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WallFlex™ Duodenal Stent Placement in a Gastric Cancer Patient with Malignant Stenosis of a Roux-en-Y Gastrojejunostomy following Distal Gastrectomy

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Key Words

Gastric cancer · Roux-en-Y gastrojejunostomy · Recurrence · WallFlex™ duodenal stent

Abstract

A 69-year-old Japanese woman with a history of distal gastrectomy with a Roux-en-Y reconstruction for advanced gastric cancer was admitted to our hospital complaining of severe dysphagia. On admission, the patient was only able to take liquids, and a firm, fist-sized tumor was palpable in her left upper abdomen. An endoscopic examination disclosed stenosis of the jejunal limb of the gastrojejunostomy. Abdominal computed tomography revealed that a recurrent tumor, 5.0 cm in diameter, was compressing the jejunal limb of the gastrojejunostomy. A knitted nitinol self-expandable metallic stent (WallFlex™ duodenal stent) was placed endoscopically at the stenotic jejunum from the gastrojejunostomy. The time required for stenting and total endoscopic manipulation was 12 and 35 minutes, respectively. No stent-related complications were observed. The patient could resume oral ingestion 1 day after endoscopic stenting and was discharged on the fifth day after treatment. She survived for 201 days after stenting. She continued oral ingestion for 194 days and stayed at home for 165 days. The WallFlex duodenal stent allows safe endoscopic stenting, even in cases of malignant stenosis of a gastrojejunostomy following distal gastrectomy. This stenting device will extend the indications for endoscopic palliation of gastric cancer patients with gastric outlet stenosis.

Introduction

Malignant gastric outlet obstruction by an unresectable or recurrent carcinoma causes nausea and vomiting, prevents oral ingestion, and seriously compromises the quality of life of the patient. Bypass surgery, i.e. gastrojejunostomy, has been the treatment of choice for malignant gastric obstruction for a long time [1]. Malignant gastric obstruction also affects gastric cancer patients who have undergone a distal gastrectomy owing to locoregional tumor relapse. In such cases, bypass surgery is often impossible, because the gastric remnant is too small to create an anastomosis and the adhesion formed by the previous surgery makes it technically difficult. Postgastrectomy patients with malignant gastric outlet obstructions have been managed with parenteral nutrition and decompression with the placement of a nasogastric tube. This treatment requires the patients to be hospitalized and is unmet to their clinical needs, because current advances in chemotherapy have markedly prolonged the survival of gastric cancer patients suffering recurrence [2]. Recently, self-expandable metallic stent (SEMS) placement has emerged as a minimally invasive alternative treatment and has shown promising results in cancer palliation [3, 4]. The WallFlex™ duodenal stent (Boston Scientific Co., Natick, Mass., USA) is a new type of enteral stent, approved in Japan in April 2010. This stent is made of nitinol instead of stainless steel, which markedly improves its flexibility while maintaining the patency of the lumen. The stent also has looped distal ends to reduce the risk of mucosal injury and a flared proximal end to minimize the risk of stent migration. These modifications allow safer endoscopic stenting at the duodenum and extend the indications for enteral stenting to at-risk sites, such as the jejunum and enteral anastomoses after surgery. However, few data are available on whether the WallFlex duodenal stent is applicable to the management of malignant gastric outlet obstructions in postgastrectomy patients. We here report a patient with malignant stenosis of the jejunal limb of a Roux-en-Y gastrojejunostomy. The patient underwent endoscopic stenting with the WallFlex duodenal stent and swiftly resumed her diet and a good quality of life.

Case Report

A 69-year-old woman attended our hospital complaining of epigastralgia. The patient was diagnosed with unresectable gastric cancer and induction chemotherapy was initiated with S-1 (TS-1; Taiho Pharmaceutical Co., Ltd., Tokyo, Japan) plus cisplatin [5] because computed tomography scans revealed that the tumor had invaded the pancreas. After two cycles of chemotherapy, the tumor had shrunk markedly and was resected with a distal gastrectomy with a D2 lymphadenectomy and a partial resection of the pancreas. Gastrojejunostomy using a Roux-en-Y procedure was selected as the anastomotic procedure to avoid anastomotic obstruction owing to local recurrence at the pancreatic head. A histological examination of the surgical specimens showed that the tumor had invaded the pancreas, but the surgical margin was negative. The patient's disease was classified as stage IV (T4N2H0P0CY0M0) according to the Japanese Classification of Gastric Carcinoma, the second English edition [6].

