

Uncut Roux-en-y esophagojejunostomy: A new reconstruction technique after total gastrectomy

Jangjoo A. · Mehrabi Bahar M. · Aliakbarian M.

Received: 17 November 2009 / Accepted: 14 December 2009
© Association of Surgeons of India 2010

Abstract

Purpose Uncut Roux-en-y is a reconstruction method with a main purpose of diminishing Roux stasis syndrome. In this study we performed this procedure to evaluate utility and complications of this technique, as well as its effect on Roux stasis syndrome.

Methods Total gastrectomy with Uncut Roux-en-y esophagojejunostomy was performed on 94 patients. This technique consists of an artificial jejunal occlusion 5 cm proximal to anastomosis and a jejunojunction between afferent and efferent loops. Diagnosis of “Roux stasis syndrome” was made by clinical criteria.

Results According to the mentioned criteria, the “Roux stasis syndrome” occurred in 21.2% of the patients. Whereas occurrence rate of other complications was: dysphasia (13.8%), benign stricture in anastomosis (9.6%), and fistula (5.3%).

Conclusions Comparing the results of our study to other related studies indicates that this type of operation has lower rate of “Roux stasis syndrome”, and also decreases the postoperative stricture rate of the anastomosis.

Keywords Roux-en-y esophagojejunostomy · Uncut Roux-en-y esophagojejunostomy · Total gastrectomy · Roux stasis syndrome

Introduction

Radical surgery is the only possibility for cure in patients with gastric cancer. Total gastrectomy is the operation of choice for tumors located in the middle or proximal part of the stomach [1]. The main issue is the way to reconstruct the continuity of the GI tract after total gastrectomy. More than 70 procedure types have been developed to reduce patients' complaints and to improve the quality of life after total gastrectomy [2], although Roux-en-y esophagojejunostomy remains the most common used type of reconstruction [3–6].

There are some serious problems after Roux-en-y esophagojejunostomy. One of the most unpleasant complications is the so called Roux stasis syndrome which involves about one third of patients undergoing Roux-en-y reconstruction [7, 8]. This syndrome consists of chronic abdominal pain, persistent nausea, intermittent vomiting and weight loss [9]. The disruption of normal propagation of pacesetter potentials in the Roux limb has been proposed as the possible etiology of the syndrome. On the basis of this theory the new method of Uncut Roux-en-y esophagojejunostomy has been developed. In this study we assessed the advantages and disadvantages of this technique.

Patients and methods

Between January 2004 and August 2007, the medical records were reviewed of all patients undergone Uncut Roux-en-y esophagojejunostomy. From 106 recorded patients who

A. Jangjoo · M. Mehrabi Bahar · M. Aliakbarian
Surgical Research Center, School of Medicine,
Mashhad University of Medical Sciences,
Mashhad, Iran

M. Aliakbarian (✉)
E-mail: aliakbarianm@mums.ac.ir

underwent total gastrectomy 94 (73 men and 21 women) patients entered the study and 12 patients were excluded because of unsuccessful follow up.

The mean age of the patients was 59 years (62 ± 2.5 years) and their stages were as follows: Stage 0 4%, stage IA 4%, stage IB 7%, stage II 11%, stage IIIA 36%, stage IIIB 20% and stage IV 18%. Follow-up after surgery was done for all patients for the period of 1 to 40 months (22.3 ± 1.1 months). Informed written consent was obtained from all patients. A special technique was used for all patients. The jejunal lumen was occluded 20 to 30 cm distal to the ligament of Treitz. For permanent occlusion of the jejunal lumen, we made four or five hand-sewn seromuscular stitches with 3-0 polypropylene around the jejunal wall circularly, and tied the suture material tightly (Fig. 1). The site of jejunal occlusion was reinforced with five interrupted seromuscular sutures (Fig. 2). The esophagojejunal anastomosis was constructed about 5 cm distal to the closed site by an end-to-side fashion. Antecolic route were used for all patients. Approximately 40–50 cm distal to this anastomosis, a side-to-side jejun-

