

Evaluation of symptoms related to reflux esophagitis in patients with esophagogastrostomy after proximal gastrectomy

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Abstract

Purpose We investigated postoperative symptoms related to reflux esophagitis in patients who underwent esophagogastrostomy reconstruction after proximal gastrectomy (PG) by conducting a questionnaire survey.

Method Quality of life was assessed using two different questionnaires, the gastrointestinal symptom rating scale (GSRS) for postoperative abdominal symptoms and F-scale for reflux esophagitis. The survey was conducted among 39 patients who underwent esophagogastrostomy after proximal gastrectomy for gastric cancer in the upper third of the stomach, and findings were compared with those in patients who underwent total gastrectomy (TG).

Results The questionnaire was returned by 32 of 39 patients (82%) in the PG group and 40 of 45 patients (89%) in the TG group. On GSRS, the score for indigestion syndrome tended to be higher in the TG group than in the PG group ($p < 0.10$), and the score for constipation was significantly higher in the PG group than in the TG group ($p < 0.05$). The score for reflux syndrome, however, was almost the same in both groups. Similarly, there was no significant difference in the frequency of GERD symptoms between the PG and TG groups on F-scale questionnaire (47% vs. 63%, $p = 0.18$).

Conclusions Esophagogastrostomy after PG in an end-to-side manner with creation of acute angle at the anastomosis

is not associated with an increased risk of reflux esophagitis compared with TG.

Keywords Proximal gastrectomy · Esophagogastrostomy · Questionnaire

Introduction

The frequency of gastric cancer in the upper third of the stomach has increased in recent decades [1, 2]. Although total gastrectomy with extensive lymph node dissection has been considered the standard procedure for proximal gastric cancer, several reports have demonstrated that proximal gastrectomy with regional lymph node dissection could achieve a survival rate equivalent to that of total gastrectomy in patients with early gastric cancers [3–6].

With the increasingly widespread application of laparoscopic gastrectomy as a less invasive treatment [7], direct esophagogastrostomy has become increasingly common as a reconstruction method after proximal gastrectomy. Esophagogastrostomy is a simple and easy reconstruction method that is adaptable to procedures subjected to various constraints. Some researchers, including us, have reported that an optimal additional procedure could prevent objective endoscopic findings in patients undergoing esophagogastrostomy, although postoperative reflux esophagitis had been considered to occur frequently [4, 8–12].

Recently, postoperative quality of life has received considerable attention in addition to oncological outcomes. In this study, we investigated postoperative reflux-related symptoms in patients who underwent esophagogastrostomy reconstruction after proximal gastrectomy by conducting a questionnaire survey.

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Materials and methods

Patients

Between 1997 and 2009, a total of 1,340 patients with gastric cancer were admitted to Kyoto Prefectural University of Medicine. Of these patients, 62 who had early gastric cancer in the upper third stomach underwent proximal gastrectomy (PG) followed by esophagogastrostomy reconstruction. After excluding patients lost during follow-up and those who died of other diseases, the questionnaires described below were sent to 39 patients (median follow-up period, 48 months; range, 8–128 months) in June 2010. Forty-five patients who underwent total gastrectomy (TG) for early gastric cancer, including the upper third stomach during the same period, were selected as controls (median follow-up period, 53 months; range, 10–139 months). There was no significant difference in the follow-up period between the two groups. The clinicopathological features of these patients were reviewed retrospectively from hospital records. No patient received adjuvant chemotherapy in either group in this study. The macroscopic and microscopic classification of gastric cancers was based on the Japanese Classification of Gastric Carcinoma [13].

Surgical procedures

Our surgical procedures of PG were previously described [4, 12]. In brief, limited proximal gastrectomy was performed to limit the resection of the stomach (one third of the stomach) and regional lymph nodes and to preserve the hepatic branch of the vagal nerve. Reconstruction was performed with end-to-side esophagogastrostomy using a circular stapler, and anastomosis was performed at the site of the anterior wall, which was 2 cm from the lesser curvature and 3 cm from the top of the remnant stomach. The surgical technique allowed the greater curvature near the top of the remnant stomach to function as a new fundus. Finally, a seromuscular anchoring suture was made between the top of the remnant stomach and the lower esophagus on both sides. The anchoring suture allowed the top of the remnant stomach to wrap the lower esophagus in a semicircular fashion and created an acute angle at the esophagogastrostomy to prevent regurgitation (Fig. 1). In the TG group, reconstruction was performed with a Roux-en-Y esophagojejunostomy. Esophagojejunostomy was performed in an end-to-side manner using a circular stapler, and jejunojenunostomy was performed, 40 cm apart from the esophagojejunostomy, in a side-to-side manner using a circular stapler.

