

# Is jejunoduodenostomy anastomosis better than jejuno-gastrostomy anastomosis in laparoscopic gastrectomy and jejunal interposition?

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## ABSTRACT

**Introduction:** The jejunal interposition can be preferred for reconstruction after laparoscopic gastrectomy because it functions as a reservoir and maintains the connection with the duodenal passage. In this procedure, the jejunal segment can be anastomosed between the proximal stomach and the duodenum or distal stomach. We aimed to present our initial experience with the jejunoduodenostomy and jejunogastrostomy in jejunal interposition after laparoscopic gastrectomy and the differences between the results of these two anastomoses.

**Materials and Methods:** Six patients who underwent laparoscopic gastrectomy with jejunal interposition between January and August 2020 were investigated. Demographic data and perioperative parameters were analyzed retrospectively. Digestive symptoms following the surgery were assessed by phone call.

**Results:** Five (83.3%) of the total six patients were male. The median age was 70 (range 19–78) years, with a median body mass index (BMI) of 25.8 (range 23–31) kg/m<sup>2</sup>. The most common surgical indication was gastric adenocarcinoma (n=4). The median operative time was 280 (200–360) minutes, and the median blood loss was 95 (50–100) ml. The median time to oral intake was 3.5 (2–13) days. The median hospital stay was 7.5 (4–16) days. Jejunogastrostomy was performed in three (50%) patients. Postoperative complications occurred in four (66.6%) patients, three of whom were with jejunogastrostomy. The most common postoperative complication was anastomotic leak (n=2).

**Conclusion:** Jejunoduodenostomy is safer than jejunogastrostomy after laparoscopic gastrectomy and jejunal interposition.

**Keywords:** Anastomosis; complication; leakage; minimally invasive, pylorus.

## Introduction

Reconstruction after laparoscopic gastrectomy is expected to solve three problems. These are the loss of the gastric reservoir function, interruption of duodenal food passage, and interruption of digestive tract continuity. Jejunal interposition after laparoscopic gastrectomy has advantages such as being a reservoir, preserving the physiological

passage of food, and preventing postgastrectomy syndrome.<sup>[1, 2]</sup> In jejunal interposition after laparoscopic gastrectomy, a jejunal segment can be anastomosed between the proximal stomach and duodenum or distal stomach.

In jejunal interposition after laparoscopic gastrectomy, a jejunal segment can be anastomosed between the proximal stomach and duodenum or distal stomach. There



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is no study comparing the outcomes of these two anastomoses in literature. We aimed to present our initial experience and the difference between the outcomes of jejunoduodenostomy and jejunogastrostomy in jejunal interposition after gastrectomy.

## Materials and Methods

Six patients underwent laparoscopic gastrectomy with jejunal interposition between January and August 2020. Demographic data and perioperative parameters were analyzed retrospectively. Digestive symptoms after surgery were assessed by phone call.

Continuous variables were defined as median (range) and categorical data were defined as frequencies and percentages.

## Surgical technique

Under general anesthesia, we placed the patient in the lithotomy position. Nasogastric tube and urinary catheter was used for decompression of stomach and bladder. The pneumoperitoneum was created from the left upper quadrant by a Veress needle and the intraabdominal pressure was kept between 12–15 mmHg during the operation. A 12 mm port was placed 21 cm down and 2 cm left from the xiphoid process. This trocar was used for scope. Then,

two 12 mm trocars were inserted from the left and right upper quadrants. A 5 mm trocar was inserted between the xiphoid and the 12 mm right upper quadrant trocar. A Nathanson retractor was placed just below the xiphoid for liver retraction. The gastrocolic ligament was divided from 2 cm outside of the gastroepiploic arcade along the greater curvature, proximally towards the fundus and distally towards the pylorus via Ligasure (Valleylab Healthcare Group LP, Boulder, CO, USA). The right gastroepiploic artery and vein were isolated, clipped, and divided under the pylorus. A small window was created in the hepatoduodenal ligament and the first part of the duodenum was mobilized by dissection from the posterior towards the window created. Then duodenum was cleared off periduodenal tissues and was transected 2 cm distal from the pylorus via 60-mm Panther Endo Stapler (Panther Healthcare Group, Beijing, China) (the transection was performed from the antrum for patients with jejunogastrostomy). The right gastric artery and vein were divided via Ligasure and the gastrohepatic ligament was divided close to the liver towards the esophagus. In the posterior gastric region, the left gastric artery and vein were isolated, clipped, and divided. The proximal transection level was determined according to the tumor location and transection was performed via 60-mm Panther Endo Stapler (the proximal transection level was the distal esopha-

**Table 1. Demographic data and preoperative characteristics**

Distal anastomosis	Patient	Age	Gender	ASA	BMI (kg/m <sup>2</sup> )	Comorbidity	Previous abdominal surgery	Tumor location	Pathology
Jejunogastrostomy	1	47	M	2	26	Asthma	–	Distal 1/3	Adenocarcinoma
	2	70	M	1	25.7	CAD	Cholecystectomy	Distal 1/3	Adenocarcinoma
	3	70	M	2	28	NHL	–	Distal 1/3	Adenocarcinoma
Jejunoduodenostomy	4	78	F	2	31	–	–	Distal 1/3	Adenocarcinoma
	5	78	M	2	23	CAD, HT	–	Proximal 1/3	High grade dysplasia
	6	19	M	2	25	FAP	Laparoscopic total abdominal colectomy	Proximal 1/3	Fundic gland polyps

M: Male; F: Female; ASA: American Society of Anesthesiologists Classification; BMI: Body mass index; FAP: Familial adenomatous polyposis; NHL: Non-Hodgkin's lymphoma; CAD: Coronary artery disease; HT: Hypertension.

