



Original article

Long-term effects of jejunal pouch added to Roux-en-Y reconstruction after total gastrectomy

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Abstract

Background. Jejunal pouch reconstruction after total gastrectomy has been demonstrated to ameliorate postgastrectomy symptoms, with the process of adaptation taking several months. In contrast to the short-term effects of pouch reconstruction, there are few reports about the long-term consequences (more than 2 years after surgery).

Methods. In this study, 22 patients with jejunal pouch (PRY group) and 12 patients without jejunal pouch (RY group) who survived for more than 2 years without any recurrence and were available for follow-up were compared. Patients in the two groups were compared 2 years after surgery in terms of postgastrectomy symptoms, and improvements in body weight and nutritional parameters.

Results. Eating capacity at a single meal compared with that in the pre-illness state was significantly better in the PRY group than in the RY group. The total score on the gastrointestinal symptom rating scale (GSRS) in the PRY group was less than that in the RY group (3.17 vs 5.25). The GSRS score for reflux syndrome in the PRY group was significantly better than that in the RY group. Assessment according to Cuschieri's gradings revealed that the total score in the PRY group was lower than that in the RY group (2.73 vs 5.92). Among the various symptoms examined, the incidence of dietary restriction and that of heartburn were significantly lower in the PRY group.

Conclusion. We conclude that, 2 years after total gastrectomy, the pouch reconstruction had alleviated postgastrectomy symptoms to a greater extent than simple Roux-en-Y reconstruction, but the effectiveness could be improved. The long-term effects of pouch reconstruction should be examined more precisely with an adequate and valid scoring system for determining quality of life.

Key words Total gastrectomy · Jejunal pouch reconstruction · Roux-en-Y reconstruction · Quality of life

Introduction

While there is a general consensus in regard to the indications and criteria for total gastrectomy, a defined optimal reconstruction method has not been clearly established. The most common method of reconstruction, esophagojejunostomy by the Roux-en-Y technique, can sometimes lead to serious postgastrectomy symptoms, such as dietary restriction, early satiety, postprandial fullness, vomiting after meals, heartburn, vasomotor dumping, and diarrhea. The short-term effects of pouch reconstruction in terms of reservoir function within 1 year after surgery were shown to be satisfactory in a few reports of randomized trials [1–5]. In contrast to the short-term results, the long-term consequences (more than 2 years after surgery) are not yet adequately understood, because a considerable number of patients would have died of the disease, and it is difficult to enroll a sufficient number of patients to permit comparisons of reconstruction methods.

The aim of this study was to compare long-term results, in terms of postgastrectomy symptoms and nutritional status, in patients with and without jejunal pouch after total gastrectomy.

Patients and methods

This study was conducted in patients who underwent total gastrectomy (resection A or B [6]) for gastric cancer from January 1994 to September 1998 and survived for more than 2 years without any recurrence. During this period, 88 consecutive patients underwent curative total gastrectomy. The reconstruction was completed according to the Roux-en-Y method in 69 patients; the other patients, who received reconstruction by other methods, such as interposition, were excluded. In 37 patients, simple esophagojejunostomy was done by the Roux-en-Y technique, while for 32 patients, with a high

probability of cure expected for a long survival, the method was modified with the construction of a jejunal pouch. The 22 patients with a jejunal pouch (PRY group) and the 12 patients without a jejunal pouch (RY group) who survived for more than 2 years without any recurrence and were available for follow-up were entered in this study.

All patients had undergone total gastrectomy with extended lymph node dissection (D2) [6]. The jejunum was divided approximately 20 cm distal to the ligament of Treitz, ensuring preservation of the nerve along the marginal vessels. In the RY group, end-to-side esophagojejunostomy was done, using a circular stapler (Premium Plus CEEA 25; U.S. Surgical, Norwalk, CT, USA). In the PRY group, to construct the jejunal pouch, a plicated jejunal loop, measuring 15 cm in length, was brought up posteriorly to the transverse colon. A linear stapler (Endo GIA 60-2.5; U.S. Surgical) was introduced at the mid-portion of the jejunum, and a side-to-side anastomosis was performed at the antimesenteric borders of the bowel. After the end-to-side esophagojejunostomy with the CEEA device, the center hole of the jejunal pouch was closed transversely in two layers. Intestinal continuity was re-established with an end-to-end jejunojejunostomy (Fig. 1).

