shadow in the right upper quadrant. The gas involves the mesentery and outlines the mesenteric blood vessels. **B** Barium enema examination reveals the presence of gas cysts in the hepatic flexure and right side of the colon



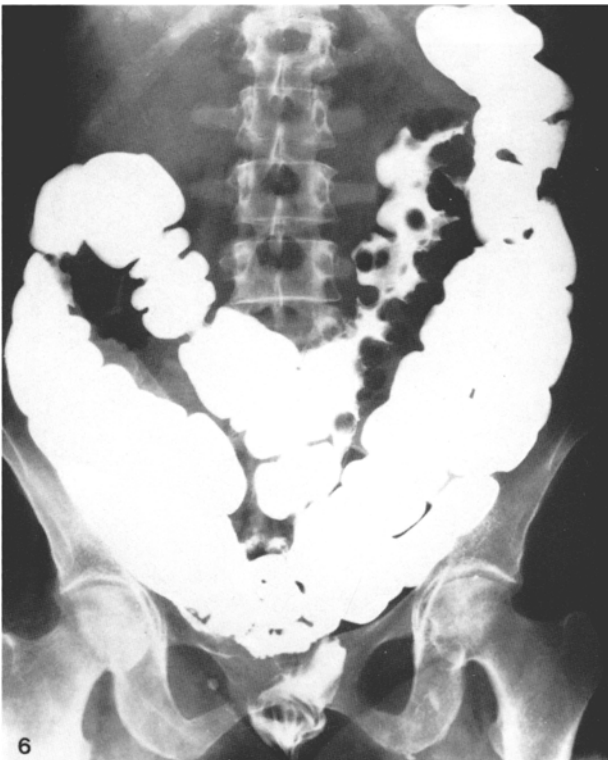
**Fig. 3. A** *Pneumatosis cystoides coli*. Barium enema examination performed one day after sigmoidoscopy and biopsy. There are multiple intramural gas pockets along the course of the distal transverse and descending colon. These irregularly encroach on the bowel lumen. **B** Magnified view of the descending colon. There is marked involvement of the bowel wall by the gas cysts



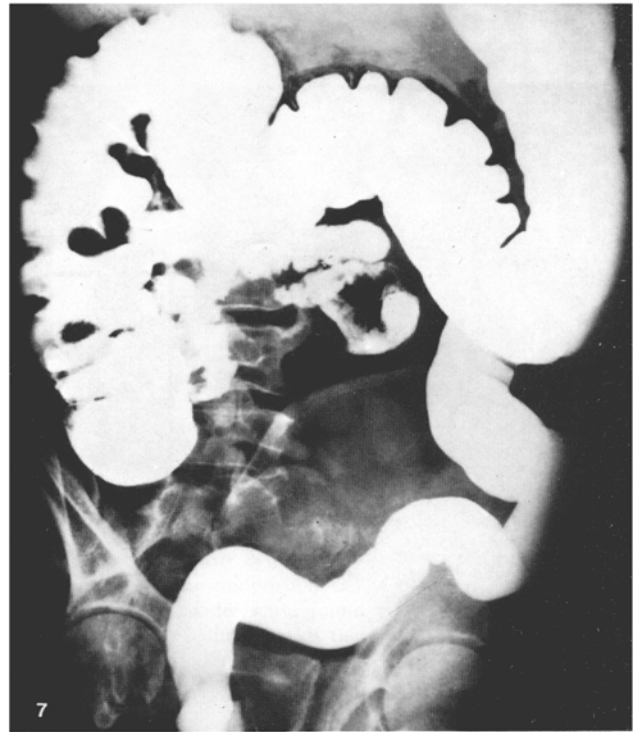
**Fig. 4.** *Pneumatosis cystoides coli*. Multiple sigmoid gas cysts



**Fig. 5.** *Pneumatosis cystoides coli*. View of splenic flexure demonstrating indentation on the bowel contour and bowel lumen by numerous gas cysts. The outer margins of the cysts are well delineated



**Fig. 6.** *Pneumatosis cystoides coli*. Barium enema examination reveals the presence of multiple gas cysts in the distal transverse colon simulating intraluminal and intramural defects. If the cysts were not recognized to contain air, an erroneous diagnosis of lymphosarcoma might be made



**Fig. 7.** *Pneumatosis cystoides coli*. Associated with ulcerative colitis. The colon shows usual changes of ulcerative colitis. Pneumatosis involves the proximal transverse and the ascending colon (Courtesy of Dr. Arthur Clemett, St. Vincent's Hospital, New York City)

## Roentgen Features (Figs. 1-7)

Plain films of the abdomen may reveal grape-like radiolucent clusters along the contour of the colon and in the region of the mesentery. These are more common in the sigmoid mesentery and they shift in position in different projections. Free air under the diaphragm has not been seen in our group of patients. The clusters of air associated with pneumatosis cystoides coli can be readily distinguished from gas in abscess cavities because in pneumatosis there are discrete, sharply defined borders and the cysts are distributed along the contours of the colon.

