

Gastrointestinal malignant neoplasms disguised as pneumatosis cystoids intestinalis

A case report and literature review

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Abstract

Rationale: Pneumatosis cystoids intestinalis (PCI) is a rare disease in which gas develops in the mucosa or submucosa of the digestive tract. The etiology and pathogenesis of this disease, at present, remain unclear, and gastrointestinal malignant neoplasms may be a potentially important cause. Herein, we report a case of mantle cell lymphoma presenting as PCI as well as present a literature review of cases of suspect PCI that was definitively diagnosed as gastrointestinal neoplasms. In doing so, we highlighted cases of neoplastic pathogenesis that present as PCI.

Patient concerns: A 55-year-old man was referred to our gastrointestinal department with complaints of intermittent abdominal pain, distention, diarrhea, and occasional melena that persisted for 2 months. He has a history of nasopharyngeal carcinoma.

Diagnoses: Intensive, translucent, grape-like cystoids of the whole colon and small intestine were disguised as PCI upon colonoscopy and capsule endoscopy.

Interventions: Right hemicolectomy and ileocecectomy were performed for intussusception and to confirm the diagnosis. Final pathology indicated that the mass was mantle cell lymphoma.

Outcomes: After surgery and subsequent chemotherapy, the patient showed good recovery and no abnormal lesions were detected on colonoscopy.

Lessons: As shown through this case and a literature review of similar cases of apparent PCI that was definitively diagnosed as gastrointestinal neoplasm, gastrointestinal malignant neoplasms might rarely present as PCI and neoplastic etiologies should also be considered once PCI is detected. Because most patients with malignant PCIs might inevitably experience severe complications, abdominal surgery should be considered and applied timely after unsuccessful resolution by conservative medical therapies and symptomatic treatments.

Abbreviation: PCI = pneumatosis cystoids intestinalis.

Keywords: gastrointestinal tumor, literature review, mantle cell lymphoma, pneumatosis cystoids intestinalis

1. Introduction

Pneumatosis cystoids intestinalis (PCI) is a rare disease in which gas develops in the mucosa or submucosa of the digestive tract. It

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always presents as a benign disease and is recommended to be treated conservatively. Herein, we report a case of mantle cell lymphoma presenting as PCI as well as present a literature review of cases of suspect PCI that was definitively diagnosed as gastrointestinal neoplasms. In doing so, we highlighted the cases of neoplastic pathogenesis that present as PCI.

2. Case presentation

The Ethics Committee of Zhujiang Hospital approved this case report. The patient presented in this case report gave his written informed consent authorizing use and disclosure of his protected health information. A 55-year-old man was referred to our department on December 24, 2015. He complained of intermittent abdominal pain, distention, diarrhea (approximately 4–5 times/d), and occasional melena over the preceding 2 months. The patient had a history of nasopharyngeal carcinoma and was treated with radiotherapy and chemotherapy. Magnetic resonance imaging was conducted quarterly to exclude the recurrence of carcinoma. Upon physical examination, he presented with an anemic appearance and mild epigastric pain. Laboratory investigations showed an extremely low hemoglobin level (69 g/L) and positive fecal occult blood testing, whereas liver and kidney function, coagulation function, myocardial enzyme levels, serum amylase and lipase concentrations, and thyroid function

