

Sigmoid Colon Perforation After Upper Gastrointestinal Series in Two Japanese Men: A Case Report

Seiji NAKAHARA^{*1}, Junichi KANEKO^{*1}, Rika FUJINO^{*1}, Hisamichi YOSHII^{*1}, Hideki IZUMI^{*1}, Kazuhito NABESHIMA^{*1}, Tomoko SUGIYAMA^{*3}, Takuma TAJIRI^{*3}, Masaya MUKAI^{*2} and Hiroyasu MAKUUCHI^{*1}

^{*1}Hepato-Biliary-Pancreatic Surgery and ^{*2}Colorectal Surgery, Department of Gastrointestinal Surgery, Tokai University, Hachioji Hospital, ^{*3}Department of Diagnostic Pathology, Tokai University Hachioji Hospital

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Colorectal perforation following an upper gastrointestinal series is rare. The majority of patients are women. Only 4 cases of perforation have been reported in men with the English literature. Here, we report two more cases of sigmoid colon perforation after an upper gastrointestinal series in men.

Key words: sigmoid colon perforation, upper gastrointestinal series

INTRODUCTION

The Japan Society of Gastroenterological Cancer recommends annual screening with an upper gastrointestinal (GI) series using barium sulfate [1]. Colorectal perforation following an upper GI series is rare. To date, 37 cases have been reported in the English-language medical literature [2-4]. The most common site of perforation is the sigmoid colon (20/36, 72%) and the majority of patients are women (33/37, 89%). Only 4 cases of perforation have been reported in men. Here, we report two more cases of sigmoid colon perforation after an upper GI series in men.

CASE REPORTS

Case 1, A Japanese man with no medical history other than hyperlipidemia and gout underwent an upper GI series at 61 years of age. He was referred to our hospital after a computed tomography (CT) scan

obtained by a local doctor for sudden onset lower abdominal pain showed free air in his lower abdominal cavity the following day.

His height and weight were 172 cm and 77 kg, respectively. Heart rate and blood pressure were 60 beats per minute and 98/49 mmHg, respectively. Body temperature was 37.3°C. Physical examination revealed abdominal tenderness and involuntary abdominal guarding from the hypogastric to left lumbar region. The CT scan showed high-density contrast in the lower abdomen and sigmoid colon with surrounding free air (Fig. 1A). White blood cell counts and C-reactive protein were 5700 / μ l and 0.52 mg/dl, respectively, with no other abnormal data.

Case 2, A Japanese man with no medical history other than depression underwent an upper GI series at 46 years of age. The next day, he was taken to the hospital due to sudden onset lower abdominal pain.

His height and weight were 186 cm and 93 kg, re-

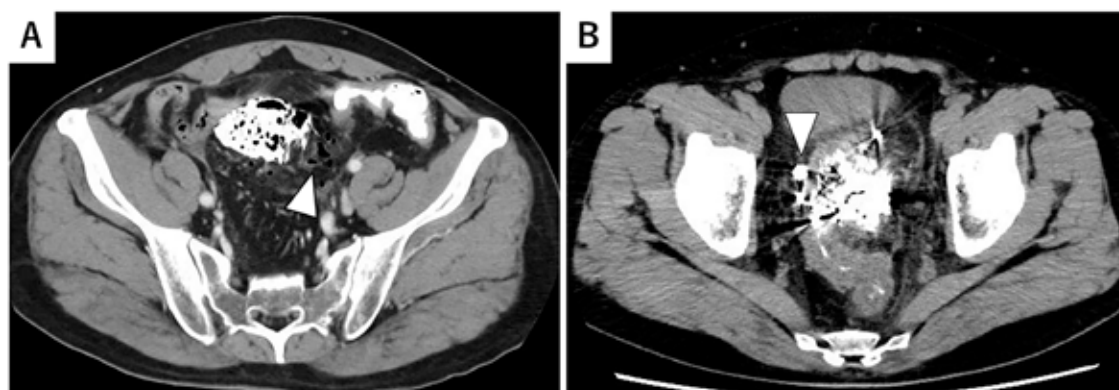


Fig. 1 Computed tomography scan showing high-density contrast in the lower abdomen and sigmoid colon with surrounding free air (white arrowheads; A, Case 1; B, Case 2).

