

Case Report

Perforated acute appendicitis misdiagnosed as colonic perforation in colon cancer patients after colonoscopy: a report of two cases and literature reviews

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Abstract: Free gas in the abdominal cavity usually indicates that the perforation of the gastrointestinal tract from many factors including perforated ulcer, tumor perforation and severe infection, etc. But the pneumoperitoneum in perforated acute appendix secondary to the colonoscopy was rare relative. We reported two colon cancer patients with signs of abdominal free air after the operation of colonoscopy, considered the diagnosis of colon perforation at first, but eventually they were confirmed as perforated appendicitis. This report highlights that purulent perforated appendicitis should be considered especially for elderly patients with colon tumor presenting as signs of pneumoperitoneum after the endoscopic operation.

Keywords: Pneumoperitoneum, perforated appendicitis, colon cancer perforation, colonoscopy

Introduction

Pneumoperitoneum is defined as free gas appears in the abdominal cavity, is usually caused by the perforation of the alimentary tract secondary to pathological or iatrogenic factors, but caused by purulent perforated appendix was rare relative. Disease related factors consist of gastrointestinal tumors, ulcers, and severe inflammation, etc. Iatrogenic pneumoperitoneum is mainly produced by the digestive tract endoscopy examination.

Colonoscopy as a kind of common procedure is used to investigate abnormal conditions of the colon and the distal small intestine [1]. Although colonoscopy was regarded as a relatively safe procedure, it entails significant morbidity and mortality. Two main complications of it are hemorrhage and perforation [2], and the incidence of colon perforation after the colonoscopy was estimated to be 0.03% to 0.8% for diagnostic colonoscopy and 0.15% to 3% for therapeutic colonoscopy, because the mechanical strength of the colon wall decrease with aging, the incidence of perforation might be higher in the older patient [3-5]. According to previous experiences, patients with pneumoperitoneum after the colonoscopy usually are considered the diagnosis of colon perforation, though the low incidence of it.

Acute perforated appendicitis is one of the common causes of acute abdomen and is needed emergency surgery. Its incidence was higher in elderly population [6]. However, acute appendicitis following the operation of colonoscopy as a rare complication, with a considered incidence of 0.038%, and the appendix is more likely to be perforated if delayed treatment was implemented especially in elderly patients [7-10], so it is necessary to consider the perforated appendicitis as a differential diagnosis for the aged with pneumoperitoneum after the colonoscopy.

The aim of this report is to describe two cases of colon cancer patient with signs of free gas in abdominal cavity caused by perforated appendicitis were misdiagnosed as iatrogenic colonic perforation after the operation of colonoscopy. Perforated appendicitis can rapidly progress to peritonitis and sepsis, so it is important to make diagnosis and treatment as early as possible.

Case presentation

Case 1

A 67 years old man was admitted to emergency because of the severe abdominal pain and distension, with nausea but without vomited. He

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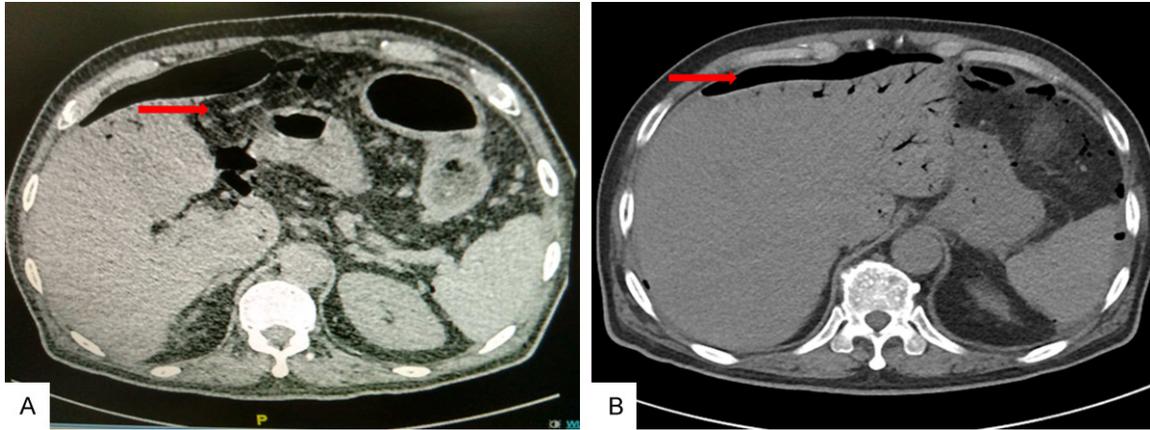


Figure 1. A, B. Abdominal CT showed a large amount of free gas in the abdominal cavity. A. The narrow of bowel cavity was caused by tumor and the expansion in the upper bowel.