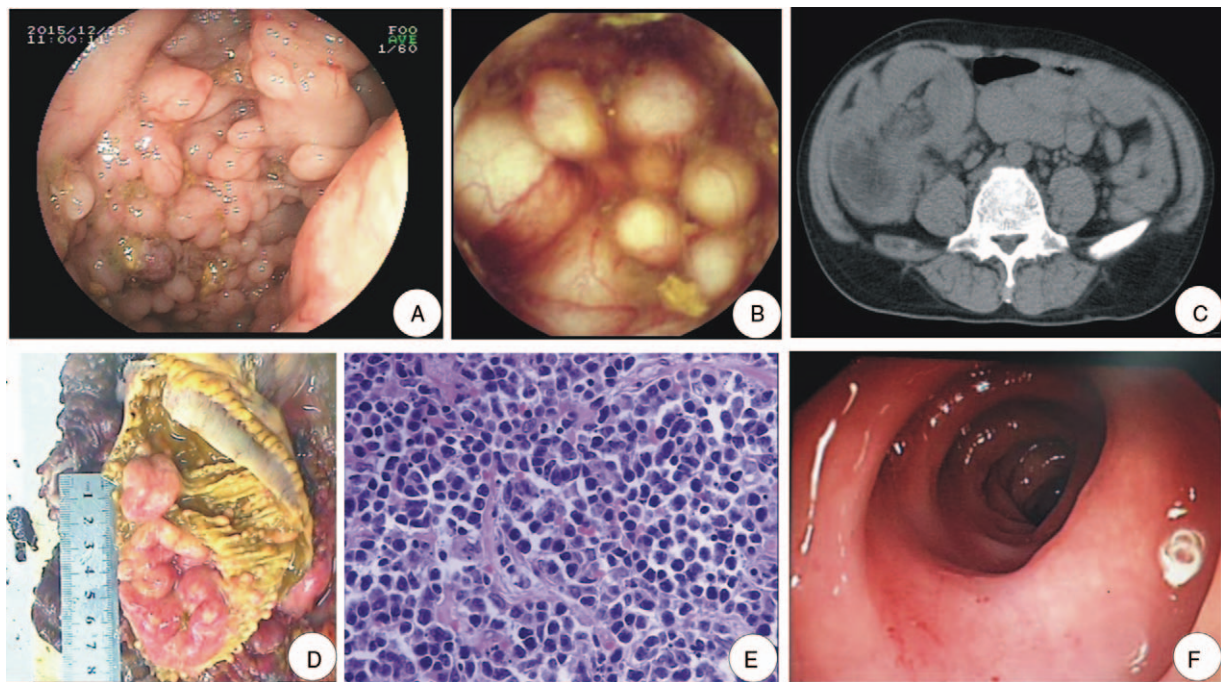


Figure 1. Imaging, endoscopic, and pathology information of the patient. Both colonoscopy (A) and capsule endoscopy (B) have shown intensive, translucent, grape-like cystoids with normal or congestive overlying mucosa in the lumen. When touched with biopsy forceps, these cystoids were soft or flexible, but collapsed with no fluid flowing out after mucosa biopsy. (C) An abdominal CT scan found an intussusception of the terminal ileum within the ascending colon. (D) The resected ileocecal mass is approximately 15×20 cm. Within the resected ileocecal segment, severe hyperemia, edema, and intensive cystoids were visible. (E) Cluster of differentiation 5-negative mantle cell lymphoma is confirmed by histologic examination (hematoxylin-eosin stain; $\times 40$). (F) After surgery and chemotherapy, the patient showed good recovery. No abnormal lesions were detected on colonoscopy in August 2016. CD = cluster of differentiation; CT = computed tomography.

were within the normal range. Electrocardiography and chest radiography findings were normal; however, abdominal ultrasound showed enlarged lymph nodes. On the second day, gastrointestinal endoscopy was conducted. During which, esophagogastroscopy indicated the presence of ulcers (A2 stage) in the gastric angle with a negative rapid urease test, whereas colonoscopy showed intensive, translucent, grape-like cystoids (Fig. 1A). The apical, adjacent mucosa of some of the cystoids appeared to be bluish and erosion. When touched with biopsy forceps, these cystoids were soft or flexible, but collapsed with no fluid flowing out after mucosa biopsy. Such cystoids were also detected in the middle and the lower segments of the small intestine (Fig. 1B). With these endoscopic characteristics, endoscopists suggested PCI as the primary diagnosis; hence, venous nutrition support, mucosa protection, and symptomatic treatment were provided to the patient. However, on the fourth day, the patient experienced deteriorating abdominal pain, diarrhea, and bloody stools. Physical examination revealed a movable, tender mass in the right lower abdomen. Abdominal computed tomography revealed an intussusception of the terminal ileum within the ascending colon (Fig. 1C). Emergency exploratory laparotomy was recommended by surgeons, and right hemicolectomy and ileocectomy were performed. A large ileocecal mass (15×20 cm) was detected and identified as intussusception (Fig. 1D). Within the resected ileocecal segment, severe hyperemia, edema, and intensive cystoids were visible. Surprisingly, histologic examination showed cluster of differentiation 5-negative mantle cell lymphoma (Fig. 1E). Subsequent chemotherapy, including modified-Hyper-cyclophosphamide, vincristine, doxorubicin, and dexamethasone alternating with high-dose methotrexate and cytarabine) + rituximab, high-dose cytarabine,

