A case of retrograde intussusception at Roux-en-Y anastomosis 10 years after total gastrectomy: review of the literature

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Abstract
A 63-year-old man, who had undergone total gastrectomy and Roux-en-Y reconstruction for gastric cancer 10 years previously, was admitted to our hospital with complaints of abdominal pain, palpable abdominal tumor, and hematemesis. On admission, the abdominal tenderness was improving and no abdominal tumor was palpable. Mild inflammatory changes and anemia were noted on blood examination. Abdominal computed tomography revealed a tumor with a layered structure in the left abdomen. The patient was diagnosed with intestinal obstruction secondary to intussusception, and surgery was performed. Retrograde intussusception was found at the site of the Y anastomosis. We conducted manual reduction using the Hutchinson procedure. The intestinal color after the reduction was good, and no intestinal resection was required. Postoperative recovery was uneventful, and the patient was discharged 12 days after surgery. Reports of jejunal intussusception after total gastrectomy with Roux-en-Y reconstruction are relatively rare. Here, we report a case of jejunal intussusception after total gastrectomy with Roux-en-Y reconstruction.

Keywords: Total gastrectomy, Retrograde intussusception, Roux-en-Y anastomosis

Background
Intussusception occurs when a portion of intestine invaginates into an adjacent section of intestine. Common physical exam findings in adults with intussusception include intermittent abdominal pain, vomiting, gastrointestinal bleeding, and/or the presence of a palpable mass. Possible sequelae of intussusception include small bowel obstruction and ischemia. Jejunal intussusception is a rare complication after gastrectomy and extremely rare after total gastrectomy. In this case study, we report a case of retrograde jejunal intussusception at Roux-en-Y anastomosis occurring 10 years after total gastrectomy. We also review other cases of intussusception after total gastrectomy that are reported in the literature.

Case presentation
A 63-year-old man, who had undergone total gastrectomy and Roux-en-Y reconstruction for early gastric cancer 10 years previously, was transferred to our institution from a local hospital with complaints of intermittent abdominal pain, palpable abdominal tumor, and hematemesis. On arrival, he was hemodynamically stable, the abdominal tenderness was improving, and the abdominal tumor was palpable. Mild inflammatory changes and anemia were noted on blood examination. Abdominal computed tomography revealed a tumor with a layered structure in the left abdomen. The patient was diagnosed with intestinal obstruction secondary to intussusception, and surgery was performed. Retrograde intussusception was found at the site of the Y anastomosis. We conducted manual reduction using the Hutchinson procedure. The intestinal color after the reduction was good, and no intestinal resection was required. Postoperative recovery was uneventful, and the patient was discharged 12 days after surgery. Reports of jejunal intussusception after total gastrectomy with Roux-en-Y reconstruction are relatively rare. Here, we report a case of jejunal intussusception after total gastrectomy with Roux-en-Y reconstruction.

Keywords: Total gastrectomy, Retrograde intussusception, Roux-en-Y anastomosis

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procedure. The involved bowel was dilated, edematous, and congested, but there was no evidence of ischemia (Fig. 3b), and therefore, we performed only manual reduction and adhesiotomy without intestinal resection. The patient’s postoperative recovery was free of complications, and he was discharged 12 days postoperatively. He has been alive without symptoms of bowel obstruction for 2 years after operation.

**Discussion**

Jejunal intussusception after gastrectomy was first reported by Bozzi [1] and is recognized as an uncommon complication, occurring in only 0.07–2.1% of patients who undergo gastrectomy [2]. Intussusception is attributed to both mechanical factors (excessive length of afferent loop, lifting afferent loop to the stomach wall, excessively large anastomosis hole, ptosis of the gastrojejunal anastomosis, postoperative adhesions, and stenosis causing reverse peristalsis) and functional factors (spasm of the intestine, peristaltic abnormality, surgical stimulation, inflammation, autonomic nervous system abnormality, enteral nutrition, drug infusion, and decrease in gastric wall tension) [2, 3]. At the site of the Roux-en-Y anastomosis in this case, adhesions were mild and no strictures or mass were observed that would cause reverse peristalsis. However, mechanical factors cannot be entirely ruled out in this patient; we suspect that some kind of peristaltic abnormality may have occurred. Tu and Kelly reported reverse peristalsis caused by an apparent ectopic pacemaker in a Roux-en-Y anastomosis of small intestinal resection [4]. This clinical condition may also cause retrograde intussusception after total gastrectomy and Roux-en-Y reconstruction.

Jejunal intussusception after total gastrectomy is rare. A review of the literature revealed 18 cases of intussusception occurring after total gastrectomy with Roux-en-Y reconstruction, including the current case (Table 1) [3, 5–18]. The majority of patients experiencing this complication were 60–70 years old. Only four cases of antegrade intussusception were observed; the other cases were retrograde intussusception. Furthermore, only six cases developed in the early postoperative period; other cases developed 1–22 years after surgery.

