Endoscopic self-expandable metal stent placement for malignant afferent loop obstruction caused by peritoneal recurrence after total gastrectomy

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Abstract

Afferent loop obstruction (ALO) caused by cancer recurrence after total gastrectomy (TG) can be managed by either surgical or non-surgical treatment. The general condition of patients with recurrent gastric cancer is often poor, so a less invasive non-surgical treatment is desirable. We report the case of a 75-year-old male who had undergone TG for gastric cancer 6 months previously and who presented at our hospital with abdominal pain and vomiting. Abdominal computed tomography scan showed a dilated afferent loop, and additionally a low-density lesion around jejunojejunal anastomosis, suggesting that ALO is associated with peritoneal recurrence. A self-expandable metal stent (SEMS) was endoscopically placed to treat ALO after decompression of the dilated afferent loop using an intestinal tube. He retained a good quality of life until his death due to cancer progression 5 months after the SEMS placement. Our case indicates that SEMS could be a less invasive alternative to surgery, and may confer a better quality of life for patients with ALO due to cancer recurrence after TG. This is the valuable report of case in which endoscopic metallic stent placement succeeded for ALO caused by peritoneal recurrence after TG.

Keywords Gastric cancer · Total gastrectomy · Recurrence · Afferent loop obstruction · Self-expandable metal stent (SEMS)

Introduction

An afferent loop obstruction (ALO) can occur by benign or malignant causes after total gastrectomy (TG), Billroth II gastrectomy, or pancreatoduodenectomy (PD). ALO can occur after Roux-en-Y anastomosis of gastrectomy or choledochojejunal anastomosis. The ALO can be treated surgically or non-surgically (endoscopic or percutaneous approach) [1–10]. However, no standard treatment strategies have been established. Recently, an endoscopic self-expandable metal stent (SEMS) placement has been reportedly as a

safe and useful minimally invasive treatment for ALO after pancreatoduodenectomy [1–5]. However, no cases of SEMS placement for malignant ALO after TG have been reported. Here, we report a case of SEMS placement for ALO caused by peritoneal recurrence after TG.

Case report

A 75-year-old man who had undergone TG with Roux-en-Y reconstruction for gastric cancer (T4a, N3, H0, P0, CY1, stage IV by the Japanese classification of gastric carcinoma [11]) 6 months previously presented at our hospital with abdominal pain and vomiting. Laboratory tests showed slight elevation levels of bilirubin (total bilirubin, 1.3 mg/dL; direct bilirubin, 0.6 mg/dL), hepatobiliary enzymes (aspartate aminotransferase, 34 IU/L; lactate dehydrogenase, 233 IU/L), and pancreatic enzymes (amylase, 646 IU/L; lipase, 1831 IU/L), with a normal white blood cell count (6500/cm²) and an increased CRP level (1.8 mg/dL), which indicated the presence of mild cholangitis and pancreatitis.

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An abdominal CT revealed a marked distention of the afferent loop and peritoneal dissemination (Fig. 1), suggesting malignant ALO. For confirmation of the diagnosis and further management, transnasal endoscopic exploration was performed with an ultrathin endoscope (GIF XP260NS; Olympus Optical Co., Ltd., Tokyo, Japan).

Malignant stenosis in the distal joint of the afferent loop blocked further passage of the ultrathin endoscope. We first chose decompression treatment using a catheter as emergency treatment.

The guidewire (0.052-in.-diameter, 450-mm-long; Create Medic Co., Ltd., Tokyo, Japan) was inserted across the stenosis into the dilated afferent loop. The endoscope was carefully removed while the guidewire was kept in place. Next, an 18Fr, 300-cm-long intestinal tube (Hydrophilic long intestinal tube Type CP-ES; Create Medic Co., Ltd., Tokyo, Japan) was advanced over the guidewire into the afferent loop, and then the guidewire was removed. The contrast fluoroscopy showed a stenosis of 3cm in the neighborhood of the jejunojejunostomy (Fig. 2). Thereafter, symptoms and laboratory data were improved.