and R-maxi-rituximab, cyclophosphamide, doxorubicin, vincristine, prednisone alternating with rituximab were administered successively since January 13, 2016. As the patient recovered well, and there were no abnormalities detected by colonoscopy (Fig. 1F) and full gastrointestinal contrast, stoma closure was conducted on August 16, 2016.

3. Literature review

As gastrointestinal neoplasms might exhibit a similar appearance as PCI, we performed a literature search to further address PCI and its potential neoplastic pathogenesis. Five databases, including PubMed, Web of science, Embase, WanFang Data, and China National Knowledge Infrastructure, were searched up to July 2017 by using the following search query: (pneumatosis cystoids) AND (gastri* OR intestin* OR jejunum OR jejun* OR ileum OR ileo* OR cecum OR cecal OR colon OR sigmoid OR rectum) AND (cancer OR tumor OR malignant OR neoplasms OR lymphoma). No language limit was applied and non-English articles were translated when necessary. Eventually, 18 reports, including 19 cases, were identified (Table 1).^[1–18] Of these cases, 10 were men and 9 were women, and their average age was 64.3 ± 15.3 years. The most common symptom was abdominal pain (7/19, 36.8%), followed by diarrhea (4/19, 21%), distention (5/19, 26.3%), bloody stool (4/19, 21%), nausea (4/19, 21%), vomiting (5/19, 26.3%), hypodynamia (3/19, 15.7%), loss of weight (5/19, 26.3%), fever (4/19, 21%), and jaundice (2/19, 10.5%). These symptoms appeared to be nonspecific. The determined malignant neoplasms included cardiac cancer ($n=1$), duodenal carcinoma ($n=2$), lower gastrointestinal carcinoma ($n=8$, 1 in jejunum, 1 in ileocecum, 3 in colon, 1 in rectum, and 2

Table 1**Clinical information of the selected cases (N = 19).**

N (%)			
Region		Clinical manifestations	N (%)
Europe and America	8 (42.1)	Abdominal pain	7 (36.8)
Asia	11 (57.9)	Diarrhea	4 (21.0)
Sex (male:female)	10:9	Distention	5 (26.3)
Age, y		Bloody stool	4 (21.0)
Mean age	64.3±15.3	Nausea	4 (21.0)
Age interval	39 to 94	Vomiting	5 (26.3)
Pathogenesis		Hypodynamia	3 (15.7)
Primary GI carcinomas	12 (63.2)	Loss of weight	5 (26.3)
Secondary GI carcinomas	2 (10.5)	Fever	4 (21.0)
Primary lymphomas	5 (26.3)	Jaundice	2 (10.5)
Location			
Upper digestive tract	5 (26.3)	Intestinal stenosis	18 (94.7)
Small intestine	3 (15.8)		
Colorectum	11 (57.9)		

GI = gastrointestinal.

in sigmoid), duodenal metastasis from cholangiocellular carcinoma (n = 2), lymphoma (n = 5), and gastrointestinal sarcoidosis (n = 1). Remarkably, these aforementioned malignant neoplasms all led to the complication of gastrointestinal stenosis, which ultimately required surgical removal and subsequent histologic examination.

