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Single Case

Damage to the Descending Colon after Endoscopic Balloon Dilatation following a Minor Traffic Accident in a Patient with Crohn's Disease: A Case Report

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Keywords
Crohn's disease · Colon injury · Blunt abdominal trauma · Traffic accident · Endoscopic balloon dilatation

Abstract
Introduction: Crohn's disease (CD) is complicated by intestinal strictures and fistula formation; however, intestinal perforation is relatively rare. ***Case Presentation:*** Following a traffic accident in the evening, a 39-year-old woman experienced abdominal pain that worsened the following morning and was taken to the emergency department. She had a 17-year history of CD and eight endoscopic balloon dilations for descending colonic strictures. She presented with a high fever of 40.0°C, along with tenderness and rebound pain throughout her abdomen, with the most substantial point being in the lower left abdomen. Computed tomography showed thickening of the descending colon wall, increased fat concentration around the wall, and a slight presence of air in the mesentery near the intestinal wall. We diagnosed the patient with generalized peritonitis due to traumatic penetration of the mesentery of the descending colon and performed emergency surgery. Intraoperative observation of the abdominal cavity with a laparoscope revealed purulent ascites but no apparent perforation or edematous mesentery, with white moss and redness in the descending colon. This prompted the decision to perform peritoneal lavage drainage and a transverse colonic double colostomy. The postoperative course was favorable, and the patient was discharged from the hospital on the postoperative day 14. Four months after discharge, colostomy closure was performed. ***Conclusion:***

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Relatively minor trauma in patients with CD can result in colon injury. An injured bowel is usually accompanied by active lesions due to CD; however, caution is required, as endoscopic balloon dilatation without accompaniment may be a background factor.

Introduction

Crohn's disease (CD) is a chronic, nonspecific, inflammatory disease of unknown etiology impacting the entire gastrointestinal tract, from the oral cavity to the anus. CD presents with various symptoms, such as intestinal stricture, fistula formation, and penetration. In contrast, intestinal injury due to blunt abdominal trauma is common in the small intestine but relatively rare in the colon. Notably, CD patients develop gastrointestinal perforation following relatively minor trauma. The mechanism involves the presence of an active lesion at the perforation site, and there are reports that CD was first diagnosed due to a perforation. Herein, we report a case of CD in which a stricture of the descending colon previously treated with balloon dilatation developed mesenteric penetration after a minor traffic accident. This is an extremely rare case where the gastrointestinal perforation site was not an active lesion but an endoscopic balloon dilatation site. The authors have completed the CARE Checklist for this case report, which is attached as online supplementary material (for all online suppl. material, see https://doi.org/10.1159/000537973).

Case Report

A 39-year-old woman presented to the emergency department with abdominal pain and fever following a traffic accident the prior evening. Although the airbag was activated, no apparent injuries, such as seatbelt marks or abdominal symptoms, were evident; therefore, she went home without medical attention. During the night, she experienced the sudden onset of left lower abdominal pain and was transported to the hospital. The patient had a 17-year history of small bowel colonic CD and had undergone eight balloon dilations for descending colonic strictures. The CD was in remission with azathioprine, mesalazine, and adalizumab treatment. Vital signs showed no decrease in blood pressure (106/47 mm Hg), but tachycardia (108 bpm) and tachypnea (23 times/min) were observed. The saturation of percutaneous oxygen (SpO_2 98%) remained stable without oxygen administration. The patient had a high fever of 40.0°C and tenderness and rebound pain throughout her abdomen, with the strongest point being in the lower left abdomen. Blood tests showed a white blood cell count of 5,200/μL and a C-reactive protein concentration of 0.92 mg/dL, indicating a slight inflammatory reaction; there were no other notable abnormal findings. Computed tomography revealed thickening of the descending colon wall, increased fat concentration around the wall, and some air in the mesentery near the intestinal wall (Fig. 1). Notably, the descending colon had undergone endoscopic balloon dilatation multiple times (Fig. 2a, b), which was thought to be a contributing factor. Based on these findings, we diagnosed generalized peritonitis due to traumatic penetration of the mesentery of the descending colon and performed emergency surgery.