The patient underwent postoperative S-1 chemotherapy for 1 year [7], but a recurrent tumor appeared in the vicinity of the gastrojejunostomy 42 months after the initial surgery (fig. 1a). The disease was controlled for 10 months by outpatient-based chemotherapy: six cycles of weekly paclitaxel, four cycles of docetaxel, and three cycles of irinotecan. However, 52 months after the initial surgery, the patient developed severe dysphagia and was hospitalized. On admission, the patient was only able to take a small amount of liquid, and her performance status was evaluated as 1 according to the Eastern Cooperative Oncology Group grading and 70% on the Karnofsky index. A fluoroscopic examination revealed that the jejunal limb of the gastrojejunostomy had narrowed on a length of 5.2

cm (fig. 1b). A gastrofiberscope (XQ240; Olympus, Tokyo, Japan) with a diameter of 0.9 cm was passed through the narrowed segment, and tumor exposure was not found in the involved jejunum (fig. 1c). Abdominal computed tomography showed that the recurrent tumor had regrown to a size of 5.0 cm and involved the jejunal limb of the gastrojejunostomy.

We made a diagnosis of stenosis of the Roux-en-Y jejunal limb following distal gastrectomy and decided to relieve the stenosis by endoscopic stenting after we had obtained the patient's informed consent (given the risk of the procedure). A WallFlex duodenal stent with a diameter of 2.2 cm and a length of 9.0 cm was selected. A guidewire was inserted through the working channel of the endoscope and advanced through the stenosis. A delivery catheter was inserted along the guidewire until it passed the distal end of the stenosis. The stent was then placed under fluoroscopic and endoscopic guidance (fig. 2a). The time required for stent insertion and total endoscopic manipulation was 12 and 35 min, respectively. No treatment-related complications, including pain, hemorrhage, or perforation, were noted. The expansion of the stent was confirmed by X-ray (fig. 2b), and oral ingestion was commenced on the day following stent placement. The patient could then resume a regular diet without obstructive symptoms such as nausea or vomiting. Follow-up fluoroscopy on the third day after treatment revealed that the stent was fully expanded and that the contrast medium had passed smoothly (fig. 2c). The patient was discharged on the fifth day after treatment. She rejected further treatment, including chemotherapy or radiation therapy, and eventually died of cancer recurrence 201 days after the stent placement. She also required no reinsertion of a nasogastric tube for decompression before her death. Oral ingestion was sustained for 194 days, which corresponded to 96.5% of the patient's survival time. She remained at home for 165 days, with an infusion-free time of 148 days.

Discussion

Malignant gastric outlet obstruction caused by an unresectable carcinoma was traditionally considered to be an indication for gastric bypass surgery as a palliative treatment. Although gastrojejunostomy relieves obstructive presentations, it often takes time to achieve stable oral ingestion, resulting in a prolonged hospital stay [1]. A systematic review of gastrojejunostomy for the palliation of gastric outlet obstruction showed that the clinical success rate was 72%, the mean hospital stay was 13 days, the early and late major complication rates were 4 and 17%, respectively, and the minor complication rate was 33% [1].

The endoscopic placement of SEMSs has emerged as an alternative minimally invasive technique for the palliative treatment of patients with unresectable malignant gastric outlet obstructions [3, 4]. Since Keymling et al. [8] initially reported the utility of SEMSs for gastric outlet obstruction in 1993, reports have accumulated supporting this as a safe and effective procedure, with high technical and clinical success rates. However, previous types of SEMSs, which had sharp ends and low flexibility, often caused severe stent-related complications, including hemorrhage and perforation, especially at the curvature of the duodenum or the colon [9, 10]. The WallFlex duodenal stent is a new SEMS that was developed for pyloroduodenal stenoses, which was approved in Japan in April 2010. Van Hooft et al. [11, 12] showed that the technical success rate for the placement of this stent to relieve gastric outlet obstruction was 93.5–98%, and the clinical success rate was 84–85%. The rates for short-term complications, including pain, perforation, and hemorrhage, were only 4, 2, and 2%, respectively. These results suggest that stenting with a Wallflex duodenal stent to relieve gastric outlet obstruction is both safe and clinically effective and could replace bypass surgery as a procedure for the palliation of patients with this condition.