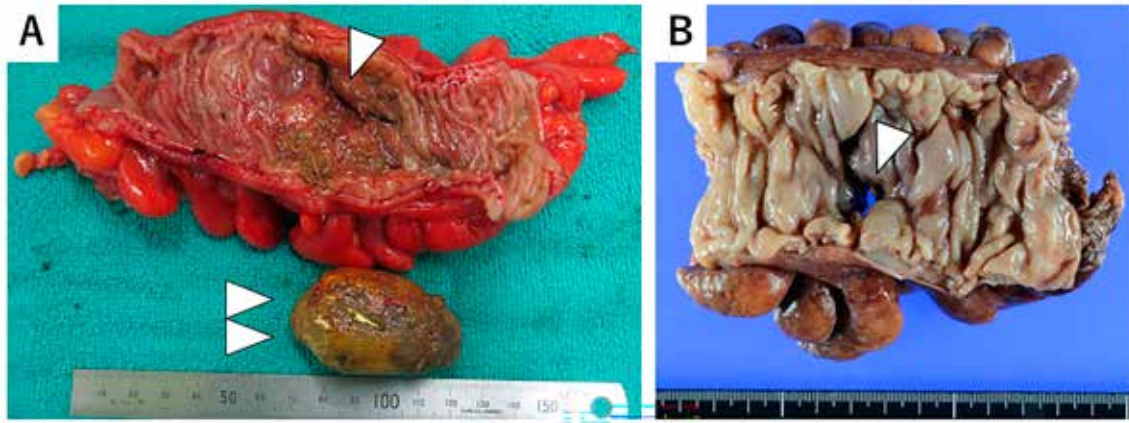


Fig. 2 Gross view of specimens showing a laceration and necrosis in the colon wall (A and B, arrowheads) and an impacted fecal bulk including barium sulfate (A, double arrowheads). Case 2 had no fecal bulk (B).

spectively. Heart rate and blood pressure were 60 beats per minute and 144/88 mmHg, respectively. Body temperature was 37.6°C. Physical examination revealed abdominal tenderness and involuntary abdominal guarding in the hypogastric region. A CT scan showed high-density contrast in the lower abdomen and sigmoid colon with surrounding free air (Fig. 1B). White blood cell counts and C-reactive protein were 23,400 / μ l and 15.6 mg/dl, respectively, with no other abnormal data.

Both patients were diagnosed with sigmoid colon perforations and after informed consent was obtained, they underwent emergency hand-assisted laparoscopic surgery or open surgery. In neither case was stool observed in the abdominal cavity, but the mesosigmoid was swollen. When the mesosigmoid was cut, stool with barium leaked into the abdominal cavity. Case 1 underwent hand-assisted laparoscopic surgery due to predicting limited leakage, but had to be converted to open surgery when a larger leakage was discovered during the procedure, and Hartmann's procedure was performed with 18,000 ml saline irrigation. The patient in Case 2 underwent anterior resection and double stapling technique reconstruction with an ileostomy due to limited leakage and 15,000 ml saline irrigation. Three drains were placed in the pelvic cavity and left and right subphrenic space in both cases. The operation times were 2 h 32 min (Case 1) and 4 h 10 min (Case 2). Estimated blood loss was 245 ml (Case 1) and 212 ml (Case 2).

Gross observation of the specimens in both cases showed a laceration and necrosis in the colon wall (arrowhead) and Case 1 also showed impacted fecal bulk with barium sulfate (Fig. 2A, B). Pathologic findings of the specimens in both cases showed necrosis and neutrophil infiltration of the colon wall along the perforation site (Fig. 3A1, A2) with scattered refractile crystals of barium sulfate (Fig. 3B1, B2). No malignancy or diverticulum was observed in either case. The postoperative course was uneventful in both cases and the patients were discharged from hospital on postoperative days 10 (Case 1) and 14 (Case 2) with a long course of antibiotics for local barium peritonitis (Clavien-Dindo classification grade II). The colostomy in both cases was closed three months later.

