



Case report

Suture-line recurrence at a jejunojejunal anastomosis after gastrectomy for gastric cancer

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Abstract

Local recurrence at a gastrojejunal anastomosis is common in patients after gastrectomy for gastric carcinoma, but recurrence at a jejunojejunal anastomosis without recurrence at a gastrojejunal anastomosis is extremely rare. We report a case of suture-line recurrence at a jejunojejunal anastomosis without recurrence at the gastrojejunal anastomosis or in the remnant stomach in a patient 23 months after receiving a Billroth II gastrectomy for gastric cancer. We attributed the implantation of cancer cells at the jejunojejunal anastomosis to contamination of the stapler with cancer cells exfoliated in the gastric mucus during the construction of the gastrojejunal anastomosis. We therefore consider that different surgical instruments, such as automatic anastomotic devices and automatic suturing devices, must be used in each phase of the surgical procedure for gastric cancer.

Key words Gastric cancer recurrence · Suture-line recurrence · Jejunojejunal anastomosis recurrence

Introduction

Despite considerable improvements in the surgical treatment of gastric cancer, gastric cancer recurrence still constitutes the main cause of death in operated patients even after curative gastrectomy. Gastric cancer recurrences include local recurrence, peritoneal recurrence, and hematogenous metastasis [1].

Local recurrence at a gastrojejunal anastomosis is common in patients after gastrectomy for gastric carcinoma, but recurrence at a jejunojejunal anastomosis without recurrence at the gastrojejunal anastomosis is extremely rare. Here we report a case of suture-line recurrence at a jejunojejunal anastomosis without recur-

rence at the gastrojejunal anastomosis or in the remnant stomach in a patient 23 months after receiving a Billroth II gastrectomy for gastric cancer.

Case report

An 80-year-old woman underwent subtotal gastrectomy because of gastric cancer on August 3, 2004. Macroscopic examination revealed a protruding tumoral mass (13 × 7 cm) classified as Borrmann 1. Multiple histological sections from the surgical specimen showed an invasive gastric adenocarcinoma of poor differentiation (Fig. 1). The cancer cells, arising from the mucosa, invaded the submucosa and three-quarters of the muscular layer, with no evidence of serosal involvement. Invasion of vascular spaces was prominent. There were extensive areas of necrosis, while fibroblastic growth was limited. The surgical margins were clear. There was no evidence of omentum involvement. Computed tomography of the chest and abdomen indicated the absence of distant metastasis.

A Billroth II operation was performed in addition to a side-to-side jejunojejunal anastomosis at the antimesenteric borders of the bowel, 15 cm distal to the gastrojejunal anastomosis. We used three suturing devices in the surgical procedure: (1) the stomach was resected using a linear stapler (4.8 mm; TA 90; Auto Suture, Tyco, CT, USA), (2) the jejunal dissection was performed with another stapler, which was reloadable and had a disposable knife (3.8 mm; GIA 60; Auto Suture), and (3) the gastrojejunal and jejunojejunal anastomoses were constructed using reloadable staplers with a disposable knife (3.8 mm; GIA 80; Auto Suture). The jejunum was not irrigated with a cytotoxic agent before creating the anastomosis.

The patient made an uneventful recovery and was discharged on the eleventh postoperative day. However, she refused chemotherapy, and 23 months after the

operation complained of epigastric discomfort. Gastrointestinal endoscopy showed a normal gastrojejunal anastomosis, but revealed a broad-based tumor, at the jejunojejunal anastomosis, which was growing in the