The questionnaires and endoscopic follow-up

Two different questionnaires were used in the present study. Overall postoperative abdominal symptoms (reflux syndrome,

abdominal pain, indigestion syndrome, diarrhea, and constipation) were evaluated by the gastrointestinal symptom rating scale (GSRS) [14], and symptoms related to reflux esophagitis were scored by F-scale [15], which has been developed to score gastro-esophageal reflux disease (GERD) symptoms and correlates well with endoscopic findings. Patients were requested to answer the self-completed and anonymous questionnaires consisting of 15 (GSRS) and 12 (F-scale) questions, respectively. The responses on the GSRS questionnaires were summarized as the score for each syndrome and as the total score, and those on F-scale were judged to indicate the presence of GERD if the patient's score was more than nine points.

Reflux esophagitis was also evaluated endoscopically in patients who underwent esophagogastrostomy. The degree of reflux esophagitis was classified according to the Los Angeles Classification System [16].

Statistical analysis

Comparisons of groups were made using Student's *t*-test or χ^2 test as appropriate. A *p* value of <0.05 was accepted as significant.

Results

The clinical characteristics of the patients are summarized in Table 1. The location of tumors in the TG group was more likely to be lower in the stomach, and the size of tumors in the TG group was larger than that in the PG group. However, there were no differences in other factors, including pT and pN stage, between the two groups. The operation time of the PG group was significantly shorter than that of the TG group. Wound infection was the most common complication in both groups, followed by pancreatic fistula and anastomotic stenosis in one patient each in the PG group. During the clinical course, there was no anastomotic leakage in any patient and there was no recurrence in either group.

Postoperative endoscopic screening was performed 1 year after proximal gastrectomy in a total of 20 PG patients. Findings of significant reflux esophagitis were observed in five patients (25%): grade M in two patients, A in two patients, and D in one patient. The case with severe reflux esophagitis, grade D, was associated with hiatal hernia.

The questionnaires were returned by 32 of 39 patients (82%) in the PG group and 40 of 45 patients (89%) in the TG group. Regarding the overall gastrointestinal symptoms evaluated by GSRS questionnaires, the mean score for indigestion syndrome was better in the PG group than in the TG group, although the difference was not significant ($p < 0.10$).

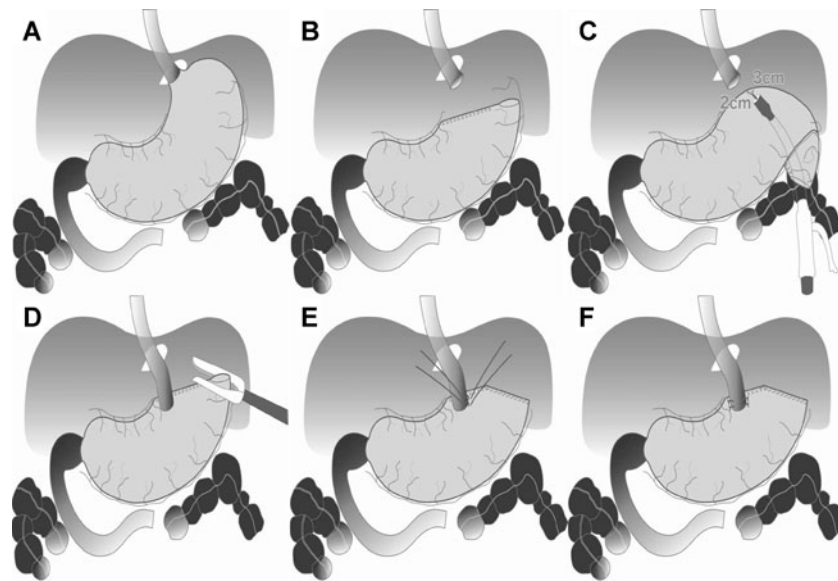


Fig. 1 a–f Our techniques of esophagogastrostomy after proximal gastrectomy. These figures are presented in chronological order. Reconstruction was performed with end-to-side esophagogastrostomy. The head of the circular stapler was inserted through an opening in the unstapled greater curvature side of the gastric stump, and the head of the circular stapler was guided to the anterior wall on the lesser