Laparoscopy was selected for intraperitoneal observation, with the surgical procedure to include irrigation and drainage of the abdominal cavity and construction of an artificial anus. Using the open method, a camera port was inserted into the abdominal cavity from the

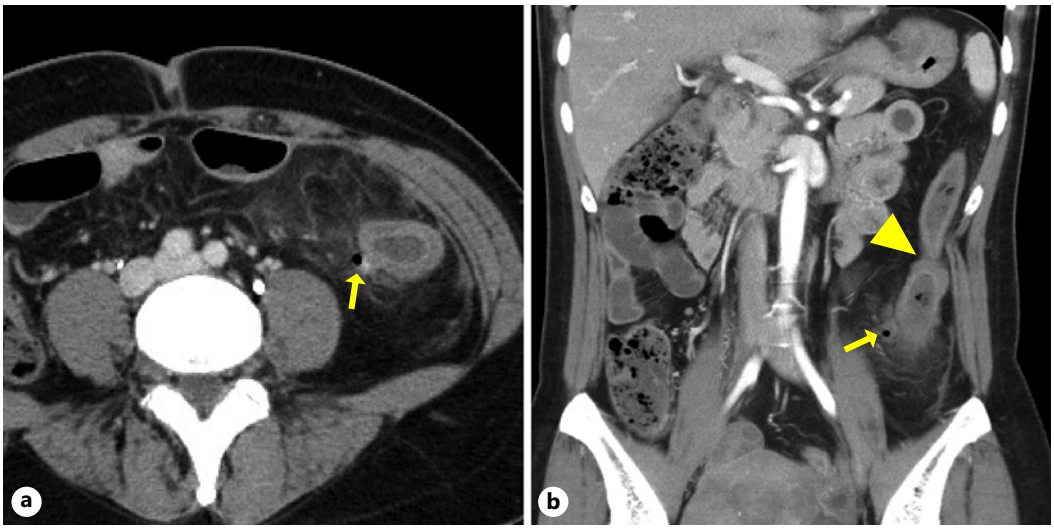

Fig. 1. Contrast-enhanced computed tomography findings. In the horizontal (**a**) and coronal (**b**) sections, thickening of the wall of the descending colon and an increase in fat concentration around the wall are observed, and a small amount of air is observed in the mesentery near the intestinal wall (arrow). In the coronal section (**b**), a descending colon stricture was observed (arrowhead) where endoscopic balloon dilation was performed.

umbilical region, revealing a moderate amount of cloudy ascites throughout the abdominal cavity, consistent with generalized peritonitis. No intraperitoneal adhesions were observed. When 5 mm ports were inserted into the right lower abdomen, right upper abdomen, and left lower abdomen. The perforated area was identified using forceps, and an edematous mesenteric area with white moss and redness was found in the descending colon (Fig. 3). No perforation was observed in the intra-abdominal cavity; therefore, this site was determined as the responsible lesion, and diagnosed as mesenteric penetration of the descending colon due to trauma. Surgery was performed as planned. The abdominal cavity was washed with 5 L of physiological saline, and a transverse colon double-hole colostomy was constructed. The operation time was 1 h and 58 min, with minimal blood loss. The patient was admitted to the intensive care unit after surgery, where she remained stable, before being discharged from the intensive care unit the day after surgery.

From postoperative day 4, the patient resumed eating and was treated with antibiotics until postoperative day 7. Discharge from the hospital occurred on postoperative day 14, when she was able to manage the colostomy. Postoperative colonoscopy revealed a scar and an inflammatory polyp on the anal side of the endoscopic balloon dilation site, 30 cm from the anal verge, which was not seen during preoperative colonoscopy (Fig. 2c, d), and fluoroscopic examination showed no leakage of the contrast medium. The polyp was biopsied and pathologically diagnosed as an inflammatory polyp unrelated to CD. Five months postoperatively, she underwent colostomy closure surgery; she is doing well postoperatively and is being followed up on an outpatient basis.