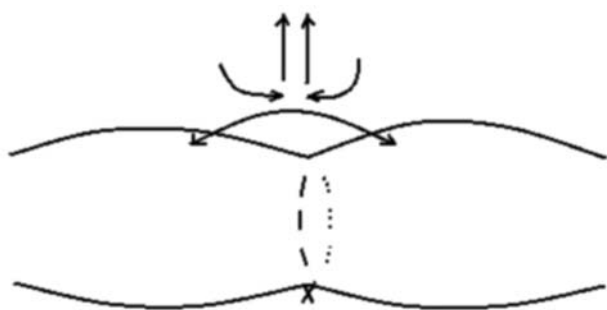


Fig. 1 Jejunal occlusion technique in uncut Roux-en-y esophagojejunostomy: four or five circular seromuscular stitches on the jejunal wall and ligation of the luminal lumen

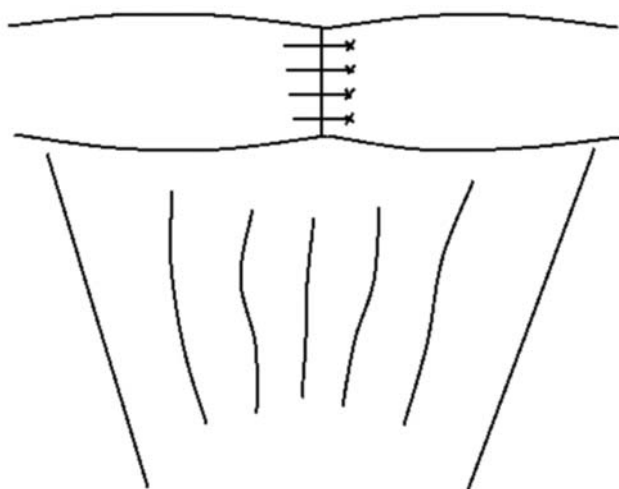


Fig. 2 Four or five interrupted seromuscular sutures at 1 cm apart over the ligation site for permanent serosa-to-serosa adhesion

jejunostomy was made for diverting the duodenal fluid. This anastomosis was located 10 to 20 cm distal to the ligament of Treitz (Fig. 3).

Nasogastric tube was routinely extracted after 48 hours and oral feeding was started on the fifth day. During the follow up period, all of the patients who complained of dysphagia were referred for endoscopy.

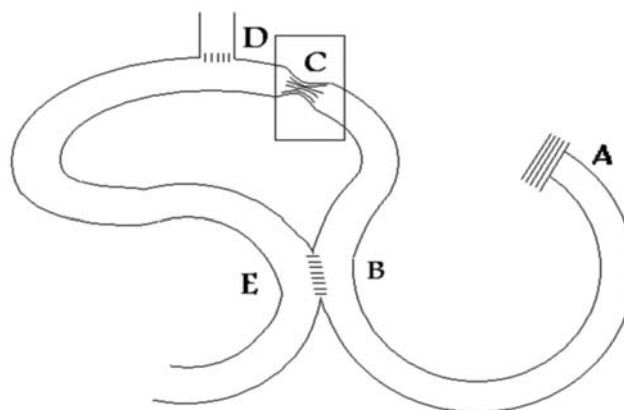


Fig. 3 Uncut Roux-en-y esophagojejunostomy: A Treitz ligament; B, E jejunojunction sites; C jejunal occlusion site; D esophagojejunostomy site
 A-B = 10–20cm A-C = 30cm
 C-D = 5cm D-E = 40–50cm

In this study, data was collected from the medical records and from direct interview with the patients and visits in follow-up clinic. The Roux stasis syndrome was defined by clinical criteria only. The first interview was 10 days after discharge and the patients were followed at least for 6 months with 1 to 2 months intervals. Those who met the criteria were considered to have Roux stasis syndrome. The criteria included one of the four following conditions during follow-up: chronic upper abdominal pain, postprandial fullness, persistent nausea, and intermittent vomiting worsened by eating.