curvature side of the remnant stomach, which is 2 cm from the lesser curvature and 3 cm from the top of the remnant stomach. The anchoring suture created an acute angle at the anastomosis and allowed the greater curvature near the top of the remnant stomach to function as a new fundus

The score for constipation was significantly worse in the PG group than in the TG group ($p < 0.05$). The score for reflux syndrome, however, was almost the same in both groups. Overall, the mean value of each syndrome score was also similar in the two groups (Fig. 2).

On F-scale score, 15 of 32 patients (47%) in the PG group were identified as having GERD, which was a slightly lower frequency than that in the TG group (25 of 40 patients, 63%); however, the difference was not significant (Fig. 3; $p = 0.18$).

Table 1 Clinicopathological details of patients

		PG group (n=39)	TG group (n=45)	p value
Age (mean)		64	62	0.24
Sex	Male	25	34	0.25
	Female	14	11	
Location	U	33	17	<0.01
	UM	6	28	
Size (mean/mm)		28	38	<0.01
Histology	Diff.	25	25	0.43
	Undiff.	14	20	
pT	T1a	12	17	0.79
	T1b	20	21	
	T2	7	7	
pN	N0	36	38	0.27
	N1	3	7	
Operation time (median/min)		240	336	<0.01
Morbidity (%)		10	18	0.33

U upper third, M middle third, Diff. differentiated adenocarcinoma, Undiff. undifferentiated adenocarcinoma, pT pathological T-classification, pN pathological lymph node (N) classification

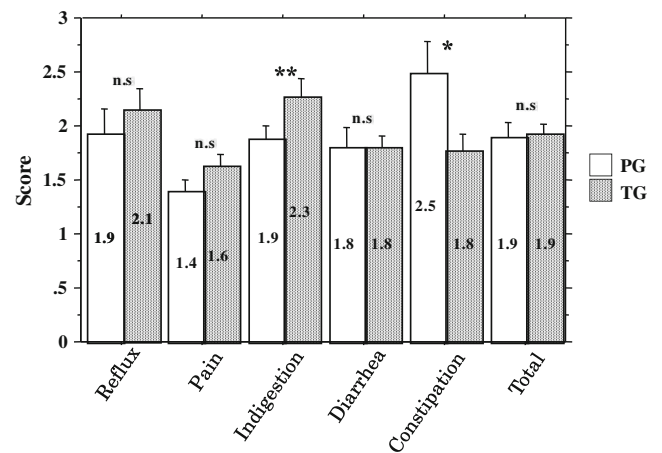


Fig. 2 Comparison of gastrointestinal symptoms based on their response on GRSR between the PG and TG groups. The mean score for indigestion syndrome was better in the PG group than in the TG group ($p < 0.10$). The score for constipation was significantly worse in the PG group than in the TG group ($p < 0.05$). However, there was no significant difference in the reflux esophagitis-related score and also the mean value of each syndrome score between the two groups. * $p < 0.05$, ** $p < 0.10$

Discussion

Several methods have been reported for reconstruction after proximal gastrectomy [17]. Since patients undergoing direct esophagogastromy are considered to demonstrate reflux esophagitis frequently, jejunal interposition reconstruction has been preferred options at many hospitals [18, 19]. Some studies, however, advocated that direct esophagogastromy with some modification facilitated an uncomplicated postoperative course as well or better than jejunal interposition [4, 8–12, 17].

