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Afferent loop obstruction with obstructive jaundice and ileus due to an enterolith after distal gastrectomy: A case report

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ABSTRACT

INTRODUCTION: Afferent loop obstruction is an uncommon complication associated with Billroth II reconstruction or Roux-en-Y reconstruction after gastrectomy. Moreover, cases where the obstruction is caused by enterolith are rare. Here, we report a rare case of afferent loop obstruction caused by an enterolith after Roux-en-Y reconstruction of gastrectomy; subsequently, leading to ileus in the ileum.

PRESENTATION OF CASE: An 84-year-old man who received a Roux-en-Y distal gastrectomy for gastric cancer presented with symptoms of fever and jaundice 14 months later. Computed tomography (CT) scan revealed an enterolith in the duodenal afferent loop and a dilated intrahepatic bile duct. Although the obstructive jaundice and fever disappeared with conservative therapy, ileus occurred due to the movement of the enterolith into the ileum, which was refractory to conservative therapy. Therefore, enterotomy was performed to remove the enterolith, and the patient had an uneventful recovery. Histologically, the enterolith derived from food residue. No postsurgical sign of recurrence has been noted for 6 months.

CONCLUSION: We report a rare case where an enterolith in a duodenal afferent loop after distal gastrectomy led to obstructive jaundice, and subsequently, caused ileus by its movement into the ileum.

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1. Introduction

Afferent loop obstruction is a potentially fatal complication that can occur following Billroth II or Roux-en-Y reconstruction after gastrectomy, and can be generally caused by adhesions, intussusception, strictures, malignancy, and internal hernias [1]. On the other hand, afferent loop obstruction can rarely be caused by an enterolith, defined as an intestinal intraluminal stone [2]. In most cases, afferent loop obstruction is asymptomatic, while it sometimes leads critical clinical conditions and requires surgical treatment in cases with gastrointestinal symptoms [3].

Here, we report a rare case where afferent loop obstruction and ileus were caused by an enterolith following Roux-en-Y distal gastrectomy. This case report has been prepared in line with the SCARE criteria [4].

2. Presentation of case

An 84-year-old man, who received a Roux-en-Y distal gastrectomy for gastric cancer (5 cm in size, poorly differentiated adenocarcinoma of T3N2M1 Stage IV) and was diagnosed with intestinal malrotation during surgery, presented with a fever (37.1 °C) and jaundice 14 months later. In abdominal examination, upper abdominal tenderness and muscular defense were revealed. The laboratory data at admission were as follows: C-reactive protein, 22.09 mg/dL (normal range, 0–0.5 mg/dL); white blood cell count, 9260/μL (normal range: 4500–9000 /μL); total bilirubin, 5.6 mg/dL (normal range 0.2–1.0 mg/dL); aspartate aminotransferase, 189 IU/L (normal range 8–38 IU/L); alanine aminotransferase, 280 IU/L (normal range 4–44 IU/L); alkaline phosphatase, 1635 IU/L (normal range 104–338 IU/L); γ-glutamyl transpeptidase, 376 IU/L (normal range 16–73 IU/L); and tumor marker levels were within the normal ranges (carcinoembryonic antigen, 1.0 ng/mL; carbohydrate antigen 19–9, 3 U/mL). Contrast-enhanced computed tomography (CT) at admission showed an enterolith (24 mm in size) in the duodenal afferent loop and a

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dilated common bile duct and intrahepatic bile duct (Fig. 1a, b). Thus, he was diagnosed with acute afferent loop obstruction by an enterolith.

The obstructive jaundice and fever gradually disappeared the day following his admission via antibiotic therapy with cephalosporin, while he began to complain of intermittent abdominal pain, nausea, and vomiting 7 days after admission. The CT on day 7 revealed that the enterolith moved into the distal ileum (Fig. 1c), and an abdominal radiograph showed multiple niveau formation (Fig. 2a). Thus, he was diagnosed with intestinal obstruction due to the enterolith. The intestinal obstruction was refractory to conservative treatment; therefore, urgent laparotomy was performed after the patient consented to undergo surgery. Perioperatively, adhesiolysis was carried out after reconfirming intestinal malrotation of the non-rotation type: the Treitz ligament had not formed and the second portion of the duodenum was poorly fixed in the retroperitoneum. Moreover, the small intestine (jejunum and ileum) was located on the right side and the colon was located in the left side of the abdominal cavity (Fig. 2b). The enterolith was 3.5 × 2.5 cm in size and was obstructing in the ileum, located 40 cm proximal from the ileocaecal junction. The bowel loops proximal to the enterolith were dilated; thus, enterotomy with removal of the enterolith was performed (Fig. 3a, b). Histological analysis revealed a calcified stone composed of necrotic vegetable tissue (Fig. 3c). The patient was started on an oral two days postoperatively and received treatment for surgical site infection. He was discharged from the hospital 40 days after the surgery. No sign of recurrence was noted 6 months after the surgery.