In 12 of the 18 reported cases, enterectomy was not performed. Kita et al. reported recurrence of intussusception within 1 year of manual reduction of intussusception. Recurrence may be more likely when only manual reduction is used, and therefore, resection and re-anastomosis should be considered [18]. We think that we may prevent retrograde intussusception by making Y leg side-to-side anastomosis in the case of gastrectomy.
Intraoperatively, a retrograde intussusception at the Y-anastomosis was observed (a). Manual reduction was performed using the Hutchinson procedure (b). The color of intussuscepted intestine after the reduction was good, and intestinal resection was unnecessary (black arrow: jejunal pouch, white arrowhead: Y-anastomosis, surrounded by the dotted line and white arrow: intussuscepted intestine).

**Table 1** Cases of jejunal intussusception after total gastrectomy with Roux-en-Y reconstruction

| Case | Age | Sex | Diagnosis       | Time after gastrectomy | Type of intussusception | Treatment                  | Year of reported | Author                |
|------|-----|-----|-----------------|------------------------|-------------------------|----------------------------|-------------------|----------------------|
| 1    | 63  | M   | Gastric cancer  | 3 years                | Retrograde              | None                       | 1954              | Davey [3]            |
| 2    | 48  | F   | Gastric cancer  | 23 days                | Retrograde              | Partial resection of jejunum | 1965              | Nishi                |
| 3    | 65  | M   | Gastric cancer  | 6 days                 | Retrograde              | Manual reduction           | 1965              | Kato et al. [5]      |
| 4    | 40  | M   | Sarcoma         | 5 years                | Retrograde              | Partial resection of jejunum | 1966              | Freeman et al. [6]   |
| 5    | 39  | F   | Gastric cancer  | 16 days                | Antegrade               | Manual reduction           | 1984              | Hanyu et al. [7]     |
| 6    | 61  | F   | Gastric cancer  | 12 years               | Retrograde              | Manual reduction           | 1993              | Hashimoto et al. [8] |
| 7    | 58  | F   | Gastric cancer  | 1 year                 | Retrograde              | Partial resection of jejunum | 1994              | Narushima et al. [9] |
| 8    | 75  | M   | Esophageal cancer| 9 years                | Retrograde              | Manual reduction           | 2000              | Goto et al. [10]     |
| 9    | 50  | F   | Gastric cancer  | 10 days                | Antegrade               | Manual reduction           | 2001              | Ozdogan et al. [11]  |
| 10   | 60  | M   | Gastric cancer  | 4 years                | Retrograde              | Manual reduction           | 2005              | Akiyama et al. [12]  |
| 11   | 74  | M   | Gastric cancer  | 12 years               | Retrograde              | Partial resection of jejunum | 2005              | Matsumoto et al. [13]|
| 12   | 74  | M   | Gastric cancer  | 21 years               | Retrograde              | Manual reduction           | 2006              | Sato et al. [14]     |
| 13   | 75  | M   | Gastric cancer  | 10 years               | Antegrade               | Manual reduction           | 2010              | Ueno et al. [15]     |
| 14   | 69  | M   | Gastric cancer  | 45 days                | Antegrade               | Manual reduction           | 2012              | Matsuda et al. [16]  |
| 15   | 77  | F   | Gastric cancer  | 5 days                 | Retrograde              | Manual reduction           | 2013              | Lee et al. [17]      |
| 16   | 75  | M   | Gastric cancer  | 21 years               | Retrograde              | Manual reduction           | 2013              | Kita et al. [18]     |
| 17   | 76  | M   | Gastric cancer  | 22 years               | Retrograde              | Partial resection of jejunum | 2013              | Kita et al. [18]     |
| 18   | 63  | M   | Gastric cancer  | 10 years               | Retrograde              | Manual reduction           | 2015              | Our case             |
This is because it thinks that it may do intussusception by the peristalsis that was handed down to intestinal tract by making end-to-side anastomosis.

Conclusions
We report a case of retrograde intussusception at Roux-en-Y anastomosis 10 years after total gastrectomy.

Abbreviations
CT: Computed tomography

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Authors’ contributions
YK, RM, TM, and KK performed the operation. YK wrote the manuscript. KK, KO, YA, and HT helped to write the manuscript and supervised the study. YK, RM, TM, SS, TS, HU, and KK provided daily medical treatment for the patient. All authors read and approved the final manuscript.

Competing interests
The authors declare that they have no competing interests.

Consent for publication
Informed consent was obtained from the patient for publication of this case report and any accompanying images.

Ethics approval and consent to participate
We excluded all identifying information and obtained informed consent to participate. Because this is a case report, the approval of the ethical review board of our hospital is unnecessary.

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