The patients were followed up regularly by ultrasound examinations and computed tomography (CT) scans. For the purpose of this comparative study, the patients were examined, by one of our experienced staff members, with a standardized questionnaire about postgastrectomy symptoms, approximately 2 years after the surgery. The patients also estimated their eating capacity at a single meal, comparing the amount they were able to eat with amounts consumed in the pre-illness state, and the frequency of daily meals was recorded. The body weights of the patients, and various nutritional parameters on laboratory examination

(hemoglobin, serum proteins, and serum albumin) were measured at every contact. For the evaluation of symptoms, the gastrointestinal symptom rating scale (GSRs), which is an interview-based rating scale consisting of 15 items for the assessment of gastrointestinal symptoms in irritable bowel syndrome and peptic ulcer disease [1,7–9], and Cuschieri's gradings, which are designed to evaluate the characteristic symptoms after total gastrectomy [10] were determined. For the GSRs, the following five dimensions were identified on the basis of a factor analysis and were used in this study: abdominal pain syndrome (three items), reflux syndrome (two items), indigestion syndrome (four items), diarrhea syndrome (three items), and constipation syndrome (three items) [7]. The GSRs data were presented as syndrome scores and as a total score.

Statistical evaluation of differences between the groups was performed by Student's *t*-test or the Mann-Whitney *U*-test, and probabilities of less than 0.05 were accepted as significant.

Results

The clinical characteristics of the patients in the two groups are presented in Table 1. In this series, pouch reconstruction was performed in patients who had a favorable tumor status and general condition that suggested a good chance of long survival; however the differences between the two groups were not significant.

Eating capacity at a single meal compared with that in the pre-illness state was significantly better in the PRY group than in the RY group. The mean frequency of daily meals (all kinds of meals) was 3.36 (range, 3–5 meals) in the PRY group as against 3.75 (range, 3–5 meals) in the RY group (not significant) (Table 2).

Gastrointestinal symptoms and associated complaints were represented by the GSRs scores, in which an increase in the total score was recorded in the early postoperative period, with a subsequent decline to pre-illness levels with the passage of time. The total score in the PRY group was less than that in the RY group (3.17 vs 5.25). The score for reflux syndrome in the PRY group was significantly better than that in the RY group (Table 3). Assessment according to Cuschieri's gradings revealed that the total score in the PRY group was lower than that in the RY group (2.73 vs 5.92). The incidences of dietary restriction and heartburn were significantly lower in the PRY group (Table 4).

Weight loss occurred early after surgery, and neither of the groups showed sufficient recovery of body weight. The ratio of the follow-up body weight to that in the pre-illness state showed no significant difference between the groups (Table 5). None of the nutritional parameters submitted to laboratory examination

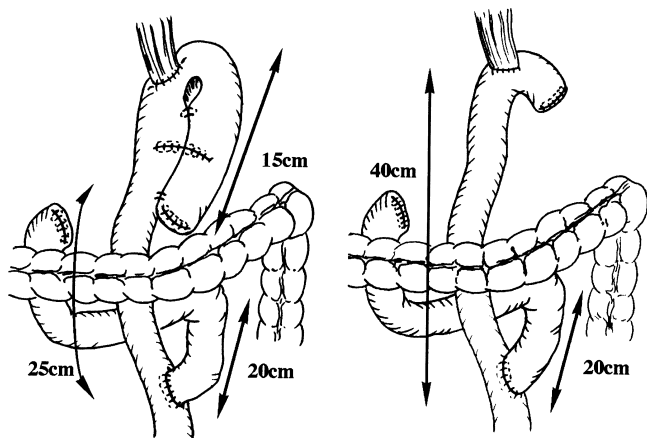


Fig. 1. Reconstruction designs, with jejunal pouch (PRY) and without jejunal pouch (RY)

Table 1. Clinical details of patients alive at least 2 years after total gastrectomy

	Pouch Roux-en-Y (n = 22)	Roux-en-Y (n = 12)	P value
Age at surgery (years; mean \pm SD)	58.5 \pm 13.4	67.2 \pm 10.8	0.0616
Follow-up (years; mean \pm SD)	4.3 \pm 1.2	5.1 \pm 1.6	0.1279
Male:Female	16:6	6:6	0.2796
Pre-illness weight (kg; mean \pm SD)	59.7 \pm 11.8	55.2 \pm 12.8	0.3087
Depth of tumor invasion (pT)			
pT1	8	2	0.2072
pT2	13	8	
pT3	1	2	
Extent of lymph node metastasis (pN)			
pN0	20	7	0.1395
pN1	0	2	
pN2	2	3	
Stage grouping (f Stage)			
IA	8	2	0.0561
IB	11	4	
II	1	2	
IIIA	2	4	
Curative potential (Resection)			
Resection A	19	7	0.1824
Resection B	3	5	