3. Discussion

Afferent loop syndrome, defined as symptoms caused by obstruction of the duodenal or proximal jejunal afferent loop, occasionally occurs after gastrectomy with Billroth II reconstruction or Roux-en-Y reconstruction [5,6]. The incidence rate has been reported to be 0.2% [6]. Generally, afferent loop obstruction is caused by internal herniation, adhesions, kinking, a gastrointestinal stone, or stenosis due to inflammatory changes or malignancy [7,8], while it is rarely caused by enterolith [9,10].

Enteroliths, which are defined as stones developing in the intestinal tract and mostly encountered in diverticula, surgically created intestinal pouches, or proximal sites of obstruction in the intestinal tract [5], are thought to be formed by decelerated bowel motility or stasis of digestive juice, leading to altered bacterial flora and promoted bacterial growth. Thus, bacteria may convert cholic acid to insoluble deoxycholic acid, and also release glycine and taurine from bile salts. Subsequently, precipitation of unconjugated bile acids in the bowel lumen leads to stone formation [2]. In this case, histological analysis revealed a stone composed of necrotic vegetable tissue with calcification. Therefore, food residues might reflux to the afferent loop due to intestinal malrotation and duodenal adhesion after gastrectomy, which may have formed the enterolith.

In this case, the duration between the gastrectomy and the onset of afferent loop obstruction was 14 months. According to previous reports, the durations between gastrectomy and onset of afferent loop obstruction were variable from 3 weeks to 15 years [6,7,11]. Therefore, this complication may occur at any time after gastrectomy.

Generally, small enteroliths (<2 cm in size) can pass unnoticed through a normal small intestine and colon [3], while large enteroliths (>2.5 cm in size) can cause an intestinal obstruction in the absence of mechanical or structural luminal compromise [12]. Therefore, when enteroliths are <2 cm in size and do not have luminal compromise, conservative treatment with strict abdomi-

