

# Laparoscopic completion total gastrectomy for remnant gastric cancer following pancreaticoduodenectomy for bile duct cancer: a case report

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Laparoscopic completion total gastrectomy following pancreaticoduodenectomy (PD) has not been reported. A 73-year-old male who underwent PD 25 years ago for distal common bile duct cancer visited a surgical department for remnant gastric cancer. A previous reconstruction was performed with pancreaticojejunostomy (PJ), gastrojejunostomy and Braun anastomosis, i.e., jejunojejunostomy (JJ), between the afferent and efferent jejunal limb to prevent bile reflux into the remnant stomach. Adhesiolysis was initially performed to secure the surgical view. Lymph node dissections around the splenic artery, splenic hilum, celiac axis, left gastric artery, and common hepatic artery were performed. The PJ site was well visualized and safely preserved. Esophagojejunostomy was performed with an OrVil system. Specimen retrieval, Roux-limb preparation and JJ were performed through an extended umbilicus trocar site. A final pathologic examination revealed a 5.5-cm serosa-exposed tumor (T4a) without lymph node metastasis. The patient was discharged on postoperative day 7 without any complications.

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**Key Words:** Gastrectomy, Laparoscopy, Pancreaticoduodenectomy

## INTRODUCTION

Laparoscopy-assisted distal gastrectomy (LADG) for gastric cancer has become a widely performed procedure and was actively adopted to improve early surgical results regarding postoperative pain and hospital stay durations. The clinical applications of laparoscopic procedures have extended to total or proximal gastrectomy for upper gastric cancer and even advanced gastric cancer [1,2]. Moreover, some experienced laparoscopic surgeons have intermittently reported laparoscopic completion total gastrectomies (LCTGs), and a small comparative study of LCTG versus open completion total gastrectomy has been reported [3,4]. However, LCTG following pancreaticoduodenectomy (PD) has not yet been reported.

Herein, we present the first experience of LCTG and lymph node (LN) dissection following PD for distal common bile duct (CBD) cancer 25 years ago.

## CASE REPORT

A 73-year-old male who underwent PD 25 years ago for distal CBD cancer visited the surgical department for remnant gastric cancer that was diagnosed during an evaluation for anemia. The patient had a history of hypertension and type 2 diabetes mellitus. In the physical examination, there were no abnormal findings with the exception of the midline scar from the previous operation. His body mass index was 22.8 kg/m<sup>2</sup>. Laboratory findings revealed hemoglobin (6.8 g/

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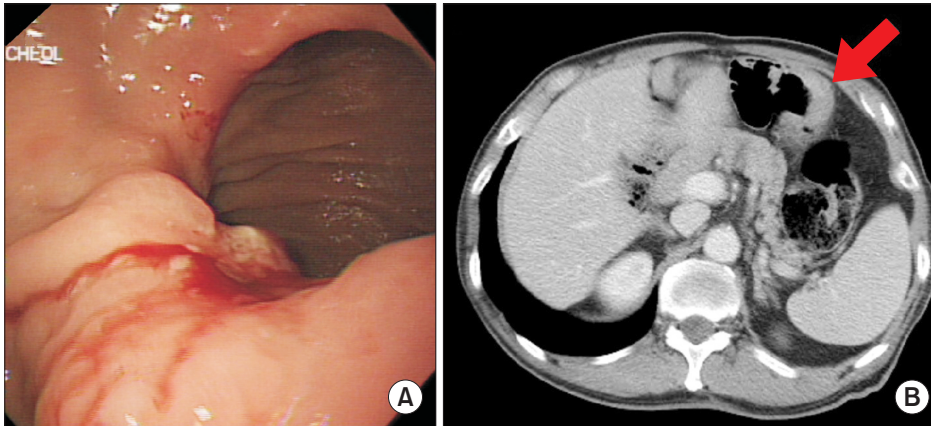
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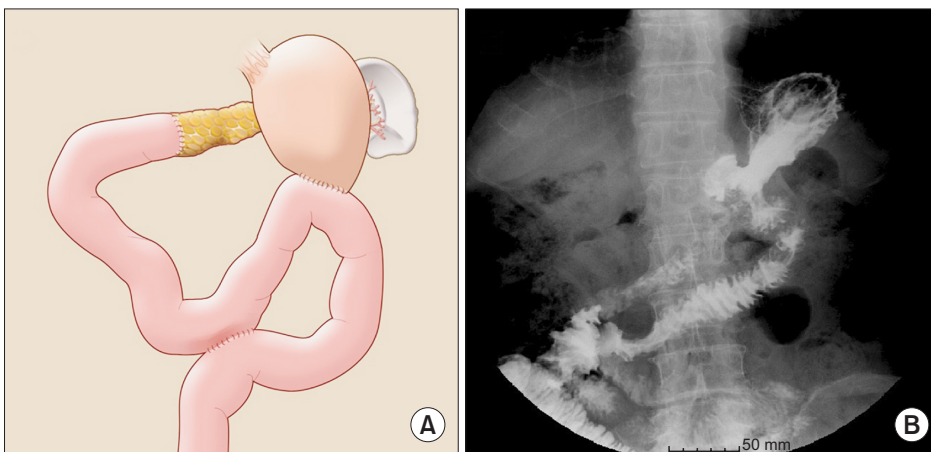
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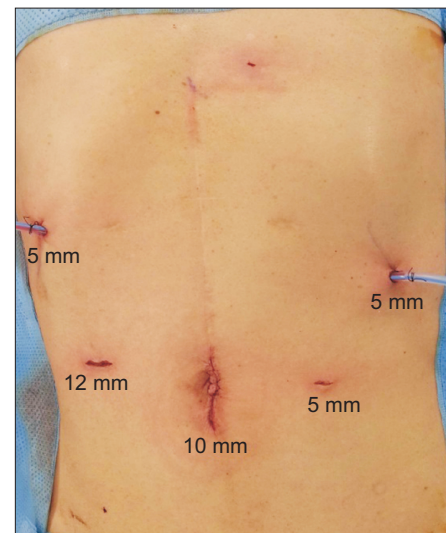
**Fig. 1.** (A) Gastrofiberscope showing a 3 × 3-cm ulceroinfiltrative lesion at the greater curvature side of gastrojejunostomy. (B) Computed tomography image showing diffuse wall thickening at the greater curvature side of gastrojejunostomy (red arrow).