In the present case, stent placement was the only way to resolve the patient's gastric outlet obstruction, which was caused by cancer recurrence, because the patient had undergone a distal gastrectomy. We were concerned about the safe and successful placement of the stent, because limited data are available on the safety of SEMS placement in postgastrectomy patients [13, 14]. Song et al. [13] placed SEMSs in 39 patients with malignant anastomotic obstructions after gastrojejunostomy and reported their results. In their series, stent placement was technically achieved in all patients, and 35 patients (90%) obtained relief from their obstructive symptoms. However, aspiration pneumonia, stent migration, and reobstruction occurred in 2, 4, and 2 patients, respectively, with a total complication rate of 23.1%. Kim et al. [14] also reported the results for 39 postgastrectomy patients who underwent SEMS placement. The technical success rate was 92% and the total complication rate was 44%. In the series of Kim et al. [14], 2 patients suffered from stent-associated perforation. On the basis of previous studies, we infer that SEMS placement is more risky in postgastrectomy patients than in patients with unresectable primary gastric cancers, although the treatment is technically feasible.

Because it prevents severe reflux esophagitis and may reduce anastomotic leakage, Roux-en-Y gastrojejunostomy is currently becoming a preferred procedure in Japan for reconstruction after distal gastrectomy [15]. The jejunal limb of the Roux-en-Y procedure is free of the retroperitoneum and may form a sharply angulated adhesion. This differs considerably from cases of antropyloric stenosis caused by unresectable gastric cancer or Billroth I anastomosis, in which the duodenum is physiologically fixed to the retroperitoneum and the curvature is natural. In our patient, we ensured that the jejunal limb was straight by passing a gastrofiberscope through the stenotic segment. In this special postsurgical setting, for the safe placement of a WallFlex duodenal stent, it is critical that the position of the distal end is confirmed using fluoroscopy and/or endoscopy.

Several studies have shown that patients with unresectable gastric cancers associated with gastric outlet obstruction have a poor prognosis, with a median survival of 33–99 days after stent placement [1, 3, 4]. These short survival times clearly suggest that the palliation for these patients should not be time-consuming. Van Hooft et al. [12] prospectively analyzed 51 consecutive patients with malignant gastric outlet obstruction and showed that, after stent insertion, obstructive presentations disappeared immediately and oral ingestion was resumed within 8 days in all patients. In the present case, oral ingestion was resumed 1 day after the intervention and the patient's intake improved from liquid only to a full diet. The patient survived for 201 days after stenting, despite her refusal of maintenance chemotherapy. She maintained oral ingestion for 194 days (96.5% of her survival time), stayed at home for 165 days (82.1% of her survival time), and remained infusion free for 148 days (73.6% of her survival time). These data demonstrate convincingly that stent placement satisfactorily contributed to the improvement of the quality of the rest of her life.

In conclusion, endoscopic stenting appears to be an effective and safe treatment for the palliation of patients with malignant gastric outlet obstruction. Stent-related complications were avoided using the WallFlex duodenal stent. Although the safety of stenting in intestinal segments interposed by an anastomosis must be confirmed, the present case suggests that the new knitted nitinol stenting device will extend the

indications for endoscopic stenting to include Roux-en-Y gastrojejunostomy following distal gastrectomy.

Disclosure Statement

The authors have no conflicts of interest to declare in connection with this paper.