Table 2. Eating capacity in patients with and without jejunal pouch

	Pouch Roux-en-Y (n = 22)	Roux-en-Y (n = 12)	P value
Eating capacity at a single meal compared with that in pre-illness state			
More than 100%	1	0	0.0123
100%	8	1	
70%	8	3	
50%	4	6	
30%	1	1	
Less than 30%	0	1	
Frequency of daily meals			
3 Times	16	7	0.4279
4 Times	4	1	
5 Times	2	4	
Mean	3.36	3.75	

(hemoglobin, serum proteins, and serum albumin) revealed any significant difference between the groups (data not shown).

Discussion

Total gastrectomy is associated with complex alterations in digestive function, characterized by the loss of reservoir function, anti-reflux function, and secretory function [11]. Postgastrectomy symptoms (dietary restriction, early satiety, postprandial fullness, vomiting after meals, heartburn, vasomotor dumping, and diarrhea) are common after total gastrectomy [10,12]. The

symptoms usually diminish or disappear during follow-up if the patients have a favorable clinical course, but some symptoms may be persistent and may cause deterioration of the patients' quality of life if they are serious. Weight loss and malnutrition are also common problems after total gastrectomy. These findings can be explained by reduced food intake as a result of the loss of reservoir function, but they also occur as a result of disturbance of the natural process of digestion by the loss of secretory function [13]. When the resection is potentially curative, the reconstruction method should ensure good digestive function to prevent persistent postgastrectomy symptoms [10]. Roux-en-Y reconstruction is used most often because it prevents bile reflux

Table 3. Assessment of symptoms by the gastrointestinal symptom rating scale (GSRS) in patients with and without jejunal pouch, and distribution of the scores for reflux syndrome

	Pouch Roux-en-Y (n = 22)	Roux-en-Y (n = 12)	
Abdominal pain syndrome	1.18	1.58	
Reflux syndrome	0.18	0.92	
Indigestion syndrome	0.95	0.42	
Diarrhea syndrome	0.82	1.50	
Constipation syndrome	0.00	0.17	
Total GSRS score	3.17	5.25	
GSRS score for reflux syndrome	Pouch Roux-en-Y (n = 22)	Roux-en-Y (n = 12)	P value
0	18	5	0.0400
1	4	5	
2	0	0	
3	0	2	

Table 4. Symptomatic assessment according to Cuschieri's gradings in patients with and without jejunal pouch, and distribution of the symptom scores

		Pouch Roux-en-Y (n = 22)	Roux-en-Y (n = 12)			
Total score for Cuschieri's gradings		2.73	5.92			
Symptom	Group	Score				P value
Dietary restriction	PRY	15	7	0	0	0.0417
	RY	4	5	1	2	
Early satiety	PRY	13	7	2	0	0.1945
	RY	5	3	2	2	
Postprandial fullness	PRY	15	7	0	0	0.3971
	RY	7	2	2	1	
Vomiting after meals	PRY	13	5	4	0	0.3773
	RY	6	1	4	1	
Heartburn	PRY	18	4	0	0	0.0400
	RY	5	5	0	2	
Vasomotor dumping	PRY	13	9	0	0	0.9713
	RY	8	2	1	1	
Diarrhea	PRY	13	9	0	0	0.8996
	RY	8	1	1	2	

PRY, Pouch Roux-en-Y; RY, Roux-en-Y

esophagitis and allows a tension-free anastomosis, but it sometimes leads to serious postgastrectomy symptoms [11,14]. Even though more than 60 different methods of reconstruction to reduce postgastrectomy symptoms have been described since the first report of total gastrectomy, there is still controversy in regard to the best method that would improve the digestive functions and quality of life of gastrectomized patients [2,3,11].