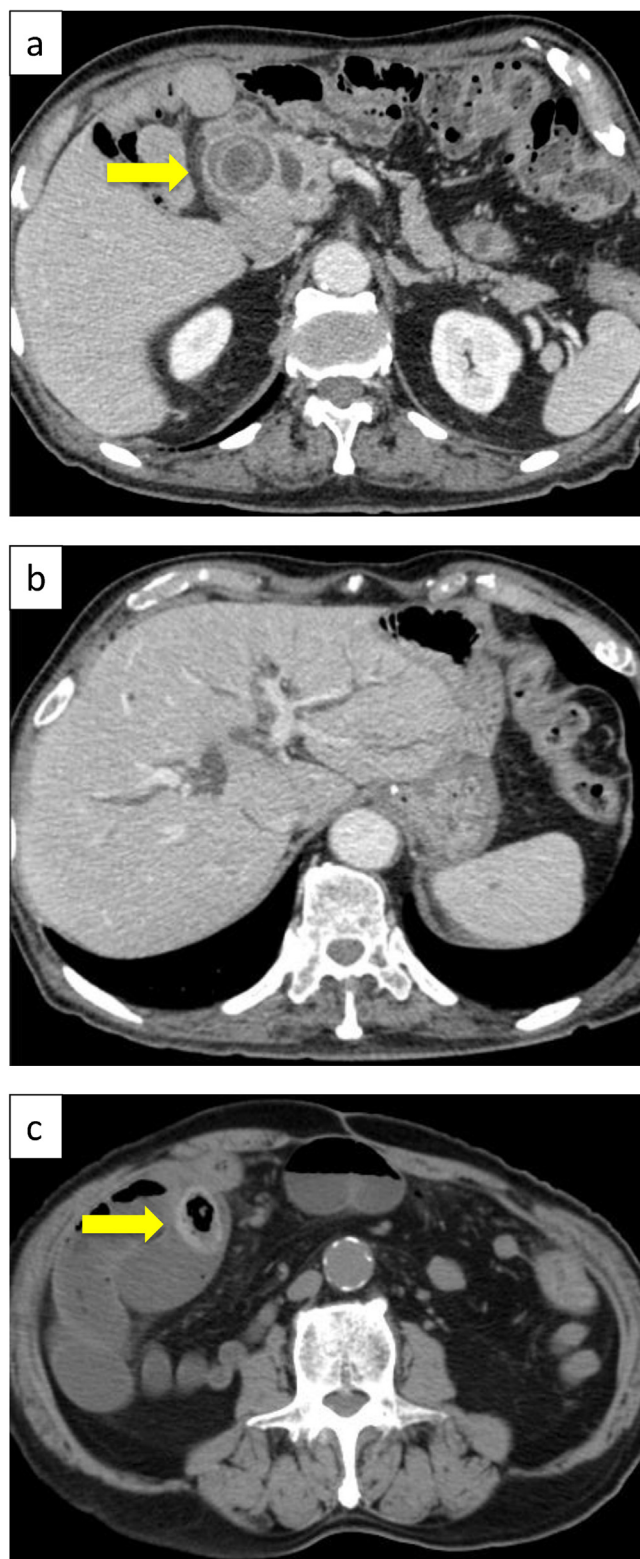


Fig. 1. Computed tomography (CT) image.
 (a) Contrast-enhanced CT scan showing a large calcified ring in the duodenal afferent loop (yellow arrow).
 (b) Contrast-enhanced CT scan showing a dilated common bile duct and intrahepatic bile duct.
 (c) CT scan on 7 days after admission showing an enterolith move into the distal ileum (yellow arrow).

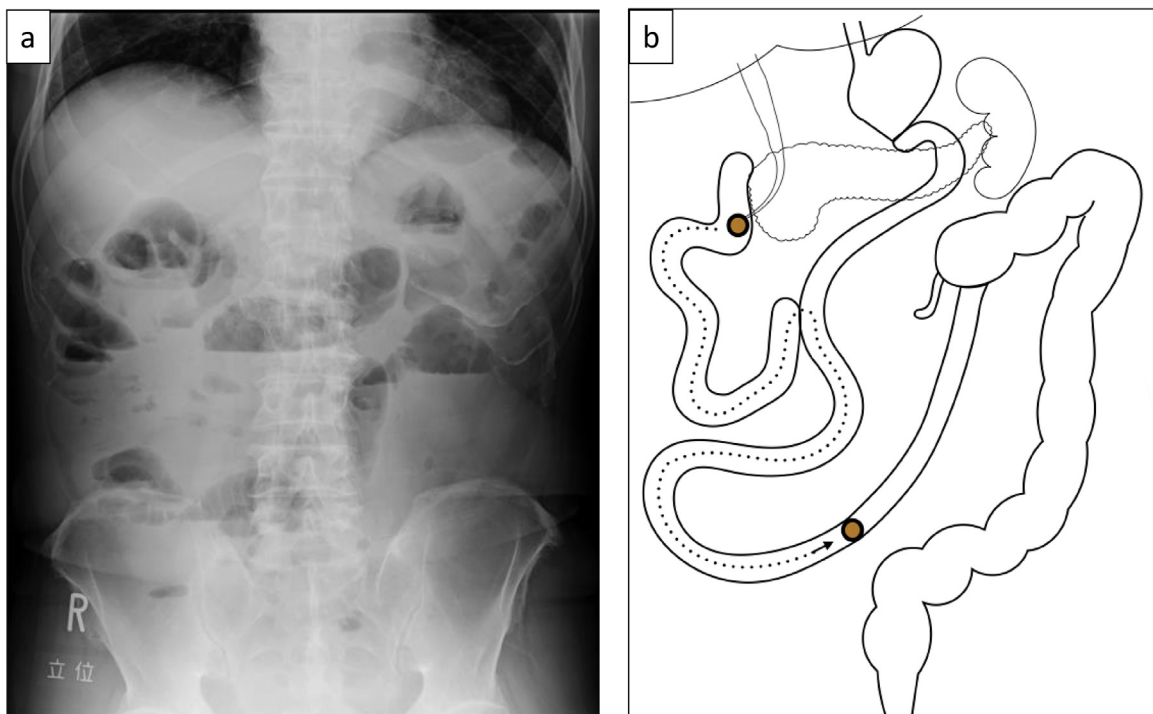


Fig. 2. Abdominal radiograph and shema.

(a) Abdominal radiograph on 7 days after admission showing multiple niveau formation.

(b) The schema of the abdominal findings. 1. The enterolith located at 40 cm proximal from the ileocaecal junction, leading the obstruction of ileum. 2. The intestinal malrotation of the non-rotation type was revealed: the Treitz ligament was not formed and the second portion of the duodenum was poorly fixed in the retroperitoneum. Moreover, the small intestine was located in the right side and the colon was located in the left side of the abdominal cavity.

nal examinations, nil per oral, and intravenous fluids along with nasogastric suctioning can be attempted [13].