**Fig. 2.** (A) The patient underwent gastrojejunostomy and Braun anastomosis nearly 30 cm distal to the gastrojejunostomy site. (B) Gastrograffin swallowing test showing the remnant stomach and Billroth-II and Braun anastomoses.

dL), hematocrit (24.8%), serum iron (<5 µg/mL) and ferritin (557 ng/mL) levels that were compatible with iron deficiency anemia. Tumor markers were within the normal limits. Esophagogastroduodenoscopy revealed ulceroinfiltrative lesion on the greater curvature side of the gastrojejunostomy (GJ) (Fig. 1A). Computed tomography revealed diffuse wall thickening of the GJ site without evidence of serosal invasion or abnormally enlarged LNs, which was suggestive of clinical stage T3N0M0 (Fig. 1B). The reconstruction status involved a distal gastrectomy state with GJ and Braun anastomosis, i.e., jejunojunction (JJ), between the afferent and efferent jejunal limb to prevent bile reflux into the remnant stomach located nearly 30 cm distal to the GJ (Fig. 2). LCTG was performed and followed by Roux-en-Y esophagojejunostomy (EJ) and JJ.

Edited operation video clip was uploaded (Supplementary video clip). Under general anesthesia, a 10-mm trocar was inserted through the subumbilical area using the Hassan technique for the application of the flexible electro-laparoscope. Additionally, four working trocars (one 12- and three 5-mm trocars) were introduced as shown in Fig. 3. When the videoscope was introduced into abdominal cavity, severe small bowel adhesion along the midline laparotomy wound