4. Discussion

PCI is an uncommon disease with an unknown etiology that is characterized by the presence of gas within the submucosa or subserosa of the intestine. Although some cases and case series have been reported, the vast majority of these reports refer to sporadic cases and have not yet identified a general incidence. However, systematic analysis might provide some general characteristics of PCI. In a retrospective review of PCI, Koss^[19] found a 3.5:1 male-to-female ratio for the occurrence of PCI in patients aged 30–50 years, and Jamart^[20] observed a 3:1 male-to-female ratio (41–50 years of age) for PCI. In this literature review, we observed a 10:9 male-to-female ratio and an average age of 64.3±15.3 years. Moreover, the most common localization of gas was in the submucosa (69.9%), with PCI occurring more commonly in the colon.^[21] Morris et al^[22] indicated that the incidence of PCI was 46% in the colon, 27% in the small intestine, and only 7% in both the colon and small intestine. Meanwhile, Wu et al^[21] recorded the approximate trend of location (colon vs. small bowel, 1.3:1) in a Chinese cohort.

Though first described by Du Vernoy^[23] in autopsy specimens in 1730 and subsequently named by Mayer as PCI in 1825, PCI is still poorly understood. Currently, there are several major theories to explain the abnormal accumulation of gas. For example, “the mechanical theory” means that intestinal obstruction, inflammatory bowel disease, ischemic bowel disease, gastroenteric tumor, anorectal surgery, and bowel preparation or colonoscopy resulting in intestinal wall injury or increased intraluminal pressure serve as the causative agent in PCI of intramural gas.^[24,25] Meanwhile, the bacterial theory refers to the production of gas by gas-forming bacteria that enters the mucosal barrier through mucosal rents or increased mucosal permeability. Indirect support for this theory was obtained by the successful treatment of PCI with antibiotics. Other theories,

including the pulmonary theory and the chemical theory or nutritional deficiency theory have also been described.^[16] Although many theories can account for the etiology or pathogenesis of PCI, no theory is sufficient to account for the entire pathologic processes. Similarly, the mechanisms of disease in the 19 patients described in this study are unclear. Based upon our experiences and observations, the mechanical theory and the bacterial theory best support our findings.

The clinical manifestations of PCI are varied. According to our literature review, the common manifestations include abdominal pain, diarrhea, distention, bloody stool, loss of weight, fever, and some other nonspecific symptoms. Such manifestations highlight the similarities between the benign group and the malignant group. When the cysts increase in size and become larger, the cysts may commonly cause obstruction by internal or external compression of the bowel lumen. Statistics from Wu et al^[21] showed us a complication incidence of 16.3% (39/239), which mainly includes intestinal obstruction (51.3%, 20/39) or intestinal perforation (35.9%, 14/39). Notably, there are relatively fewer cases reported as intussusception associated with PCI. In 2016, Itazaki et al^[26] performed a literature review and found 9 reports of such cases. For this reason, interpretation or analysis of the pathogenesis of intussusception associated with PCI is needed.

PCI may be found by laparotomy, radiology, or endoscopic examinations, and can distinguish between benign or malignant tumors through pathological examination. Once confirmed, its management might be challenging for clinicians. Currently, there is no consensus on the appropriate management. Conservative medical therapies and symptomatic treatments are recommended empirically, whereas surgical treatment should be considered when severe complications, such as bowel obstruction, intussusception, and massive hemorrhage, occur. In our literature review, all patients with PCI derived from gastrointestinal malignant tumors ultimately required surgical removal, thereby indicating that clinicians must be mindful of such potential complications and the deteriorations of PCI. Abdominal surgery should be considered and performed at the most appropriate time if possible.

5. Conclusion

Gastrointestinal malignant neoplasms can present as PCI, and neoplastic etiologies should also be considered once PCI is detected. As most patients with malignant PCIs may inevitably experience severe complications, abdominal surgery should be considered and applied emergently after unsuccessful resolution by conservative medical therapies and symptomatic treatments.

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