**Table 2. Intraoperative and postoperative outcomes**

Distal anastomosis	Patient	Operative time (min)	Blood loss (ml)	Time to oral intake (day)	Postoperative complication	Length of hospital stay (day)	Reoperation	Mortality
Jejunogastrostomy	1	260	100	4	–	7	No	No
	2	360	100	3	–	8	No	No
	3	210	90	5	Intraabdominal hemorrhage	10	Yes	No
Jejunoduodenostomy	4	330	100	13	Anastomotic leak	16	Yes	No
	5	200	50	2	Anastomotic leak	4	Yes	Yes
	6	300	70	2	Perforation	5	Yes	No

**Table 3. Assessment of digestive symptoms after surgery**

Distal anastomosis	Patient	Regurgitation	Dumping symptoms	Postprandial fullness	Diarrhea
Jejunogastrostomy	1	No	No	No	No
	2	No	No	Yes	No
	3	Yes	No	No	No
Jejunoduodenostomy	4	No	Yes	Yes	No
	5	NA	NA	NA	NA
	6	Yes	No	No	No

NA: Nonavailable.

gus for one patient and 3 cm below the cardioesophageal junction for others). For patients with gastric carcinoma perigastric tissue was completely dissected and D2 lymph node dissection was performed. Then, the jejunal pouch was created as follows. The jejunum was transected from 15 cm distal to the Treitz ligament via 60-mm Panther Endo Stapler and a 20 cm jejunal segment was created. Side-to-side jejunojejunostomy was performed via 60-mm Panther Endo Stapler for continuity of the gastrointestinal tract. The jejunal segment was carried cranially and interposed between the proximal (esophagus or proximal stomach) and distal (duodenum or distal stomach) transection sites via 60-mm Panther Endo Stapler. An abdominal drain was placed near the interposed jejunal segment.

## Results

Five (83.3%) of the patients were male. The median age was 70 (19–78) years, with a median body mass index (BMI) of 25.8 (23–31) kg/m<sup>2</sup>. Table 1 shows the demographic data and preoperative characteristics of the pa-

tients. Intraoperative and postoperative outcomes are shown in Table 2. The median operative time was 280 (200–360) minutes, and the median blood loss was 95 (50–100) ml. The median time to oral intake was 3.5 (2–13) days. The median hospital stay was 7.5 (4–16) days. Early postoperative complications were two anastomotic leaks (one in the esophagojejunostomy and one in the jejunogastrostomy), and one intraabdominal hemorrhage. These patients were reoperated. The late postoperative complication was the perforation of the interposed jejunal segment five months after surgery. Mortality occurred in one patient with anastomotic leakage. Table 3 shows the assessment of digestive symptoms after surgery (one patient was excluded due to mortality).

## Discussion

In this study postoperative complications were more in patients with jejunogastrostomy after reconstruction with jejunal interposition. We think an intact pylorus causes high intraluminal pressure on the neo-stomach and anas-

tomoses. This high pressure may be associated with an increased risk of anastomotic leakage. Katsube et al.<sup>[3]</sup> presented a patient who had undergone proximal gastrectomy with jejunal interposition. Two years after surgery, barium radiography was performed for reflux symptoms. The barium radiography revealed a normal pyloric function, a dilated jejunal pouch, and reflux from the remnant stomach to the jejunal pouch. This result supports our thinking. In addition, Ichikawa et al.<sup>[4]</sup> performed proximal gastrectomy with jejunal interposition on a patient. An anastomotic leak was observed in jejunogastrostomy ten days after surgery. The patient was followed up conservatively.

Roux-en-Y reconstruction after gastrectomy prevents the esophagus from the biliary and pancreatic secretions. However, iron, vitamin B12, and folate deficiencies occur due to malabsorption induced by the procedure. Roux stasis syndrome, which consist of abdominal pain, nausea, vomiting, and fullness occurs in 1/3 of the patients.<sup>[3]</sup> Dumping syndrome which is manifested by abdominal distension and increased intestinal motility can be observed due to uncontrolled and rapid transit of food into the efferent loop.<sup>[2, 5, 6]</sup> Only one patient of the study group developed dumping syndrome. Jejunal interposition may be preferred for reconstruction after gastrectomy since postgastrectomy syndromes are less common.<sup>[7]</sup>