Results

Pathologic diagnoses of the patients were as follows: Adenocarcinoma in 89 patients (94.9%), dysplasia in 3 patients (3.1%) and lymphoma in 2 patients (2.1%). According to intraoperative findings and pathologic reports, tumor location was in cardia, greater curvature, and lesser curvature in 38 (40.4%), 10 (10.4%), and 21 patients (22.3%) respectively. In 24 patients (25.5%) the tumor involved both lesser curvature and antrum and one patient had diffuse involvement. Furthermore, 7 patients had local invasion to pancreas, 6 patients to the spleen and 1 patient had mesocolon involvement in whom distal pancreatectomy, splenectomy and mesocolon shaving were done respectively.

Follow up was completed in 47 patients among whom postprandial abdominal pain occurred in 9 (17.6%), postprandial fullness in 6 (11.8%), Nausea in 4 (7.8%) and vomiting in 2 patients (3.9%). According to the criteria mentioned above, the Roux stasis syndrome occurred in 19 patients (21.2 %). All of the cases were improved with promotilic agents except for one case with retractable symptoms who was re-operated, in whom the failure of occlusion site was diagnosed as the reason of retractable symptoms. In this case, conversion to Roux-en-Y has terminated the dysphagia.

Dysphagia occurred in 13 patients (13.8%), which was investigated by endoscopy in all cases. Five patients had benign stricture accompanied by esophagitis, four patients had benign stricture, two cases had esophagitis, and two patients had no identifiable pathology. All cases of benign strictures were resolved with endoscopic dilatation except one. In this case endoscopy was repeated 5 months later for continued dysphagia which was normal. This patient was improved later with conservative management.

Anastomotic site leakage from esophagojejunostomy occurred in 5 patients in hospital (Table 1). Leakage resolved in two cases with conservative management; staged laparotomy was done for one patient because of peritonitis, with favorable result and 2 patients died of

Table 1 Postoperative complications

| Complications | Number | Percent |
|--------------------------|--------|---------|
| Post operative mortality | 2 | 2 |
| Duodenal leakage | 0 | 0 |
| Relapse in anastomosis | 0 | 0 |
| Benign stricture | 9 | 9.6 |
| Dysphagia | 13 | 13.8 |
| Fistula | 5 | 5.3 |
| Roux stasis syndrome | 20 | 20.2 |
| Wound infection | 1 | 1 |

leakage complications in hospital. No gross disruption of a newly formed occlusion site was confirmed by endoscopy in patients investigated because of dysphagia.

Discussion

The Roux-en-y anastomosis is designed primarily to divert the alkaline secretions away from the esophagus. However transection of the small intestine to create the Roux limb may result in some degree of stasis which probably is the result of impaired electrical continuity. Roux stasis syndrome may be caused by separation of the Roux limb from the natural small bowel pacemaker, located in the

proximal duodenum [10]. Theoretically, the maintenance of myoelectrical continuity between the duodenal pacemaker and the Roux limb can prevent the Roux stasis syndrome. Furthermore, with maintenance of intestinal mesenteric continuity, the better perfusion of anastomotic site may induce less stricture formation than Roux-en-y.

Miedema et al. reported that the staple lines placed across the jejunal wall for the uncut Roux-en-y operation do not disrupt myoelectrical continuity to the uncut Roux limb in dogs. Ectopic pacemakers do not appear in the limb, and Roux limb transit is preserved [11].

Seung-Moo Noh, made an occlusion on the jejunum 25 to 45 cm distal to the ligament of Treitz, and confirmed that the artificial permanent serosa-to-serosa adhesion was maintained without any suture line dehiscence [8]. He showed that this type of occlusion provided a normal myoneural pathway for the propagation from the duodenal pacemaker to the uncut Roux limb, and diverted biliary and pancreatic secretions through the jejunojejunostomy away from the gastric remnant and esophagus. A blind afferent limb (15 to 25 cm long) didn't cause blind loop syndrome or stasis in their follow-up [8].