We previously reported favorable postoperative results of direct end-to-side esophagogastromy with bilateral anchoring seromuscular sutures, creating an acute angle at the anastomosis [4, 12]. The concept of the procedure is as follows: (1) preservation of as much of the intra-abdominal esophagus as possible and sufficient capacity in the remnant stomach with a safe margin, (2) dissection of regional lymph nodes that are likely to metastasize, (3) prevention of reflux esophagitis by end-to-side anastomosis using an anchoring suture to create an acute angle at anastomosis and creation of substitutional fundus, and (4) preservation of the hepatic and pyloric branches of vagal nerve so that antral and pylorus ring functions are maintained after surgery. The rapid return of oral dietary intake was noted, and only a few patients with this procedure showed endoscopic findings of severe reflux esophagitis.

Recently, postoperative quality of life has received considerable attention in addition to oncologic outcomes in patients undergoing oncological surgery. Among several evaluation methods, survey of postoperative complaints has received increasing attention, the same as postoperative functional, nutritional and/or physiological findings, such as hematological examination, the amount of food intake, body weight loss, and endoscopic findings. Patient complaints are caused by various physiological and psychological factors, which often affect the patients' postoperative quality of life and sometimes disrupt the patients' ability to lead a healthy and comfortable life.

In the present study, patients who underwent esophagogastromy reconstruction after proximal gastrectomy demonstrated a better outcome regarding indigestive syndrome than patients who underwent total gastrectomy. Concerning symptoms related to GERD, there was no significant difference between the two groups on either questionnaire survey (Figs. 2, 3). Because this survey was anonymous, we could not compare the endoscopic findings of reflux esophagitis against questionnaire responses indicating symptoms. One patient showed endoscopic findings of severe reflux esophagitis (Los Angeles Classification D) but was asymptomatic at every examination in the outpatient clinics. This patient presented with the endoscopic finding of hiatal hernia, and therefore gastropexy to the crura of the diaphragm should be

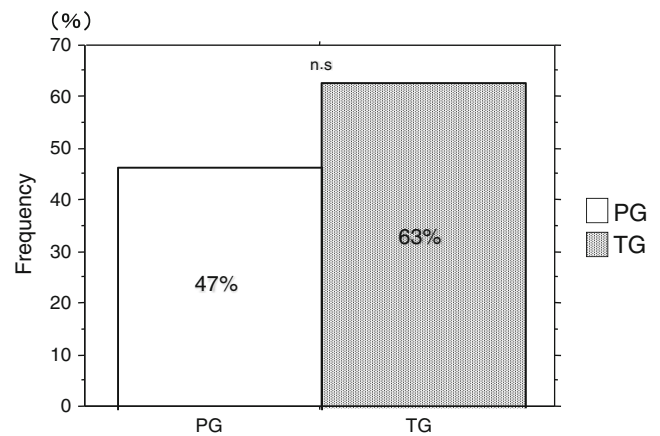


Fig. 3 Frequency of GERD-related symptoms as assessed by F-scale. Patients were judged to have GERD if the total score on F-scale was more than 9 points. There was no significant difference in the frequency between the two groups ($p=0.18$). PG proximal gastrectomy, TG total gastrectomy

added after esophagogastromy. Despite the absence of complaints, such a patient should be prescribed H₂ blocker or proton pump inhibitor to prevent Barrett's esophagus and/or esophageal cancer [20]. Symptoms with regard to constipation were more frequent in the PG group than in the TG group. This appears to be the first report of such a finding, and it is not known exactly why this occurred. Because our standard reconstructive method has been esophagogastromy, we could not compare these postoperative complaints with those of patients who had reconstruction by another method, such as jejunal interposition. On this point, Tokunaga et al. reported the results of a questionnaire survey of patients with esophagogastromy and those with jejunal interposition reconstruction and clearly demonstrated that esophagogastromy reconstruction was a superior reconstruction method, especially with regard to symptoms of abdominal fullness, hiccup, and epigastric discomfort [21].

Another outstanding feature of esophagogastromy reconstruction after proximal gastrectomy is the ease of postoperative screening on endoscopy. Recent advances in the diagnosis and treatment of gastric cancer have resulted in an increase in the incidence of metachronous gastric cancer in the remnant stomach. Therefore, we should attach importance to periodic examination of the remnant stomach for the management of postgastrectomy patients.

Conclusions

Esophagogastromy after PG using the described techniques is not associated with an increased risk of reflux esophagitis compared with total gastrectomy.

Conflicts of interest None.

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