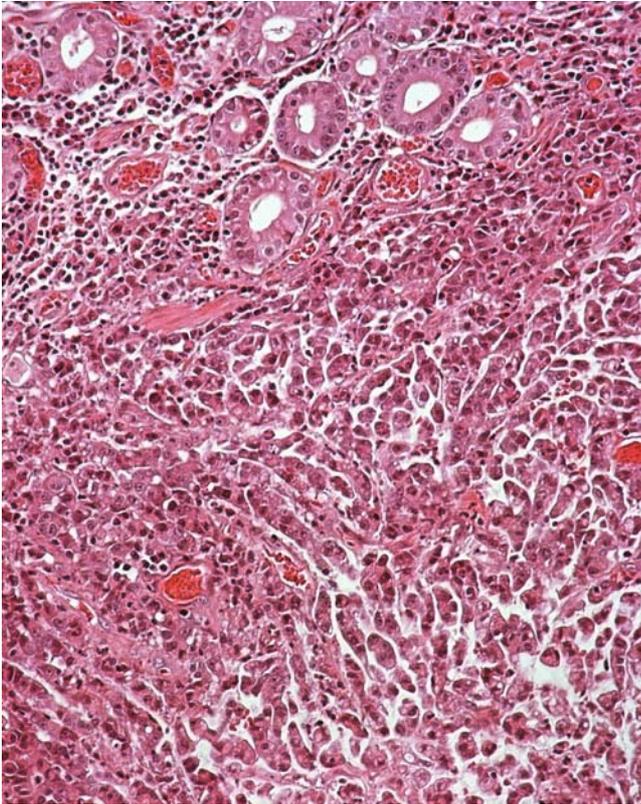


Fig. 1. Pathologic findings of the resected gastrectomy specimen (H&E, ×200)

suture line created by the linear stapler. The tumor had not spread to the remnant stomach.

On July 3, 2006, the patient underwent re-operation, in which the jejunojejunal anastomosis was resected and a Roux-en-Y reconstruction was performed (Figs. 2, 3). Microscopic examinations revealed an anaplastic carcinoma with no evidence of glandular differentiation. There were extensive areas of necrosis, with poor stromatogenic activity. The tumor had invaded throughout the intestinal wall but had not invaded the adjacent fatty tissue. The surgical margins were clear (Fig. 4).

The patient exhibited a good postoperative course and she was discharged on the tenth postoperative day without problems. She was free of symptoms 3 years after the initial gastrectomy and 13 months after the second operation, with gastrointestinal endoscopy revealing no recurrence.

Discussion

Suture-line recurrence at a gastrojejunal anastomosis is a common and well-recognized event, but such recurrence is extremely rare on suture lines other than at the anastomosis. The literature contains two reported cases of suture-line recurrence at an anastomosis (jejunal pouch) distant from the primary tumor that was replaced after total [2] or proximal [3] gastrectomy for gastric cancer.

Miyoshi et al. [2] reported a case of a 74-year-old man with suture-line recurrence in the jejunal pouch after total gastrectomy for advanced gastric cancer. Reconstruction was carried out by jejunal pouch interposition

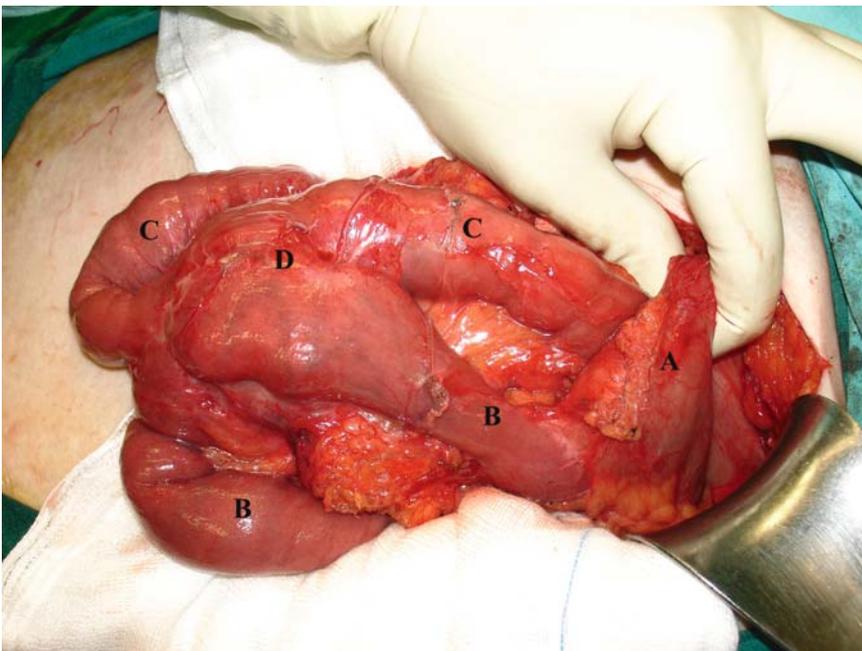


Fig. 2. A Gastrojejunal anastomosis in the remnant stomach. B Afferent loop. C Efferent loop. D Jejunojejunal anastomosis