Eleven days after this procedure, a SEMS was placed across the stenosis (Fig. 3, Video 1 Suppl.). Under conscious sedation using diazepam, a therapeutic endoscope (GIF 1T240; Olympus Optical Co., Ltd., Tokyo, Japan) was inserted to this side of the afferent loop stenosis part before removing the 18Fr long intestinal tube. A guidewire (0.035-in.-diameter, 450-mm-long Jagwire; Boston Scientific Corp, Tokyo, Japan) was inserted into afferent loop along the 18Fr long intestinal tube. After confirmation of the stenosis using a contrast medium, a stent sheath was placed and the 18Fr long intestinal tube was removed (Fig. 4a). A

Fig. 1 CT images before the long intestinal tube insertion. Marked distention of reconstructed duodenal and proximal jejunal loop (arrow) and peritoneal dissemination (arrowhead)

Fig. 2 Long intestinal tube was inserted into the dilated afferent loop. Contrast fluoroscopy using the long intestinal tube showed dilated afferent loop and severe stenosis in the distal joint of the afferent loop (arrowhead)

Fig. 3 Schematic of stenosis site (arrow) and afferent loop distention. Arrows point showed a stenosis of 3cm in the neighborhood of the jejunojejunostomy

Fig. 4 Self-expandable metal stent (SEMS) placement. **a** The stent sheath was inserted into the dilated afferent loop before removing the long intestinal tube by the transoral endoscope-assisted approach. **b** SEMS was placed by the standard through-the-scope (TTS) technique

Niti-S uncovered duodenal stent measuring 22 mm in diameter and 12 cm in length (Taewoog Medical, Seoul, South Korea) was placed by a standard through-the-scope (TTS) technique (Fig. 4b).

After SEMS placement, there was no relapse of the dilated afferent loop which was confirmed on X-ray. The patient made an uneventful recovery 2 days after the procedure. The patient could take in low-residue diet and did not receive parenteral nutrition for 130 days after SEMS. He retained a good quality of life by receiving chemotherapy until his death due to cancer progression 5 months after the SEMS placement. At the time of death, he did not develop a recurrence of malignant ALO.

Discussion

ALO is a rare complication that occurs in 0.2–1.0% of patients after gastrectomy with a Billroth II or Roux-en-Y reconstruction [7, 8]. ALO may be caused by mechanical obstruction of the afferent loop by benign (adhesions, internal herniation, volvulus, intussusception, intestinal kinks/strictures, gastrointestinal stones, and radiation enteritis) or malignant (intra-abdominal recurrence) causes [4, 8].

An obstruction of the afferent loop disrupts the flow of bile and pancreatic juice, resulting in acute pancreatitis or obstructive jaundice. In some patients, the condition can be rapidly complicated by the development of perforation/peritonitis and can result in death [8]. Therefore,

early diagnosis and intervention is important to decrease the mortality rate, especially when the condition develops acutely [8].

The management strategy of ALO depends on the nature (i.e., benign or malignant) of the obstruction. Benign ALO needs definitive repair of the primary cause by surgery with the exception of anastomotic ulcerations, which can be managed by endoscopic balloon dilation. However, malignant ALO often needs palliative treatment (percutaneous and endoscopic approach, or bypass surgery) or secondary surgery with curative intent (excision and reconstruction) [4].

Surgery is invasive and may not be effective in malignant ALO. Surgery, such as Roux-en-Y or Braun enteroenterostomy between the proximal afferent loop and the efferent loop to bypass the obstruction, is usually impossible because of the recurrent mass at the anastomotic site and/or extensive mesenteric carcinomatosis resulting in bowel loop fixation. The survival time is extremely short in patients with malignant ALO caused by peritoneal recurrence [9]. Therefore, non-surgical treatment may be desirable for malignant ALO [3].

A direct percutaneous drainage of the dilated afferent loop is a possible treatment if the dilated afferent loop underlies the anterior abdominal wall; however, this method has a risk of intestinal leakage and subsequent peritonitis [2]. Malignant ALO has also been treated by percutaneous transhepatic biliary drainage (PTBD) [7, 10]. PTBD may provide effective palliation; however, this method has a risk of serious adverse events, such as cholangitis and hemorrhage

[10]. In a patient with massive ascites, the percutaneous and/or fluoroscopic approach may be contraindicated.

Recently, some cases of successful SEMS placement via the percutaneous and peroral approaches using the endoscopic and/or fluoroscopic routes have been reported for the treatment of malignant ALO [2, 3, 7]. The improvement of diagnostic imaging systems including endoscopic examination and X-ray inspection has enabled us to perform this procedure. A peroral approach using fluoroscopic route is minimally invasive; however, when the bowel segment until the lesion is too long or is tortuous, peroral route can be difficult.