Pneumatosis cystoides coli is usually segmental in distribution [8, 9]. We have not seen a universal pneumatosis. The rectum is rarely involved, and the left colon is more frequently a site of involvement than the right. The length of the alterations may vary from one or two inches to several feet. Barium studies confirm that the gas shadows lie adjacent to the intestinal lumen and indent its contours [10]. Depending on the size and number of the gas cysts, a variable appearance is noted in the barium filled colon. There is one common feature: the filling defects lie between the lumen, outlined by barium, and the outer margin of the bowel wall. Occasionally the cysts are small, simulating tiny polyps; others are in clusters; and still others are so large that they produce scalloped defects simulating large intramural defects. In the latter instance it may be difficult to distend the colon completely. The barium-filled lumen reveals varying degrees of encroachment. Although slight obstruction can be encountered during retrograde filling, significant intestinal obstruction has not been seen and proximal dilatation is rare. The mucosal pattern is distorted by intramural masses but the folds are intact.

The bowel segments involved in pneumatosis need not be continuous and skip areas may be identified. When pneumatosis is secondary to ischemia of the colon, the blebs are confined to a short segment and the other roentgen manifestations of ischemia are prominent. Gas cysts may persist for many years and remain unchanged in appearance. In many cases complete resolution occurs.

Pneumoperitoneum is rare and has not been seen in our series of cases.

## Differential Diagnosis

When the cysts are small the fact that they contain gas may not be appreciated and the indentation on the barium filled colon is mistaken for an early presentation of lymphosarcoma or metastatic disease of the colon. In lymphosarcoma the nodules do not contain gas and they are frequently associated with enlarged folds. Although colitis cystica profunda may extend proximally as far as the mid-transverse colon, the rectum is characteristically involved. In pneumatosis the rectum is usually spared. Ischemia of the colon produces some thumb-printing, increased secretions, and rapid progression or resolution of the lesion. The most obvious mistake is confusing pneumatosis cystoides coli with polyposis. In polyposis the lesions are within the lumen of the bowel and do not have the characteristic anatomic location or the roentgen features described above. They are not, of course, present in the mesentery.

## References

1. McGregor JK, McKinnon DA: Intestinal interstitial emphysema (pneumatosis cystoides intestinalis). *Gastroenterology* 35:206-211, 1958
2. Keyting WS, McCarver RR, Kovarik JL: Pneumatosis intestinalis: A new concept. *Radiology* 76:733-741, 1961
3. Smith WG, Anderson MJ, Pemberton HW: Pneumatosis cystoides intestinalis involving the left portion of the colon. Report of 4 cases diagnosed at sigmoidoscopy. *Gastroenterology* 35:528-533, 1958
4. Bass DB, Schuster MM: Proctoscopic diagnosis of pneumatosis cystoides coli. *Gastrointest Endosc* 16:164-166, 1970
5. Varano VJ, Bonanno CA: Colonoscopic findings in pneumatosis cystoides intestinalis. *Am J Gastroenterol* 59:353-359, 1973
6. Simon NM, Nyman KE, Divertie MB: Pneumatosis cystoides intestinalis. Treatment with oxygen via close-fitting mask. *JAMA* 231:1354-1356, 1975
7. Gruenberg JC, Batra SK, Priest RJ: Treatment of pneumatosis cystoides intestinalis with oxygen. *Arch Surg* 112:62-64, 1977
8. Marshak RH, Eliasoph J: Pneumatosis coli. *Am J Dig Dis* 1:99-107, 1956
9. Marshak RH, Lindner AE, Milano AM: Pneumatosis coli. *Am J Gastroenterol* 56:68-73, 1971
10. Bloch C: The natural history of pneumatosis coli. *Radiology* 123:311-314, 1977

Received: May 20, 1977; accepted: June 7, 1977