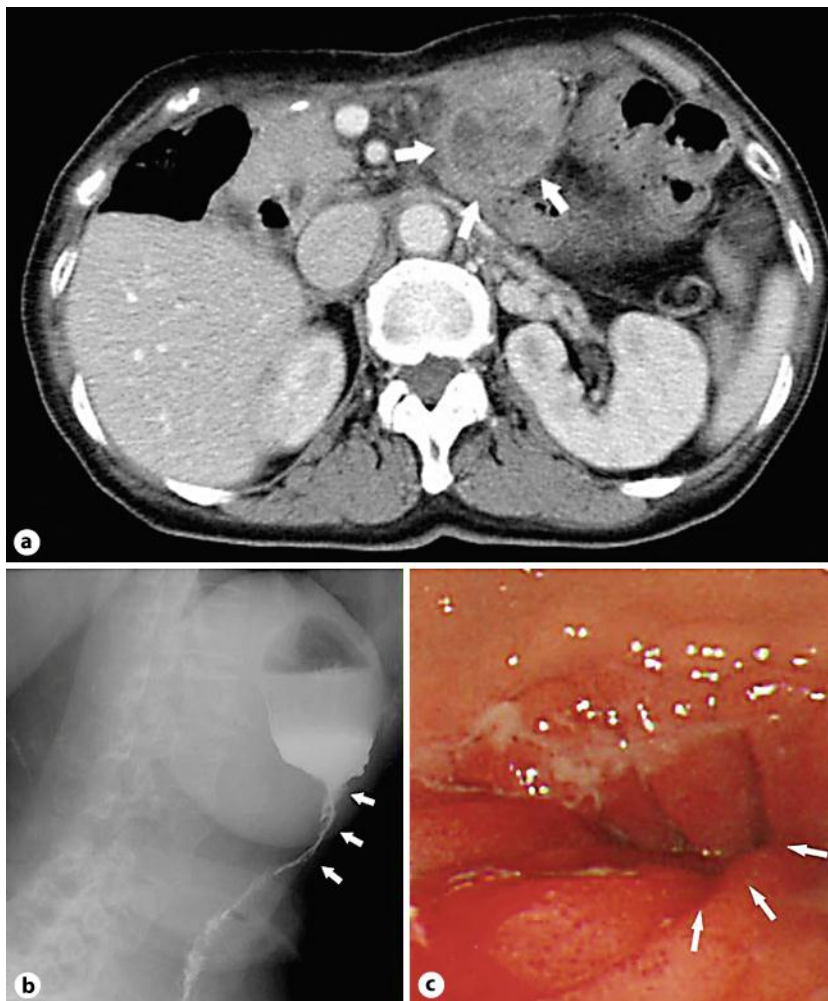


Fig. 1. **a** Computed tomography scans revealed a recurrent tumor in the vicinity of the gastrojejunostomy (arrows). **b** Fluoroscopy, using contrast medium, showed narrowing of the jejunal limb of the gastrojejunostomy (arrows). **c** An endoscopic examination revealed stenosis of the jejunal limb from the gastrojejunostomy. Arrows indicate the anastomosis line. A gastrofiberscope was passed through the narrowed segment and revealed no tumor exposure in the jejunal mucosa.

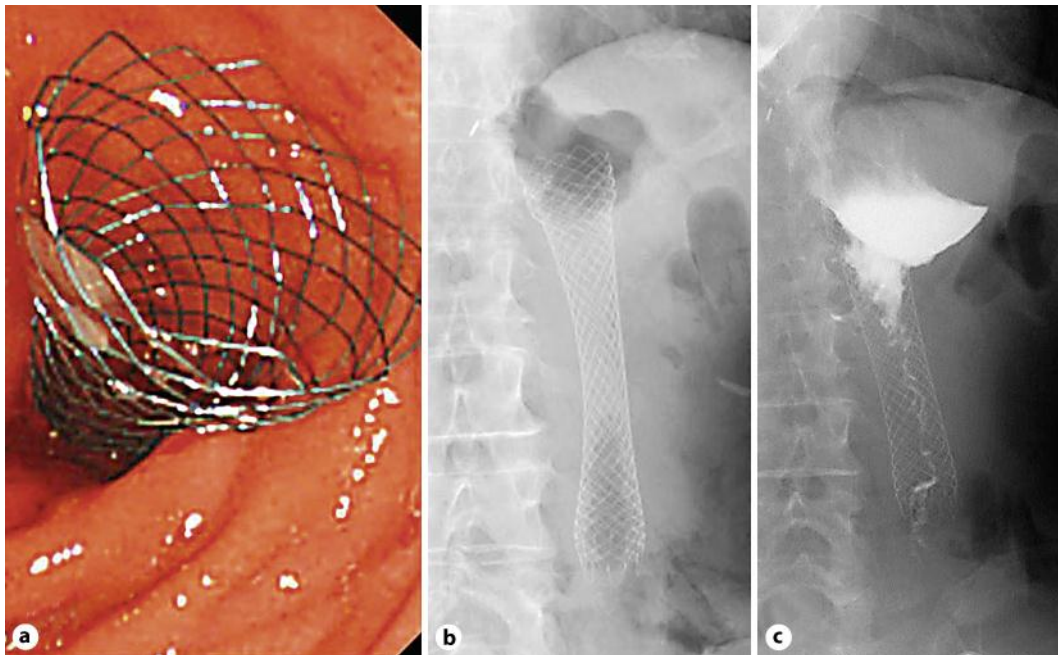


Fig. 2. Under fluoroscopic and endoscopic guidance, a WallFlex duodenal stent, 2.2 cm in diameter and 9.0 cm in length, was placed through the gastrojejunal anastomosis. **a** Endoscopy showed that the flared end was located at the outlet of the gastric remnant. **b** An abdominal X-ray conducted on the day after stenting showed that the stent had expanded well and was properly located. **c** Fluoroscopy on the third day after treatment showed that the stent was fully expanded and the contrast medium had passed smoothly.