DISCUSSION

We performed emergent operations in 2 men with sigmoid colon perforation after an upper GI series using barium sulfate. The postoperative course was uneventful. Emergent operation and irrigation with a large amount of saline may be key to avoiding severe peritonitis.

Although the incidence and mortality of gastric cancer has decreased in Japan over the last 50 years, it still ranks 3rd among men and 5th among women in terms of prevalence [5]. Therefore, the majority of cases of colorectal perforation related to a screening upper GI series were reported in Japan. Mass cancer screening using an upper GI series is only performed in East Asia and several South American countries [6]. For instance, in the United States, according to cancer statistics in 2024, gastric cancer ranked 20th, accounting for 1.4% of all cancer cases [7]. We searched the English-language medical literature in the PubMed and Semantic Scholar databases between 1990 and May 29, 2024, using the words "barium", "perforation", and "upper gastrointestinal series". Only 3 reports of colorectal perforation were found in the English-language medical literature [2, 4]. Tachioka and colleagues reviewed 36 cases from the Japanese literature [2]. In their report, the median age of the patients was 65 years (range, 40–90 years). Most (72%) of the patients were 60 years of age or older and were women (32/36, 89%). Perforation occurs less often in men and the present cases comprise the 5th and 6th reported cases of colorectal perforation in men following an upper GI series (Total 5 sigmoid, 1 rectum). According to a meta-analysis, constipation is less common in men compared to women [8]. However, another recent report of large cohort in Japan showed that 57% of colorectal perforation occurred in men, based on a national clinical database, which is different from the 11% found in the present study. While the tendency towards constipation in woman may be a key factor in the background of the disease, further research is needed to clarify the gender difference between barium use and other cohorts [9]. The most common site of perforation is the sigmoid colon (20/36, 72%). Perforation occurred within 4 days of upper GI series in 30 of 36 patients reported by Tachioka and