The jejunal pouch reconstruction was designed to supply a gastric substitute. It was expected that patients could eat larger amounts at a meal, that the pouch

would serve as a barrier against entero-esophageal reflux, and that the intestinal transit time would be longer [15]. Newly developed stapling devices that provide safer, easier, and quicker anastomosis have led to a widespread use of the method [16]. The important problem in pouch reconstruction is to have a pouch of an adequate size. Some studies report a larger pouch, proportional to the body size. However, if the jejunal pouch was too large, it took longer to discharge food from the pouch and was not advantageous [14]. An adequate size is considered to be 15–20 cm in length, scintigraphically

Table 5. Changes in body weight in patients with and without jejunal pouch

	Pouch Roux-en-Y (<i>n</i> = 22)	Roux-en-Y (<i>n</i> = 12)	<i>P</i> value
Body weight in pre-illness state (kg; mean ± SD)	59.7 ± 11.8	55.2 ± 12.8	0.1754
Body weight 2 years after total gastrectomy (kg; mean ± SD)	51.6 ± 8.9	43.0 ± 6.5	

as determined [4]. The short-term effects of pouch reconstruction (within 1 year after surgery) were found to be favorable in some randomized trials [1–5]. It was concluded in a review of six prospective randomized trials that, 6 months postoperatively, patients with a pouch had fewer postgastrectomy symptoms and less weight loss than those without a pouch [2]. However, the effects would not appear just after surgery, and processes of adaptation in the pouch are necessary in order to fulfill the functions. It takes at least 3–6 months before the efficacy of a pouch can be shown [2,4]. We chose pouch reconstruction for patients who received curative total gastrectomy and for whom long survival was expected.

In contrast to the short-term results, the long-term consequences (more than 2 years after surgery) are not yet understood, because a considerable number of patients would have died of the disease and it is difficult to enroll a sufficient number of patients to permit an adequate comparison of reconstruction methods [1–5]. If evaluation is delayed until several years after the surgery, the analysis may be substantially biased, because the long follow-up selects all long-term survivors, irrespective of type of surgery, or reconstruction, or both [17]. In practice, because individual patients show marked variation in functional response, and because recovery depends on adequate dietary rehabilitation, clinical assessments, especially in long-term follow-up, are not easy [16]. Leidman et al. [1] demonstrated less weight loss in the pouch group, mainly because of the conservation of body fat stores, but no significant advantages in eating capacity 3 years after surgery. Buhl et al. [18] showed significantly fewer symptoms of the dumping syndrome in the pouch group during the oral glucose tolerance test, whereas eating capacity was similar and the frequency of daily meals was rather increased in the pouch group after a median 2 years' follow-up after surgery. Iivonen et al. [5] reported that pouch reconstruction was associated with better eating capacity, lower frequency of daily meals, diminished postgastrectomy symptoms (early satiety, dumping syndrome, and dysphagia), and decreased weight loss 3 years after surgery. Svedlund et al. [9] reported that pouch reconstruction diminished indigestion syndrome and diarrhea scores 5 years after surgery. In the present

study, we found that pouch reconstruction had the advantages of leading to better eating capacity and fewer postgastrectomy symptoms (reflux syndrome and dietary restriction). The differences in clinical background at surgery appear to have little influence on the evaluation after long follow-up. Some authors have, however, found no clinical benefit of pouch reconstruction [15–17]. Bozzeti et al. [17], in their prospective randomized trial, reported that pouch reconstruction was of no benefit to patients without dietary assistance. There are few reports of the advantages of pouch reconstruction after a long follow up. Iivonen et al. [5] reported that, with pouch reconstruction, after 8 years, there was no advantage in terms of eating capacity on weight gain. It is presumed that the adaptation process after Roux-en-Y reconstruction is over by that time, and that there are no longer any differences according to the presence or absence of pouch reconstruction.

It is a major difficulty with these studies cited above that the most important parameters employed to assess the patients' physical and psychological condition were subjective scores, measured anamnistically. In these reported series, most evaluation depended on the analysis of quality of life, but the evaluation of quality of life is still characterized by a lack of proper definition. A trend to a better quality of life was seen in studies on the relevance of pouch reconstruction, but the findings were not always significant, owing to the choice of unsuitable instruments for measuring the quality of life [2]. Although there is no consensus in the literature on how quality of life is to be defined, it is commonly accepted that quality of life is multidimensional. Agreement on the parameters to be used for measuring the quality of life, as well as agreement on a suitable index to assess it, should be a future objective. An approach to more accurately evaluate quality of life in patients might be to compare pre- and postoperative findings [3].

We conclude that 2 years after total gastrectomy, pouch reconstruction had alleviated postgastrectomy symptoms to a greater extent than simple Roux-en-Y reconstruction, but the effectiveness of the pouch reconstruction could be improved. The long-term effects of pouch reconstruction should be examined more precisely with adequate and valid scoring system of quality of life.

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