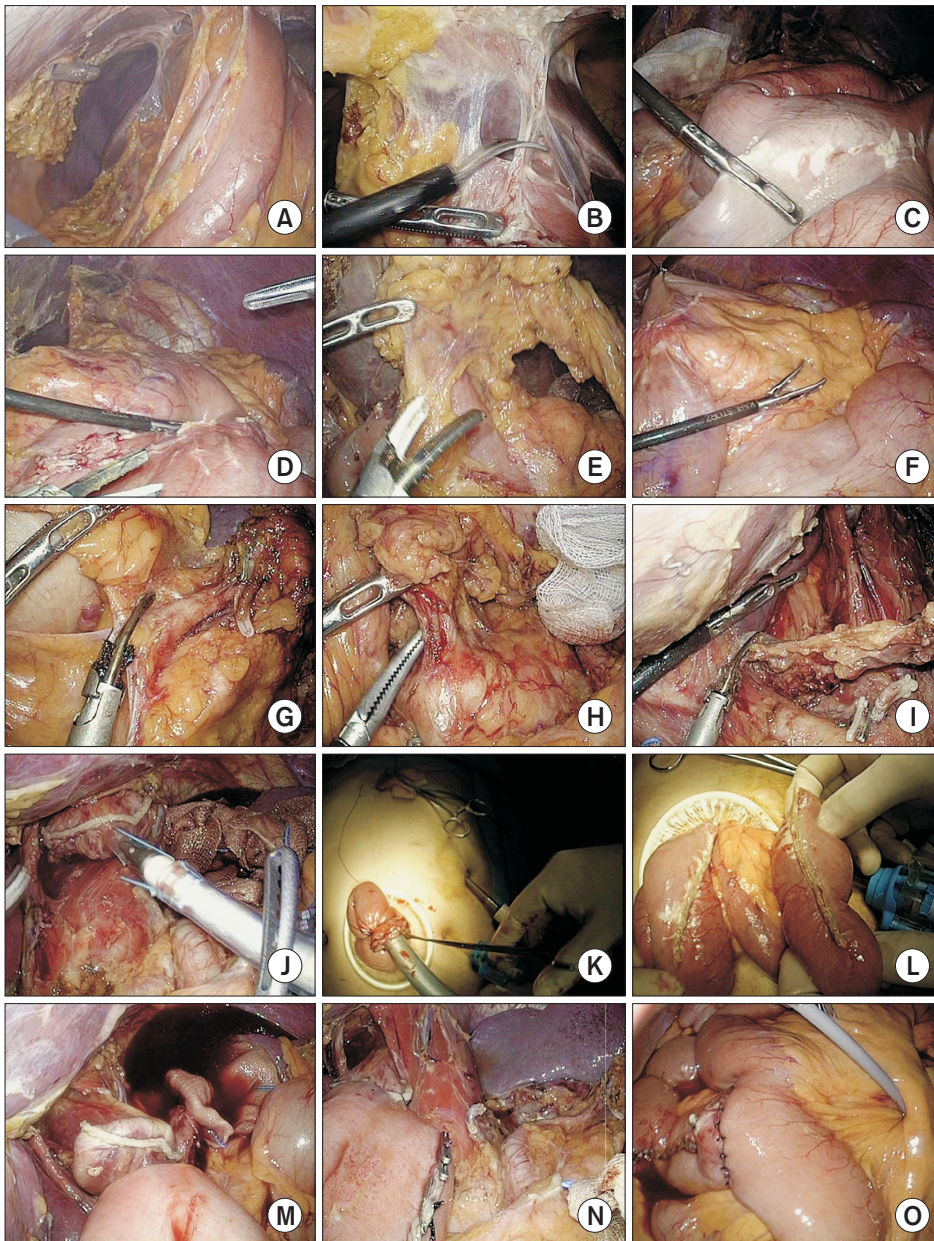


**Fig. 3.** Trocar placement for the laparoscopic completion total gastrectomy.

was observed (Fig. 4A). Sharp dissection and adhesiolysis were performed with endo-scissors between the abdominal wall and the small bowel and between the inferior border of

the left hepatic lobe and the remnant stomach (Fig. 4B). After the adhesiolysis was completed, we identified the locations of the Braun anastomosis (Fig. 4C) and the GJ site (Fig. 4D). Total omentectomy for the remnant omentum was performed, and the pancreaticojejunostomy (PJ) site was well visualized and preserved without any injury (Fig. 4E, F). LN dissection along the greater curvature side was performed, and the left gastroepiploic vessels and short gastric vessels were ligated. LN dissections along the splenic artery, splenic hilum, celiac axis, left gastric artery and common hepatic artery were performed (Fig. 4G-I). Because the patient had previously undergone PD, the soft tissue and LNs along the proper hepatic artery and portal vein had already dissected; thus, the dissection

of the LN 12a area was omitted. After the full mobilization of remnant stomach, the esophagus was divided with an endoscopic linear stapler, and an OrVil (Covidien, Mansfield, MA, USA) was introduced for anvil placement (Fig. 4J). The remnant stomach and jejunal loop were retrieved through the extended umbilicus trocar site. The afferent and efferent limbs were divided at 10 cm distal to the anastomosis. Next, the specimen was finally divided. The Braun anastomosis was divided with a linear stapler, and the stapled segment was also used to achieve the proper length of biliopancreatic limb (Fig. 4K). Roux-limb preparation and JJ were completed through the extended umbilical trocar site (Fig. 4L). EJ was performed with a 25-mm circular stapler in the laparoscopic view (Fig.