Discussion

CD is a chronic granulomatous inflammatory disease of the gastrointestinal tract that causes intestinal strictures, fistula formation, and penetration. Strictures are common in the small bowel, and colonic strictures are found in 8–14% of patients with CD [1]. Drug therapy

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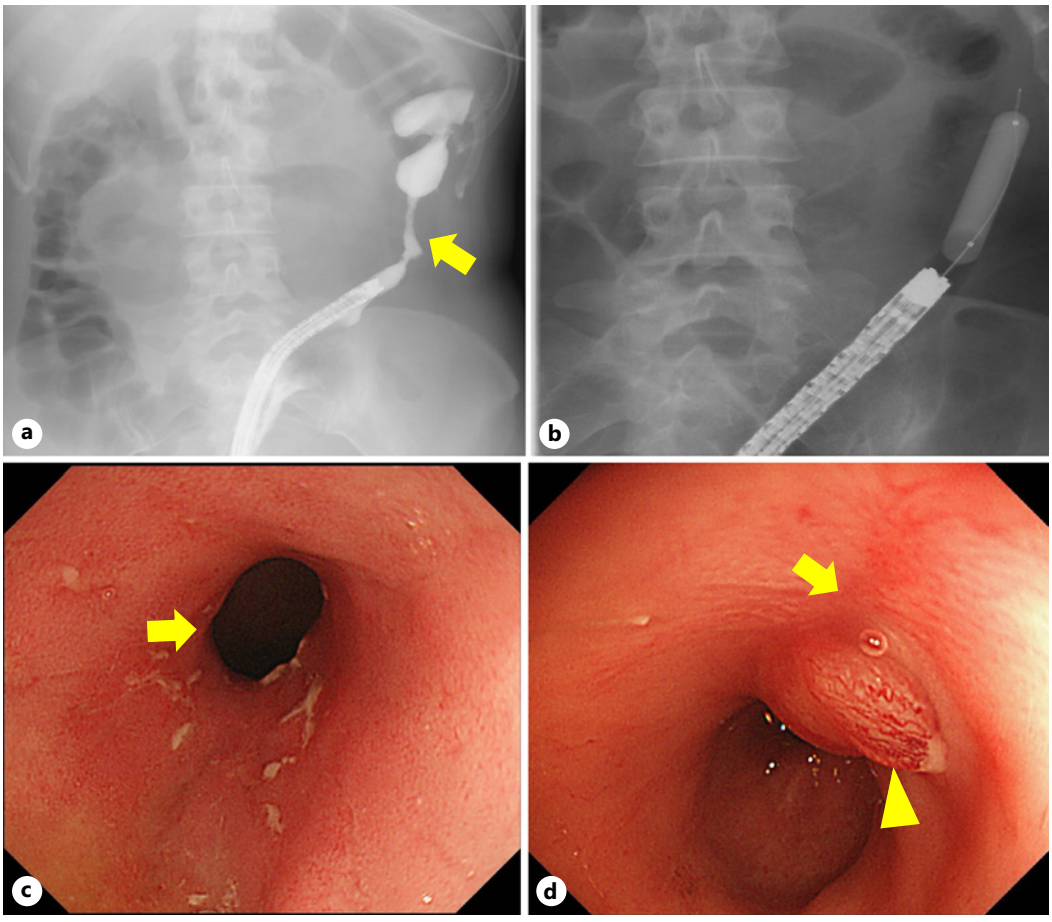

Fig. 2. Fluoroscopic image during endoscopic balloon dilatation and colonoscopy images before and after surgery. **a** Fluoroscopic imaging showed stricture in the descending colon (arrow). **b** Endoscopic balloon dilation was performed for descending colon stricture. **c** Preoperative colonoscopy images showed a stenosis in the center of the image (arrow). The mucosa in the endoscopic balloon dilation area was clear. **d** Postoperative colonoscopy revealed a scar (arrow) and an inflammatory polyp (arrowhead) 30 cm from the anal verge that was not seen on preoperative colonoscopy.