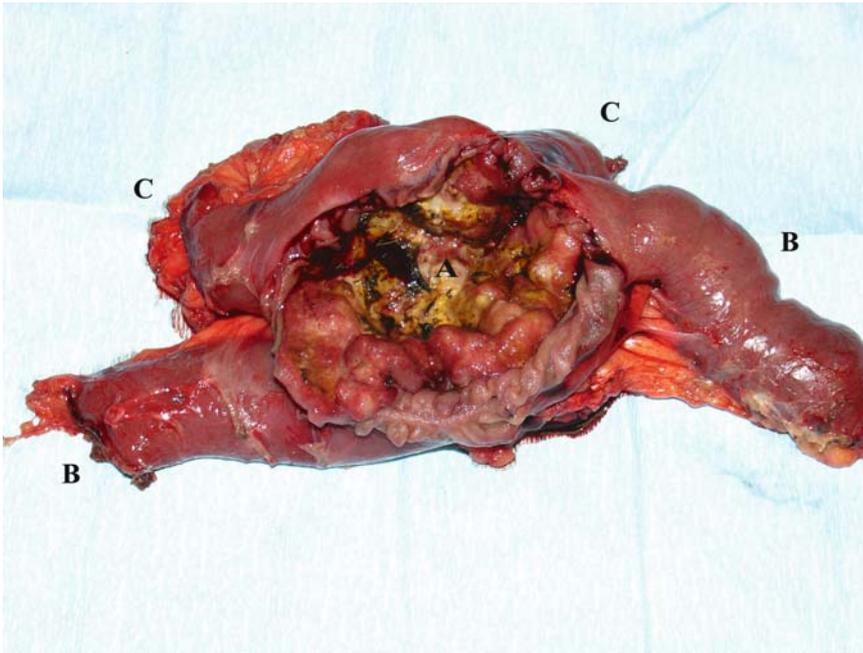


Fig. 3. Resected specimen. *A* Recurrent tumor at the jejunojejunal anastomosis. *B* Afferent loop. *C* Efferent loop

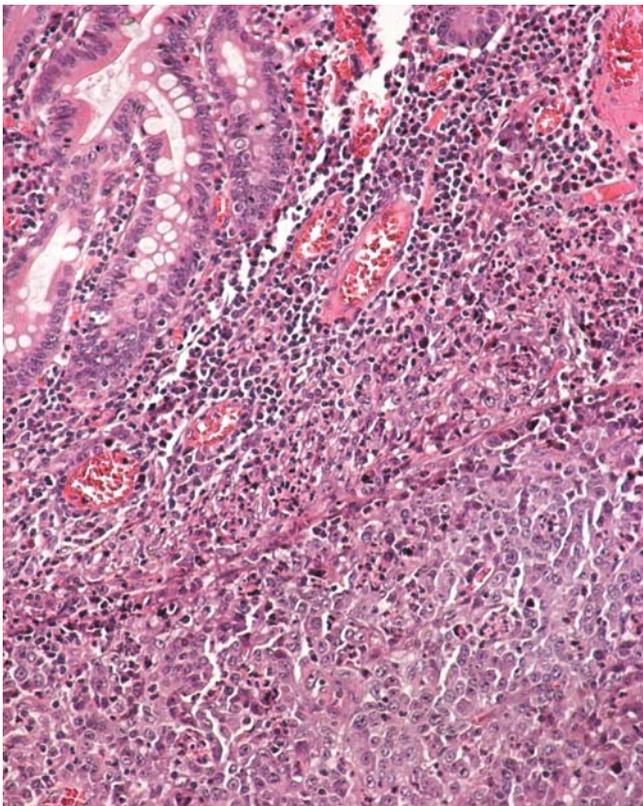


Fig. 4. Pathologic findings of the resected recurrent tumor at the jejunojejunal anastomosis (H&E, $\times 200$)

with a side-to-side anastomosis using a linear stapler, and the operation was completed with an end-to-side esophagojejunostomy and an end-to-end jejunoduodenostomy using circular staplers. The intestinal continuity was reestablished with the end-to-end jejunojejunostomy. Computed tomography performed 4 months later revealed an intraluminal tumor in the jejunal pouch without any other recurrent lesion.