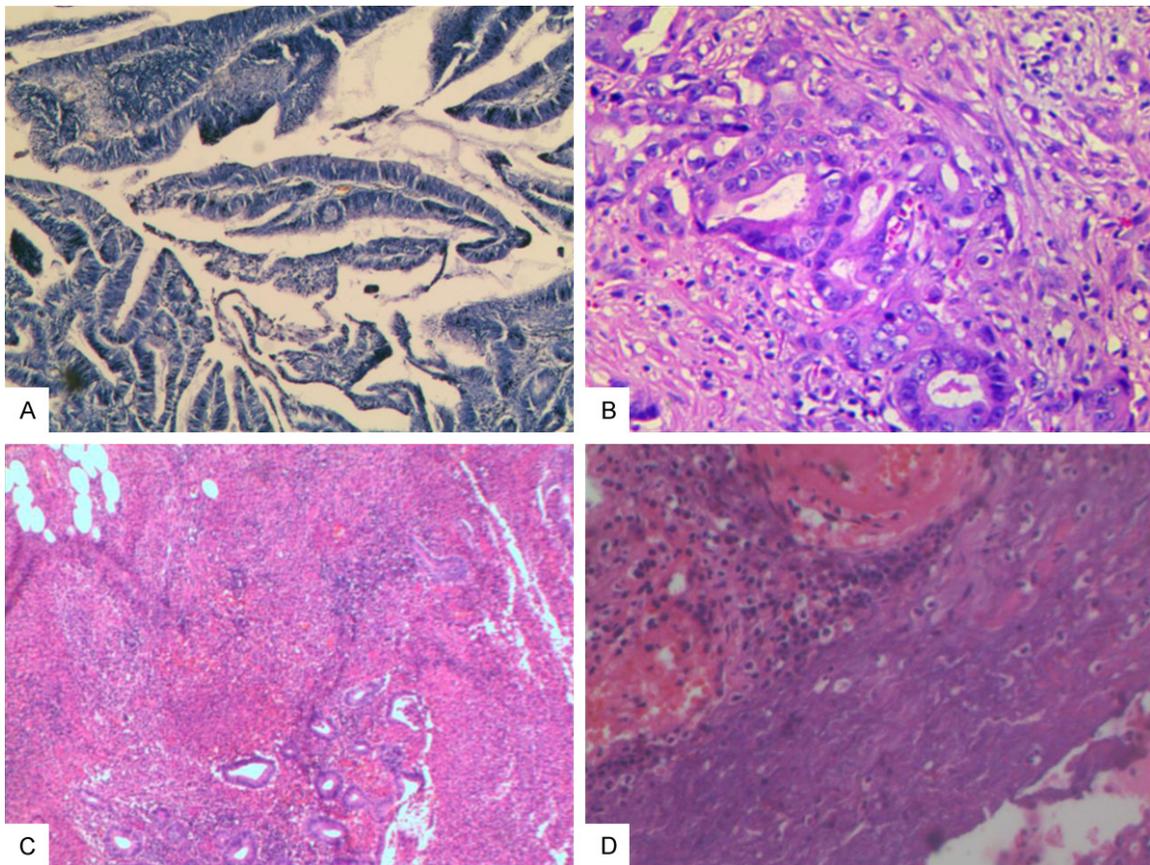


Figure 2. A. The pathology result indicated the high differentiated villous tubular adenocarcinoma and invasion of the whole layer of the colonic wall. B. The biopsy showed moderately differentiated adenocarcinoma in rectum. C, D. Pathological findings showed that the appendix was filled with large numbers of white blood cells after appendectomy.

had undergone the colonoscopy examination in other hospital about 12 hours before, the result of it indicated that a mass in the descending colon about 75 cm from the anus, then the

mass was biopsied. On the abdomen physical examination, this patient with diffuse abdominal tenderness and rebound pain, with slight abdomen muscular tension, especially in the

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Figure 3. The gross image of appendix after appendectomy.

right lower quadrant of the abdomen. The bowel sounds disappeared.

Abdominal CT indicated that free air and a little liquid in the cavity of the abdomen and pelvis, part of the intestinal cavity was expanded (**Figure 1A**).

The patient was immediately taken to the operating room and an open exploration was performed. During the exploration, the greater omentum adhered with cecum and an enclosed mass was found, the gangrenous and perforated appendix within it was verified, then the appendectomy was performed. A tumor could be touched in the spleen region of colon, about 2×2×1 cm in size, the partial colectomy was implemented, the distal colon cavity was closed and colostomy was made in the proximal colon. The pathology of the tumor showed high differentiated villous tubular adenocarcinoma (**Figure 2A**). The postoperative period was uneventful, and he was discharged with good clinical conditions after twenty days.