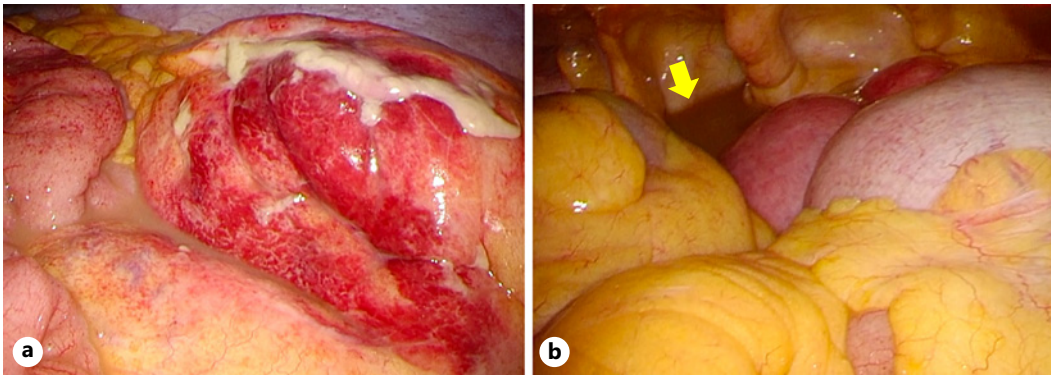

Fig. 3. Intraoperative imaging findings. **a** An edematous mesenteric area with white moss and redness was observed in the descending colon. **b** A moderate amount of cloudy ascites was observed in the pelvis (arrow).

and surgery have been reported to be beneficial treatments for strictures in patients with CD; however, endoscopic balloon dilatation is now widely performed because it is minimally invasive and preserves the intestinal tract. Thus, endoscopic balloon dilatation has been rendered safe and effective. Typical complications include intestinal perforation and bleeding, with an incidence rate of approximately 4% [2]. The short-term results have reported the alleviation of symptoms in 42–90% of cases, indicating its efficacy. Long-term results reveal a recurrence rate of obstructive symptoms after endoscopic balloon dilatation to be 24–79%, and the cumulative proportion of patients requiring additional dilation within 5 years is 80.6% [1, 2]. As a result, many patients with CD require frequent redilation. Our patient underwent eight endoscopic balloon dilatations over 6 years. Thereafter, our patient was asymptomatic for approximately 3 years until the injury.

Gastrointestinal perforations are relatively rare in patients with CD. In a study of 126 patients with CD with gastrointestinal perforation, 7 cases (5.6%) involved the jejunum, 102 cases (81.0%) involved the ileum, and 17 cases (13.0%) involved the colon, indicating that perforation of the colon is relatively rare [3]. Factors such as increased oral intestinal pressure due to obstruction or stenosis, ischemic changes resulting from vasculitis, and decreased immune function due to steroid therapy have been reported as mechanisms of gastrointestinal perforation in CD [4]. In contrast, the frequency of luminal organ injuries associated with blunt abdominal trauma is approximately 1%, with the small intestine being the most common, followed by the colon [5]. Typically, small bowel perforation is often traumatic; however, colon perforation is often caused by colon cancer, idiopathy, or diverticulum, and trauma is relatively rare.

Given that colon perforation may indicate colon cancer, a thorough systemic examination is recommended. Upon closer examination, our patient raised suspicion of endoscopic balloon dilatation as a contributing factor. It has also been reported that malnutrition in patients with CD may be related to disease progression, and malnutrition is associated with postoperative complications [6]. In this case, the disease was in remission, and the patient exhibited good nutritional status preoperatively, so treatment could be performed without significant postoperative complications.

It has been reported that relatively minor trauma in patients with CD can result in gastrointestinal injury. To the best of our knowledge, only 11 cases of traumatic intestinal injury have been reported [7–15]. All cases are summarized in Table 1. Their ages ranged from 15 to 46 years, comprising 9 males and 2 females, with all patients experiencing abdominal pain. The mechanisms of injury were traffic accidents (5 cases), sports contact (6 cases), and perforation sites in the small intestine (5 cases) and the colon (6 cases). Except for our case, intestinal resection was performed, and a pathological relationship with CD was proven at the site of injury. Two teenagers who had not been previously diagnosed with CD were diagnosed with CD after the injury [12, 13], and attention should be paid to the initial diagnosis. Owing to minor trauma, the symptoms progress slowly and, in some cases, occasionally lead to delayed hospital admission. In our case, the imaging findings were marked by increased lipid concentrations around the intestinal tract, making identifying the source of inflammation easy, while extraintestinal air was minimal.