In contrast, a peroral endoscopic approach would be less invasive and technically easier than a transhepatic approach if the endoscope can reach the site of stenosis in the afferent loop [2, 7]. In our case, an ultrathin endoscope was easily advanced to reach the stenosis in the afferent loop, and we inserted a long intestinal tube into the dilated afferent loop for decompression. Because the stenosis was not severe and dealt with early, this procedure could be completed relatively easily. It was very effective for the drainage of the dilated afferent loop, and the subsequent alleviation of mild cholangitis and pancreatitis. Therefore, this case might be able to observe the clinical course with only decompression using the long tube. It is often difficult to diagnose comorbid anastomotic stenosis by CT, but a contrast medium injection through the nasoduodenal drain into the decompressed afferent loop helped in visualizing the normal small bowel in the present case. The long intestinal tube was useful as a guide for the insertion of the endoscope when SEMS is used. One-step SEMS placement may be less invasive than our two-step placement. However, one-step SEMS may not be useful for cases requiring emergent decompression of the afferent loop for impending cholangitis or pancreatitis, because a SEMS is expanded slowly for 48 h and remained poorly expanded when a stenosis is hard [7]. Therefore, we performed two-step SEMS placement. The advantages of two-step placement are as follows. First, the initial long intestinal tube can immediately decompress the dilated afferent loop. Second, other stenosis sites can be evaluated after the initial procedure. Third, the 18Fr long intestinal tube can serve as a guide for SEMS placement.

There was no other obstruction after SEMS treatment in this case. Even if the long intestinal tube was guided, we consider that this procedure could not be applied when there were several strong obstructions, or more severe anal stricture.

To our knowledge, this is the valuable report of a case in which endoscopic SEMS placement was successfully used to treat malignant ALO after total gastrectomy (TG). As far as we examined, there was no report of endoscopic SEMS placement for malignant ALO after TG. The endoscopic stenting method (or treatment strategy) differs for

patients who have undergone TG and patients who have undergone other abdominal operations. After TG, via slim reconstruction intestinal tract of around 40 cm due to the small intestine, it is thought to be difficult to insert the endoscope for a stenosis, afferent loop (side-to-side anastomosis), which we transformed by peritoneal dissemination as well as deformity due to adhesions. The site of TG is farther from the afferent loop than that of Billroth II gastrectomy or PD. Therefore, endoscopic SEMS placement may be technically complicated after TG. However, by having taken effect by the two-step SEMS placement method, it was not difficult to place SEMS in presented case.

In conclusion, the presented procedures (endoscopic SEMS placement after decompression of a dilated afferent loop using an intestinal tube) may be a feasible, safe, and minimally invasive treatment for patients with malignant ALO after TG. It may be a safer and more effective alternative to other non-surgical approaches.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest. No financial support was received for the work described in this manuscript.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants to be included in the study.

References

1. Fujii M, Ishiyama S, Saito H et al (2015) Metallic stent insertion with double-balloon endoscopy for malignant afferent loop obstruction. *World J Gastrointest Endosc* 7:665–669
2. Huang J, Hao S, Yang F et al (2015) Endoscopic metal enteral stent placement for malignant afferent loop syndrome after pancreatoduodenectomy. *Videosurg Other Miniinvasive Tech* 10:257–265
3. Sakai A, Shiomi H, Okada Y et al (2015) Effectiveness of endoscopic self-expandable metal stent placement for afferent loop obstruction caused by pancreatic cancer recurrence after pancreaticoduodenectomy. *Clin J Gastroenterol* 8:103–107
4. Blouhos K, Boulas KA, Tsalis K et al (2015) Management of afferent loop obstruction: reoperation or endoscopic and percutaneous interventions? *World J Gastrointest Surg* 27:190–195
5. Sasaki T, Isayama H, Kogure H et al (2014) Double-balloon enteroscope-assisted enteral stent placement for malignant afferent-loop obstruction after Roux-en-Y reconstruction. *Endoscopy* 46(Suppl 1 UCTN):E541–E542
6. Kim J, Choi JJ, Kim CG et al (2011) Self-expandable metallic stent placement for malignant obstruction in patients with locally recurrent gastric cancer. *Surg Endosc* 25:1503–1513

7. Han K, Song HY, Kim JH et al (2012) Afferent loop syndrome: treatment by means of the placement of dual stents. *Am J Roentgenol* 199:W761–W766
8. Aoki M, Saka M, Morita S et al (2010) Afferent loop obstruction after distal gastrectomy with Roux-en-Y reconstruction. *World J Surg* 34:2389–2392
9. Lee KD, Liu TW, Wu CW et al (2002) Non-surgical treatment for afferent loop syndrome in recurrent gastric cancer complicated by peritoneal carcinomatosis: percutaneous transhepatic duodenal drainage followed by 24-hour infusion of high-dose fluorouracil and leucovorin. *Ann Oncol* 13:1151–1155
10. Morita S, Takemura T, Matsumoto S et al (1989) Septic shock after percutaneous transhepatic drainage of obstructed afferent loop: case report. *Cardiovasc Interv Radiol* 12:66–68
11. Japanese Gastric Cancer Association (2011) Japanese classification of gastric carcinoma (3rd English edition). *Gastric Cancer* 3:101–112