**Fig. 4.** (A) Severe small bowel adhesion to the previous laparotomy wound. (B) Adhesiolysis with endo-scissors between the liver and remnant stomach. (C) Braun anastomosis located 30 cm distal to the gastrojejunostomy. (D) Overview of the remnant stomach, gastrojejunostomy, pancreas body, and spleen. (E) Total omentectomy was performed near the pancreaticojejunostomy. (F) The greater curvature side of the gastrojejunostomy exhibited no definitive serosal invasive lesion. (G) Lymph node dissection along the distal portion of the splenic artery. (H) Lymph node dissections around the celiac axis, proximal portion of the splenic artery, and left gastric artery. (I) Lymph node dissection around the common hepatic artery. (J) Anvil was introduced with a OrVil tube. (K) The Braun anastomosis was extracorporeally divided by linear stapler. (L) The jejunum was prepared for esophagojejunostomy with a circular stapler through the extended umbilicus trocar site. (M) Esophagojejunostomy performed under laparoscopic vision. (N) Esophagojejunostomy and post-lymph node dissection view along the splenic artery and hilum. (O) A hand sewing jejunojunction was performed through the umbilicus port site.



**Fig. 5.** The resected specimen opened along the lesser curvature side revealed a 5.5-cm-long serosal-exposure gastric cancer without metastatic nodes among the 20 retrieved lymph nodes.

4M). Final operation field shows completed EJ, dissected splenic artery and JJ site underwent with extracorporeal hand-sewing method (Fig 4N, O). The total operation time was 295 minutes, and the estimated blood loss was 200 mL. The final pathologic examination revealed a 5.5-cm poorly differentiated adenocarcinoma with serosal exposure (T4a) and no LN metastasis among the 20 retrieved LNs (Fig. 5). The patient was discharged on postoperative day 7 without any complications. During the 3-year follow-up period, there was no evidence of tumor recurrence.

## DISCUSSION

LADG has been established as a promising alternative procedure to open distal gastrectomy regarding operative and oncologic safety [5]. Laparoscopy-assisted total gastrectomy (LATG) has gradually increased in popularity and demonstrated its safety in short-term surgical outcomes [6]. Regarding LCTG, the first successful laparoscopic surgery for remnant gastric cancer was reported in 2005 [7]. In 2009, some case reports supported the surgical safety of LCTG even with postoperative adhesions [8]. One comparative study revealed the superior technical feasibility of LCTG compared with that of open completion total gastrectomy [3].

In 2002, the Korean Gastric Cancer association classified gastric stump cancers into primary, remnant and recurrent cancer. Primary cancer is defined as gastric stump cancer that developed more than 10 years after gastrectomy regardless of the cause of the primary gastrectomy. Remnant cancer refers to gastric stump cancer that occurs within 10 years of the initial

gastrectomy due to benign or malignant lesion. However, if the cancer develops at the anastomosis site or at the resection margin within 10 years of gastrectomy for a malignant lesion, the new lesion is referred to as recurrent cancer [9]. According to the mentioned classification, the present case was referred as primary gastric stump cancer.

The present case actually involved a type of LCTG, and to the best of our knowledge, laparoscopic completion gastrectomy for the remnant stomach cancer following PD has not yet been reported. This procedure is not much different from completion gastrectomy following Billroth-II distal gastrectomy. However, there are a few factors that should be noted prior to such operations. First, adhesiolysis should be performed carefully to avoid injuring the adjacent structures, particularly for PJ and choledochojejunostomy. Second, the extent of the LN dissection should be considered because guidelines related to this issue have not been established for remnant gastric cancer. Total omentectomy and possible dissection of the D2 area with the mesentery of the jejunal loop were attempted. Because the left gastric artery was not ligated in the previous operation, LN dissections of LN 7, 8a, 9, 10, 11p, and 11d were performed. However, we were able to omit the dissection of the No. 12a LN because the LN 12a was already dissected 25 years ago.

LCTG seems not to have rapidly spread like LADG and LATG. This difference may be due to the lower incidence of LCTG and postoperative adhesions. In a recently published report, conversion was required in 8 of 17 LCTG patients (47.1%) [3]. Among the eight patients, severe adhesion was the most common cause for conversion to open completion gastrectomy. Although postoperative adhesion is somewhat of a major concern during this procedure, laparoscopic adhesiolysis is now also established for many surgeons [10]. Additionally, we have experienced no difficulties in laparoscopic adhesiolysis when the adhesion is not stony or hard.

The present case involves the unique experience of LCTG. Although the advantage of LCTG has not been established relative to the open procedure, we expect that LCTG has general advantages, such as reduced pain and faster recovery, without compromising oncologic safety.

## CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

## SUPPLEMENTARY MATERIAL

The supplementary video clip can be found via <http://astr.or.kr/src/sm/astr-90-106-s001>.

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