Case 2

A 65 years old man was admitted to the outpatient department because of the intermittent hematochezia, and no abnormalities were

found in the physical examination. The colonoscopy indicated an ulcerative mass existed in the descending colon about 10 cm from the anus, about 2×3 cm in size, and multiple polyps were found in the ascending colon. Then the patient was treated with electrocautery for the ascending colon polyps through the colonoscopy. The ulcerative mass was biopsied. The mass biopsy showed moderately differentiated adenocarcinoma (**Figure 2B**).

However, about 9 hours after the process of colonoscopy, the patient suddenly had severe pain in the lower abdomen. His body temperature was gradually up to 38°C. His abdomen showed slight distension and diffuse signs of peritoneal irritation. The right lower quadrant of the abdomen was more obvious. The bowel sounds disappeared. Free gas in the abdominal cavity was identified by abdominal CT (**Figure 1B**).

Then this patient was immediately taken to the operation room for the open exploration. The purulent and perforated appendix was found in abdominal cavity, there was lots of purulent drainage around the appendix, then the perforated appendix and purulent fluids were removed (**Figure 3**). The pathological result showed that the appendix was filled with large numbers of white blood cells (**Figure 2C, 2D**). The postoperative period was uneventful. Two months later, the patient was taken to the hospital again and the radical operation for rectal tumor was performed.

Discussion

Colonoscopy as currently a kind of standard and widespread technique is used in diagnosis of colorectal diseases such as tumor and polyps. In general, colonoscopy is regarded as a safe procedure, and serious complications are not considered as frequent, but iatrogenic perforation of colon during the colonoscopy, especially in endoscopic therapy is an unfortunate complication that can induce significant morbidity and even death, the sigmoid is the most common location of perforation [11]. Free gas in the peritoneal cavity or inferior diaphragm space can be found by abdominal CT or plain film, and CT examination has been shown to be more sensitive than the plain film for the detection of abdominal free air [12].

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Pneumoperitoneum generally indicate that the perforation of the hollow viscera and most cases require the emergency surgical exploration and intervention, it is usually accompanied by diffuse peritonitis in cases of gastrointestinal perforation [13]. If colon perforation occurs, local signs of peritonitis were minimal because more solid substances leaked out at first. When bacterial peritonitis appeared, symptoms of peritoneal irritation could present more obviously [14]. In some serious cases, the tension pneumoperitoneum and intra-abdominal infection caused respiratory distress, which was associated with a poor prognosis. However, the pneumoperitoneum caused by perforated appendicitis was rare relative and was neglected and misdiagnosed easily especially combined with other diseases or secondary to the endoscopic operation, as the above cases described. Obstruction and bacterial infection in the appendix cavity were the major factor for the formation of perforated appendicitis.

X-rays findings of free air in the abdominal cavity secondary to perforated appendicitis was rare, acute appendicitis presented with perforation was about 20% to 30% of cases, and pneumoperitoneum with perforated appendicitis was from 0 to 7%, but the incidence increased in older age [15]. Barreto have found patients that the male and being older than 60 were significantly associated with a higher risk of perforation. Similarly, Augustin has obtained the same result in patients older than 50 [16]. The reason behind the high rate was not clear for elderly people. Delayed in diagnosis and surgical intervention, patients combined with other relative diseases and the age-specific physiological change may be major factors [17, 18].

Acute appendicitis has been referred in the literature as a possible complication after the colonoscopy, with a considered incidence of 0.038% [9]. Its reasons may consist of excessive pressure at the appendix cavity from the endoscope and possible excessive inflation which could result in inflammation. It has also been reported that the impaction of stools at the appendix orifice during the operation of colonoscopy could lead to the obstructive appendicitis [19, 20]. Collins has reported that 3% of acute appendicitis patients were associated with the left side colon obstruction and

about 86.2% of the obstruction was caused by neoplasm [21]. When the tumor caused the stenosis of the colon cavity, as the two patients we introduced, it could lead to different degrees of colonic obstruction, and also caused the expansion of bowel above the diseased region. At first, the colon gas entered into the appendix cavity and made it expanded. Secondly, fecal blocked and colon bacterium entered in the appendix cavity, which led to the obstruction and inflammation of the appendix, and the necrosis and perforation of the appendix wall would be formed finally if not get treatment in time.

Therefore, the perforated appendicitis is likely to happen secondary to the colonoscopy under some factors such as the old age, colon tumor and the delayed therapy.

Conclusion

We introduced two cases of perforated appendicitis with abdominal free gas secondary to the operation of colonoscopy. In order to avoid a delayed diagnosis and give an earlier treatment, we should pay attention to patients with colorectal tumor especially in the old age group presented pneumoperitoneum after the colonoscopy. Besides the colon perforation, some other diagnoses should also be considered such as perforated appendicitis.

Disclosure of conflict of interest

None.

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