References

- 1 Jeurnink SM, Van Eijck CH, Steyerberg EW, Kuipers EJ, Siersema PD: Stent versus gastrojejunostomy for the palliation of gastric outlet obstruction: a systematic review. *BMC Gastroenterology* 2007;8:7–18.
- 2 Cunningham SC, Schulick RD: Palliative management of gastric cancer. *Surgical Oncology* 2007;16:267–275.
- 3 Dormann A, Meisner S, Verin N, Wenk Lang A: Self-expanding metal stents for gastroduodenal malignancies: systematic review of their clinical effectiveness. *Endoscopy* 2004;36:543–550.
- 4 Kim JH, Song HY, Shin JH, Choi E, Kim TW, Jung HY, Lee SK, Kim MH, Ryu MH, Kang YK, Kim BS, Yook JH: Metallic stent placement in the palliative treatment of malignant gastroduodenal obstructions: prospective evaluation of results and factors influencing outcome in 213 patients. *Gastrointestinal Endoscopy* 2007;66:256–264.
- 5 Koizumi W, Narahara H, Hara T, Takagane A, Akiya T, Takagi M, Miyashita K, Nishizaki T, Kobayashi O, Takiyama W, Toh Y, Nagaie T, Takagi S, Yamamura Y, Yanaoka K, Orita H, Takeuchi M: S-1 plus cisplatin versus S-1 alone for first-line treatment of advanced gastric cancer (SPIRITS trial): a phase III trial. *Lancet Oncol* 2008;9:215–221.
- 6 Japanese Gastric Cancer Association. Japanese Classification of Gastric Carcinoma – 2nd English Edition –. *Gastric Cancer* 1998;1:10–24.
- 7 Sakuramoto S, Sasako M, Yamaguchi T, Kinoshita T, Fujii M, Nashimoto A, Furukawa H, Nakajima T, Ohashi Y, Imamura H, Higashino M, Yamamura Y, Kurita A, Arai K; ACTS-GC Group: Adjuvant chemotherapy for gastric cancer with S-1, an oral fluoropyrimidine. *N Engl J Med* 2007;357:1810–1820.
- 8 Keymling M, Wagner HJ, Vakil N, Knyrim K: Relief of malignant duodenal obstruction by percutaneous insertion of a metal stent. *Gastrointestinal Endoscopy* 1993;39:439–441.

- 9 Thumbe VK, Houghton AD, Smith MS: Duodenal perforation by a Wallstent. *Endoscopy* 2000;32:495–497.
- 10 Graber I, Dumas R, Filoche B, Boyer J, Coumaros D, Lamouliatte H, Leqoux JL, Napoleon B, Ponchon T: The efficacy and safety of duodenal stenting: a prospective multicenter study. *Endoscopy* 2007;39:784–787
- 11 Van Hooft JE, Mutignani M, Repici A, Messmann H, Neuhaus H, Fockens P: First data on the palliative treatment of patients with malignant gastric outlet obstruction using the WallFlex enteral stent: a retrospective multicenter study. *Endoscopy* 2007;39:434–439.
- 12 Van Hooft JE, Uitdehaag MJ, Bruno MJ, Timmer R, Siersema PD, Dijkgraaf MG, Fockens P: Efficacy and safety of the new WallFlex enteral stent in palliative treatment of malignant gastric outlet obstruction (DUOFLEX study): a prospective multicenter study. *Gastrointestinal Endoscopy* 2009;69:1059–1066.
- 13 Song HY, Kim TH, Choi EK, Kim JH, Kim KR, Shin JH, Lee SK, Kim TW, Yook JH, Kim BS: Metallic stent placement in patients with recurrent cancer after gastrojejunostomy. *J Vasc Interv Radiol* 2007;18:1538–1546.
- 14 Kim J, Choi IJ, Kim CG, Lee JY, Cho SJ, Park SR, Lee JH, Ryu KW, Kim YW, Park YI: Self-expandable metallic stent placement for malignant obstruction in patients with locally recurrent gastric cancer. *Surgical Endoscopy* 2011;25:1505–1513.
- 15 Takiguchi S, Yamamoto K, Hirao M, Imamura H, Fujita J, Yano M, Kobayashi K, Kimura Y, Kurokawa Y, Mori M, Doki Y: A comparison of postoperative quality of life and dysfunction after Billroth I and Roux-en-Y reconstruction following distal gastrectomy for gastric cancer: results from a multi-institutional RCT. *Gastric Cancer* 2012;15:198–205.