In the absence of surgical resection in our case, a real-time pathological examination of the intestinal tract injury was not performed, which made it difficult to evaluate the perforation site. However, by assessing the imaging findings of the coronal CT scan (Fig. 1b), preoperative and postoperative colonoscopy, we were able to identify the location of the perforation as 30 cm from the anal verge, on the anorectal side of the endoscopic balloon dilation area (Fig. 2c, d).

There are several possible mechanisms for perforation at the endoscopic balloon dilation site. The first reason was that the intestinal wall had become extremely thin due to the intense

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Table 1. Reported cases of intestinal injury due to trauma in patients with CD

Case	Author	Year	Age	Gender	Symptoms	Injury mechanism	Damage location	Association with CD
1	Johnson et al. [7]	1990	26	Male	Abdominal pain	Contact in basketball	Sigmoid colon	Ulcers
2	Tomita et al. [8]	1993	23	Male	Abdominal pain	Traffic accident	Jejunum	Ulcers
3	Bunni et al. [9]	2008	21	Male	Abdominal pain	Contact in football	Ascending colon	Inflammation
4	Wagner et al. [10]	2012	22	Male	Abdominal pain	Traffic accident	Ileum	Ileal fistula
5	Maconi et al. [11]	2013	46	Male	Abdominal pain	Contact in skiing	Ileum	Inflammation
6	Onwubiko et al. [12]	2015	13	Female	Abdominal pain	Contact in water sports	Ileum	Ulcers and chronic inflammation
7	Lucke-Wold et al. [13]	2016	15	Male	Abdominal pain	Traffic accident	Ileum	Acute cryptitis, crypt abscess formation, focal granulomas
8	Pérez-Jiménez et al. [14]	2020	20	Male	Abdominal pain	Contact in football	Ascending colon	Ulcers and chronic inflammation
9	Pérez-Jiménez et al. [14]	2020	39	Male	Abdominal pain, hematochezia	Contact in martial arts	Transverse colon	Inflammation
10	Babiker et al. [15]	2022	25	Male	Abdominal pain	Traffic accident	Ascending colon	Unknown
11	Present case	–	39	Female	Abdominal pain	Traffic accident	Descending colon	Endoscopic balloon dilatation

pressure from the endoscopic balloon dilation. The second reason was that intense external energy was accidently applied locally to the endoscopic balloon dilatation site. The third reason was that the endoscopic balloon dilation caused intestinal adhesions, which caused a decrease in intestinal flexibility. After reviewing the surgical footage, no intestinal adhesions were observed within the peritoneal cavity, suggesting that the first and second mechanisms were related in this case. Alternatively, in this case, the anal stenosis was such that a colonoscopy could not be inserted without using a finger bougie. The intestinal tract between the endoscopic balloon dilatation site and the anus may have become a semi-closed space where gas and feces could accumulate, making it easy for intense pressure to be applied. Due to the above mechanism, it is thought that the wall of the descending colon became fragile after eight endoscopic balloon dilatation treatments, which resulted in the colon becoming damaged by mild blunt trauma that would not usually cause complications. Our case is noteworthy for its distinctive mechanism deviating from a previous report that originated from active lesions of CD and is considered a new finding in the trauma treatment of patients with CD.

In conclusion, we encountered a case of CD in which the colon was damaged in a relatively minor traffic accident. Although this usually accompanies active lesions due to CD, previous endoscopic balloon dilatation was considered a contributing factor in the present case. The initial examination of trauma-induced abdominal pain in patients with CD requires careful attention.

Acknowledgment

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Statement of Ethics

Written informed consent was obtained from the patient for the publication of this case report and the accompanying images. Ethics approval was not required for this study in accordance with national guidelines in Japan.

Conflict of Interest Statement

The authors declare that they have no competing interests.

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Author Contributions

Takaomi Seki reported this case and wrote the manuscript. Katsuya Osone, Hiroomi Ogawa, Takuhisa Okada, Takuya Shiraishi, Makoto Sohda, Ken Shirabe, and Hiroshi Saeki critically revised the manuscript. All the authors have read and approved the final manuscript.

Data Availability Statement

All data generated or analyzed during this study are included in this article. Please direct further inquiries to the corresponding author.

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