Jejunal interposition provides endoscopic access to the duodenum and this is an advantage, especially in patients with Familial Adenomatous Polyposis. This enables the endoscopic examination of the duodenum and early detection of duodenal pathologies such patients.<sup>[8]</sup> In addition, preserving the duodenal food passage increases the efficiency of the digestive system.<sup>[9]</sup> Thus, jejunal interposition ensures earlier recovery of postoperative nutritional status.<sup>[6, 7]</sup> Less weight loss is seen in jejunal interposition compared to other reconstruction techniques.<sup>[2]</sup> Since jejunal interposition acts as a sphincter, it is thought to prevent reflux from the remnant stomach.<sup>[10]</sup>

In a study of Yasoshima et al.,<sup>[11]</sup> they performed an upper endoscopy and observed a deep ulcer in the jejunal pouch in a patient with proximal gastrectomy and jejunal interposition four months after the operation. We observed a perforation of the interposed jejunal segment in one patient of the study group five months after surgery. We attributed the perforation to the absence of a negative feedback mechanism affecting the G cells in the antrum and the resulting hypergastrinemia. It is believed that peptic

ulcer caused by hypergastrinemia triggers jejunal ulcer formation.<sup>[1]</sup> Acid suppression alone is effective in preventing this complication.<sup>[11]</sup>

After surgery, two patients (33.3%) of the study group complained of postprandial fullness. Lee et al.<sup>[2]</sup> stated that food stasis could continue for up to six months and recommended taking meals 5–6 times per day during this period and increasing the size of each meal after 6 months.

## Conclusion

Jejunoduodenostomy after laparoscopic gastrectomy with jejunal interposition is safer than jejunogastrostomy.

## Disclosures

**Ethics Committee Approval:** Retrospective study.

**Peer-review:** Externally peer-reviewed.

**Conflict of Interest:** None declared.

**Authorship Contributions:** Concept – A.Z., C.K.; Design – Y.M.B., C.K.; Supervision – C.K.; Materials – A.Z.; Data collection and/or processing – A.Z.; Analysis and/or interpretation – Y.M.B.; Literature search – A.Z., M.C.A.; Writing – A.Z., Y.M.B.; Critical review – M.C.A.

## References

1. Yasoshima T, Denno R, Ura H, Mukaiya M, Yamaguchi K, Hirata K. Development of an ulcer in the side-to-side ansatomosis of a jejunal pouch after proximal gastrectomy reconstructed by jejunal interposition: Report of a case. *Surg Today* 1998;28:1270–3. [\[CrossRef\]](#)
2. Lee J, Hur H, Kim W. Improved long-term quality of life in patients with laparoscopy-assisted distal gastrectomy with jejunal pouch interposition for early gastric cancer. *Ann Surg Oncol* 2010;17:2024–30. [\[CrossRef\]](#)
3. Katsube T, Konno S, Hamaguchi K, Shimakawa T, Naritaka Y, Ogawa K. Complications after proximal gastrectomy with jejunal pouch interposition: report of a case. *Eur J Surg Oncol EJSO* 2005;31:1036–8. [\[CrossRef\]](#)
4. Ichikawa T, Kaira K, Oh S, Takagi H, Mori M. Serious complications after a proximal gastrectomy with a jejunal pouch interposition for gastric cancer. *Clin J Gastroenterol* 2009;2:183–6. [\[CrossRef\]](#)
5. Zherlov G, Kosheh A, Orlova Y, Zykov D, Sokolov S, Rudaya N, et al. New type of jejunal interposition method after gastrectomy. *World J Surg* 2006;30:1475–80. [\[CrossRef\]](#)
6. Yun L, Zhiwei J, Junsheng P, Xiaobin W, Cancan X, Jieshou L. Comparison of Functional Outcomes between Functional Jejunal Interposition and Conventional Roux-en-Y Esophagojejunostomy after Total Gastrectomy for Gastric Cancer. *Dig*

- Surg 2020;37:240–8. [\[CrossRef\]](#)
7. Zuin M, Celotto F, Pucciarelli S, Urso EDL. Isoperistaltic Jejunal Loop Interposition after Total Gastrectomy for Gastric Cancer in Patients with Familial Adenomatous Polyposis. *J Gastric Cancer* 2020;20:225–31. [\[CrossRef\]](#)
  8. Srinivasa D, Wray CJ. Total gastrectomy with isoperistaltic jejunal interposition flap for symptomatic management of gastric polyposis from familial adenomatous polyposis. *J Gastrointest Oncol* 2014;5:E18–21.
  9. Ding X, Yan F, Liang H, Xue Q, Zhang K, Li H, et al. Functional jejunal interposition, a reconstruction procedure, promotes functional outcomes after total gastrectomy. *BMC Surg* 2015;15:43–51. [\[CrossRef\]](#)
  10. Kinoshita T, Gotohda N, Kato Y, Takahashi S, Konishi M, Kinoshita T. Laparoscopic proximal gastrectomy with jejunal interposition for gastric cancer in the proximal third of the stomach: a retrospective comparison with open surgery. *Surg Endosc* 2013;27:146–53. [\[CrossRef\]](#)
  11. Rasmussen JJ, Fuller W, Ali MR. Marginal ulceration after laparoscopic gastric bypass: an analysis of predisposing factors in 260 patients. *Surg Endosc* 2007;21:1090–4. [\[CrossRef\]](#)