Adam Kiciak et al. investigated myoelectric activity of the jejunum in two animal models with Roux-en-y and Uncut Roux-en-y and concluded that the intestinal migrating motor complexes were restored within 10.5 and 37 h in 'uncut' Roux and Roux-en-y pigs, respectively. In two weeks follow up, the 'Uncut' Roux piglets increased their body weight by 18.0%, whereas the Roux-en-y piglets increased their body weight by only 7.3% [12].

BaoLien Nguyen Tu et al. demonstrated that in the dogs with uncut Roux limbs, jejunal pacesetter potentials propagated aborally across the neuromuscular bridge, although their frequency was slightly slower distal to the bridge (proximal 19.5 ± 0.7 cpm versus distal 18.8 ± 1.1 cpm) [13].

The major research limitation of this study was the absence of the patients with Roux-en-y esophagojejunostomy to be compared to our patients.

As we know, there are no human study about Uncut Roux-en-y esophagojejunostomy but the prevalence of Roux stasis syndrome in many studies with Roux-en-y esophagojejunostomy is reported to be more than 30% [7, 8] while it was 21% in our study.

In this study we investigated the Uncut Roux-en-y esophagojejunostomy which showed lower rate of Roux stasis syndrome in comparison with reported rates of this complication in Roux-en-y reconstruction in other studies. We believe that this technique can be a good substitution for conventional Roux-en-y after total gastrectomy.

Acknowledgement The authors acknowledge the contribution of Dr. R. Sadeghi. We are very grateful to Ms. M. Hassanpour for editing the manuscript.

References

1. Barbarisi A, Parisi V, Parmeggiani U, Cremona F, Delrio P (2001) Impact of surgical treatment on quality of life of patients with gastrointestinal tumors. *Ann Oncol* 12:27–30
2. Takeshita K, Sekita Y, Tani M (2007) Medium - and long-term results of jejunal pouch reconstruction after a total and proximal gastrectomy. *Surg Today* 37:754–761
3. Espat NJ, Karpeh M (1998) Reconstruction following total gastrectomy: a review and summary of the randomized prospective clinical trials. *Surg Oncol* 7:65–69
4. Paolini A, Tosato F, Cassese M, De Marchi C, Grande M, Paoletti P, et al. (1986) Total gastrectomy in the treatment of adenocarcinoma of the cardia. Review of the results in 73 resected patients. *Am J Surg* 151:238–243
5. Butler JA, Dubrow TJ, Trezona T, Klassen M, Nejdil RJ (1989) Total gastrectomy in the treatment of advanced gastric cancer. *Am J Surg* 158:602–604
6. Gustavsson S, Kelly KA (1987) Total gastrectomy for benign disease. *Surg Clin North Am* 67:539–550
7. Gustavsson S, Ilstrup DM, Morrison P, Kelly KA (1988) Roux-en-y stasis syndrome after gastrectomy. *Am J Surg* 155:490–494
8. Noh SM (2000) Improvement of the roux limb function using a new type of “Uncut Roux Limb”. *Am J Surg* 180:37–40
9. Mathias JR, Fernandez A, Sninsky CA, Clench MH, Davis RH (1985) Nausea, vomiting and abdominal pain after Roux-en-y anastomosis: motility of the jejunal limb. *Gastroenterology* 88:101–107
10. Morrison P, Miedema BW, Kohler L, Kelly KA (1990) Electrical dysrhythmias in the Roux jejunal limb: cause and treatment. *Am J Surg* 160:252–256
11. Miedema BW, Kelly KA (1992) The Roux stasis syndrome. Treatment by pacing and prevention by use of an “uncut” Roux limb. *Arch Surg* 127:295–300
12. Kiciak A, Woliński J, Borycka K, Zabielski R, Bielecki K (2007) Roux-en-yor ‘uncut’ Roux procedure? Relation of intestinal migrating motor complex recovery to the preservation of the network of interstitial cells of Cajal in pigs. *Exp Physiol* 92:399–408
13. Tu BN, Kelly KA (1995) Elimination of the Roux stasis using a new type of “Uncut Roux” Limb. *Am J Surg* 170:381–386