On the other hand, when small enteroliths are refractory to such conservative treatment or large enteroliths are confirmed, intensive management should be immediately considered. In previous reports, successful treatments using endoscopic electrohydraulic lithotripsy and mechanical lithotripsy for afferent loop obstruction were described [10,14]. Ishioka et al. reported the successful removal of an enterolith in the distal ileum using balloon-assisted endoscopy [15]. However, cases with successful endoscopic removal of enteroliths in the afferent loop were rare. In fact, both Carbognin et al. and Santori et al. failed to extract an enterolith using an endoscopic approach [5,16]. Moreover, Santori et al. made an attempt using a Dormia basket, subsequently resulting in perforation of the afferent limb [16]. Surgical management is a definitive treatment in the majority of the cases [3]. The consensus management policy with laparotomy is to first attempt manual lysis of the calculus without enterotomy and then milking the smaller parts into the proximal colon allowing exit via the rectum [3]; however, there is a possibility that remnants may become a nidus for future stones. If this is not possible, enterotomy removal is considered as the standard procedure [17]. Bowel resection and anastomosis are usually conducted when severe inflammation, perforation, necrotic bowel diverticulosis, or long segment or multiple strictures causing enterolithiasis are present [18,19]. In this case, we first selected conservative treatment, because the patient's condition was stable, his upper abdominal pain immediately disappeared just after admission, and fever and obstructive jaundice disappeared gradually by conservative treatment. However, the enterolith moved to the lower small intestine and caused ileus. Subsequently, laparotomy was performed because this case was refractory to conservative treatment.

4. Conclusions

This report describes a case of an enterolith occurring in the duodenal afferent loop after distal gastrectomy, leading to obstructive jaundice and ileus. Although afferent loop enterolith formation is uncommon, it should be considered when a patient with a history of B-II gastrectomy or Roux-en-Y reconstruction presents with fever, abdominal pain, or other symptoms suggesting acute cholangitis. Moreover, surgical treatment should be considered for afferent loop obstruction or intestinal obstruction that is refractory to conservative treatment.

Conflicts of interest

The authors declare that they have no competing interests.

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Ethical approval

We have a consent by the patient. Ethical approval was obtained from the ethical committee of Tsuchiya General Hospital.

Consent

Written informed consent was obtained from the patient for the publication of this case report and any accompanying images. A copy of the written informed consent is available for review by the Editor-in-Chief of this journal.

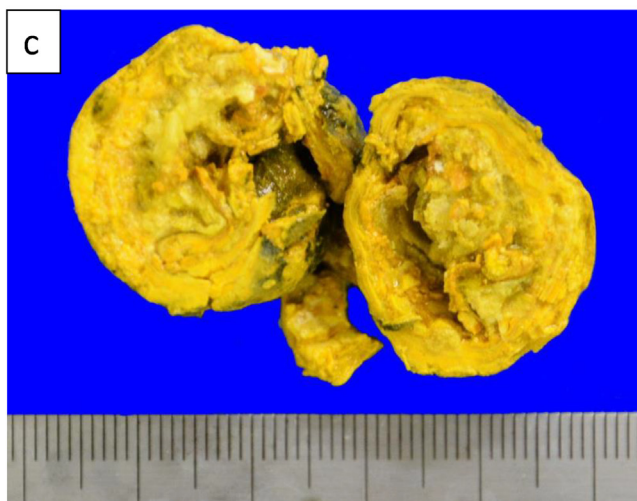
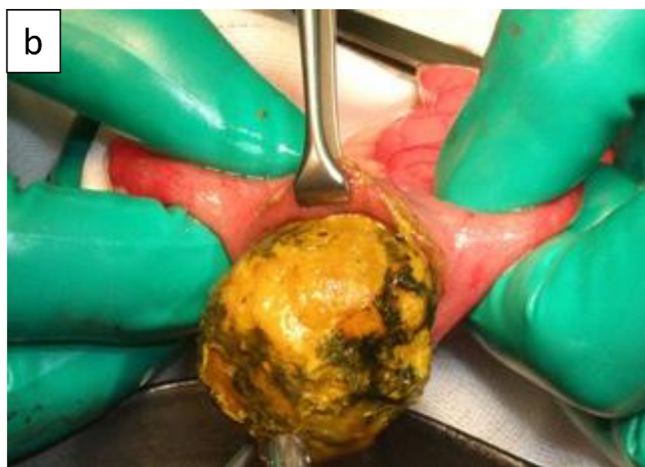


Fig. 3. Intraoperative findings.
 (a) The enterolith located in the distal ileum leading the obstruction and dilation of the oral side of the ileum (black arrow).
 (b) Enterotomy with removal of the enterolith was performed.
 (c) Histological analysis showing a stone composed of necrotic vegetable tissue with calcification.

Author contribution

KS and MB wrote the manuscript. KS, MN, YK and KS performed the operation. FS diagnosed the disease pathologically. KS and MB performed the research/study, analyzed the data, designed the study, and interpreted the results. All authors conceived the study, participated in its design and coordination, and helped draft the manuscript. All authors read and approved the final manuscript.

Registration of research studies

Not applicable. No research study involved.

Guarantor

Masataka Banshodani.

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