The second case reported in the literature was in a 57-year-old woman who underwent proximal gastrectomy with jejunal pouch interposition. The authors used an automatic suturing device (the so-called Nakayama suturing instrument) to resect the upper one-third of her stomach and a linear cutter for the creation of the jejunal pouch. Gastrointestinal endoscopy performed 29 months later revealed recurrence in the jejunal pouch [3].

Miyoshi et al. [2] proposed two possible causes of the suture-line recurrence in their patient: (1) the implantation of tumor cancer cells exfoliated in the jejunal mucus and then at the suture line, and (2) the implantation of cancer cells at the suture line due to the stapling device being contaminated when cutting the duodenal cap. Although Nishimura et al. [3] acknowledged contamination of stapling devices as a possible cause of suture-line recurrence, they rejected this cause in their patient, because they had used different suturing devices to resect the stomach and construct the jejunal pouch. They, instead, speculated that the implantation in the suture line resulted from the exfoliation of viable tumor cancer cells in the jejunum used for the jejunal pouch

or from cancer cells that subsequently became attached to the nasogastric tube and then became detached and implanted on the suture line.

The implantation of viable cancer cells in freshly cut tissues was first reported in two articles by Ryall [4, 5] in 1907 and 1908. In general, the implantation of cancer cells from carcinomas of the colon and rectum is a well-known phenomenon, in contrast with gastric cancer.

In 1954, McGrew et al. [6] isolated exfoliated cancer cells from malignant colorectal tumors without determining their viability, and Umpleby et al. [7] reported that a cytological examination revealed the viability of exfoliated cells that could be detected intraluminally as far as 35 cm proximal to the resection margin in colorectal cancer specimens.

Various agents, such as mercuric chloride [8], mercury bichloride [9], chlorhexidine-cetrimide, povidone-iodine [10], and normal saline [11] have been proposed for intraluminal irrigation to decrease the incidence of suture-line recurrence. However, it is not clear whether cytotoxic agents are effective in preventing suture-line recurrence at an anastomosis [12].

Implantation of viable exfoliated cancer cells may be responsible for some instances of suture-line recurrence. Previous clinical studies have revealed that multiple clusters of malignant cells can collect on a circular stapler used to produce an anastomosis when resecting for rectal cancer [11, 13, 14]. Gertsch et al. [13] and Jenner et al. [11] reported that cytology revealed malignant cells in centrifuged saline used for washing circular staplers in nine of ten and eight of ten cases of low anterior resection, respectively. Such malignant cells that collect on a stapler can be trapped or implanted in the suture line when constructing an anastomosis and hence cause subsequent suture-line recurrence [11, 13–15].

Our patient exhibited suture-line recurrence at the jejunojejunal anastomosis distant from the primary tumor and approximately 15 cm below the gastrojejunal anastomosis, without the presence of recurrence in the remnant stomach or at the gastrojejunal anastomosis. From the previously reported possible causes of suture-line recurrence [2, 3], we consider it unlikely that the recurrence in our patient was caused by the implantation, at the anastomosis, of exfoliated cancer cells that had migrated in the gastric or jejunal mucus, or by cells attached to the nasogastric tube subsequently becoming detached during the anastomosis. The jejunal loop used to construct the jejunojejunal anastomosis was well separated from the tumor, at approximately 30 cm below the ligament of Treitz, and is it unlikely that viable exfoliated cancer cells could travel such a distance. Moreover, the nasogastric tube was sufficiently distant from this anastomosis. We believe that this mechanism (implantation at the anastomosis, of exfoliated cancer

cells in the gastric or jejunal mucus, or by cancer cells detached from the nasogastric tube) could cause recurrence at the gastrojejunal anastomosis too. It is therefore quite possible for cancer cells to be implanted at a jejunojejunal anastomosis by a stapler that is contaminated with cancer cells exfoliated from the gastric mucus during the construction of a gastrojejunal anastomosis.

Nishimura et al. [3], in their similar reported case of gastric cancer recurrence, excluded the possibility that cancer cells implanted at the anastomosis were from the suture device. However, they stated that “it is important to avoid contamination through surgical instruments in order to avoid stapler-line recurrence”, and Miyoshi et al. [2] “recommended either using a new device or clearing the device with a cytotoxic agent prior to carrying out the reconstruction”. However, it may be technically difficult to eliminate cancer cells completely by such clearing methods [2].

We therefore consider that different surgical instruments, such as automatic anastomotic devices and automatic suturing devices, must be used in each phase of a surgical procedure for gastric cancer.

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