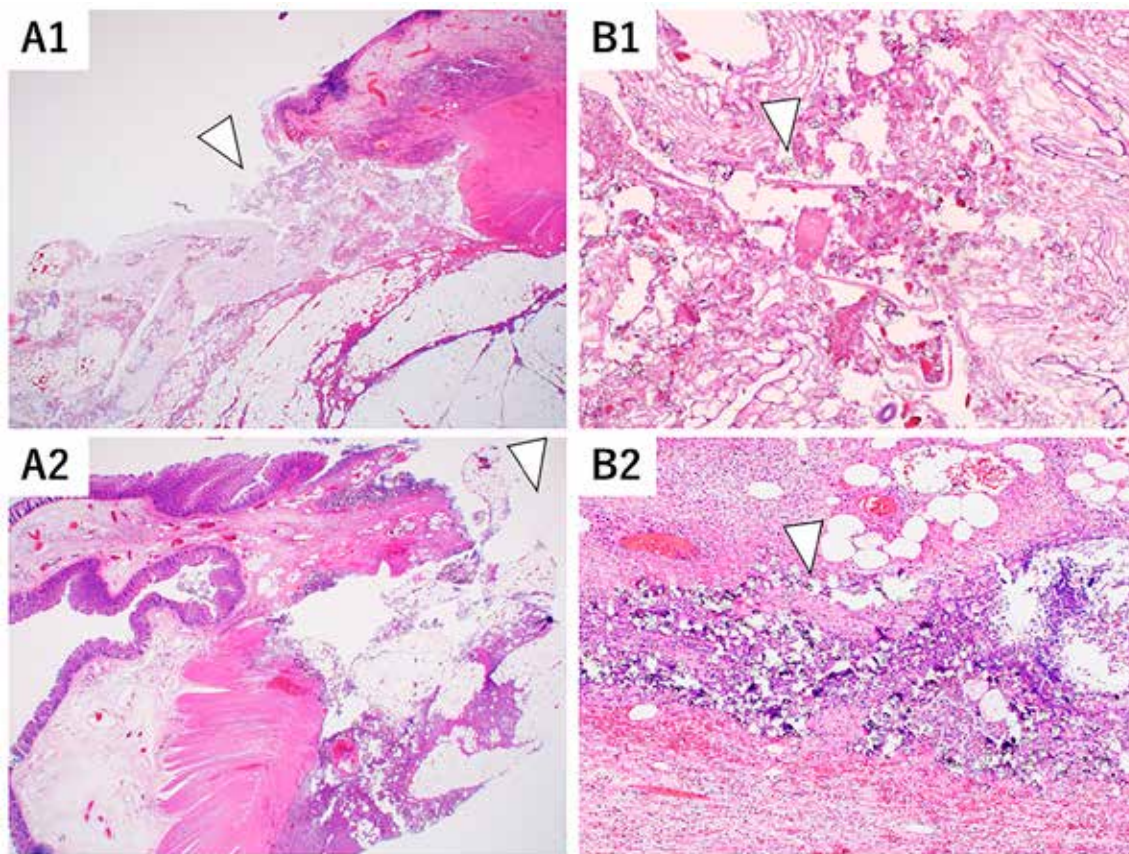


Fig. 3 Pathologic findings of the specimens showed necrosis and neutrophil infiltration of the colon wall along the perforation site (A1, Case 1; A2, Case 2, arrowheads, low power field of view 10X) with scattered refractile crystals of barium sulfate (B1, Case 1; B2, Case 2, arrowheads, high power field of view 200X and 100X, respectively).

colleagues, and perforation occurred within 24 h in the present two cases.

Based on the disease prevalence rate, barium sulfate use may not be an independent risk factor for colorectal perforation. Colorectal perforation after an upper GI series is very rare, occurring in only 3 of 1 million people [10], whereas the risk of perforation from colonoscopy per 1 million people screened is 880 according to a systematic review and meta-analyses for colorectal cancer screening [11]. Another report showed 28 colorectal perforations after CT colonoscopy, leading to an estimate of 400 cases per 1 million [12]. In barium enema studies, the reported incidence of perforation is 200 to 400 per 1 million people [13]. Focusing only on the prevalence rate of general colorectal perforation based on a Japanese nationwide surgical database [14], 10,090 cases of colorectal perforation requiring surgery were registered during 2011 to 2013, indicating an estimated incidence of 26 of 1 million people per year. Considering these statistics, an upper GI series with barium sulfate is still considered safe. Barium halation on CT may make diagnosis difficult, however, and emergent surgery is necessary to avoid delaying a precise diagnosis.

Barium sulfate may cause retention or constipation [15]. If the intraluminal pressure increases due to constipation, bowel wall perfusion abnormalities may develop and fecal impaction can progress to stercoral colitis, leading to pressure necrosis and perforation [16]. Although barium use is one of the reasons that can cause constipation, the precise etiology of perforation

is still unknown. A recent case report suggests that a hard mixture of inspissated barium and feces may lead to local colitis for resulting in perforation such as ordinary stercoral colitis [17]. It is important to use of enough laxatives with drinking water after an upper GI series. In the present study, patients followed protocol laxative use but further research is needed to explore the effect of laxative use. Barium perforation may differ from other common perforations, due to adherent and accumulative nature of barium making peritoneal lavage difficult [17]. Direct peritoneal lavage through open surgery may be important in these cases. Laparoscopic surgery was only performed in 18% of cases in a large cohort study on colorectal perforation from a national clinical database 2012 to 2020 [9]. The mortality of barium peritonitis is reportedly high, 30%-50% [18]. Tachioka and colleagues recently reported a mortality rate of 17% (6/36). According to an analysis of 10,090 cases from the Japanese nationwide surgical database, postoperative mortality for colorectal perforation is 11%. In any case, emergent surgery is important. Use of the term “barium peritonitis” may be controversial. Ghahremani and colleagues suggested that the term “barium peritonitis” may be a misnomer and suggested that the combination of barium with spillage of the intestinal contents and fecal material loaded with bacteria accounts for the development of peritonitis [9]. Further studies are needed to evaluate the role of barium sulfate in the acute phase of peritonitis.

CONCLUSION

We describe two cases of sigmoid colon perforation in men following an upper GI series, both requiring emergent surgery.

ETHICS STATEMENT

All patients in this manuscript have given informed consent for publication with their clinical details.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest associated with this manuscript.

ABBREVIATIONS: GI, gastrointestinal

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