Laparoscopic duodenojejunostomy for malignant stenosis as a part of multimodal therapy: A case report

Murakami T et al. Laparoscopic duodenojejunostomy for malignant stenosis

Abstract
BACKGROUND
Laparoscopic duodenojejunostomy (LDJ) has become the standard surgical procedure of superior mesenteric artery syndrome due to its sufficient outcome in terms of safety and symptom relief. However, there are only a few reports about LDJ for malignant stenosis and its indication remains uncertain.

CASE SUMMARY
A 77-year-old woman with a history of pancreatic cancer (PC) treated with distal pancreatectomy with en bloc resection of the transverse colon 7 mo ago was admitted for recurrent vomiting. Imaging upon admission revealed marked distention of the duodenum and a tumor around the duodenojejunal flexure. She was diagnosed with malignant stenosis caused by local recurrence of PC. LDJ was performed with an uneventful postoperative course, followed by chemotherapy which gave her 10 mo overall survival.

CONCLUSION
We think that LDJ is a valuable method for unresectable malignant stenosis around the duodenojejunal flexure as a part of multimodal therapy.
**Key Words:** Duodenoejunostomy; Laparoscopic surgery; Malignant stenosis; Pancreatic cancer; Multimodal therapy

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**Core Tip:** There are many reports on Laparoscopic duodenoejunostomy (LDJ) for superior mesenteric artery syndrome, but rarely for malignant stenosis. In general, prognosis of patients bearing recurrent cancer are poor, however, development of new chemotherapeutic agents and new combination therapy improve their overall survival. Obstruction due to malignancy is often an obstacle for chemotherapy, and a safe and minimally invasive method would help enable a rapid induction. We think LDJ is a valuable method for patients with unresectable malignant stenosis around the duodenojejunal flexure.

**INTRODUCTION**

Patients with recurrent or metastatic cancer have poor prognosis, and chemotherapy has a pivotal role in their survival[1-3], especially in highly malignant disease such as pancreatic cancer (PC). When patients with unresectable malignancies require surgery for symptom relief, selection of a minimally invasive procedure allows faster recovery and thus quicker induction of chemotherapy.

Laparoscopic duodenoejunostomy (LDJ) has become the standard surgical procedure of superior mesenteric artery syndrome (SMAS) due to its sufficient short and long-term outcomes in terms of safety and symptom relief[4,5]. However, there are only a few reports about LDJ for malignant stenosis[6] and its indication remains uncertain.

We hereby report a successful case of LDJ as palliative care on a patient with unresectable malignant stenosis around the duodenojejunal flexure caused by recurrent PC (rPC). The postoperative course was uneventful, and early food consumption and
induction of chemotherapy were achieved. Hence, we think this method is valuable for the multimodal therapy of unresectable malignancies.

**CASE PRESENTATION**

*Chief complaints*

A 77-year-old woman presented with upper right abdominal distension and recurrent vomiting.

*History of present illness*

The patient had a history of pancreatic cancer treated with distal pancreatectomy with en bloc resection of the transverse colon 7 mo ago. She presented with upper right abdominal distension and recurrent vomiting since a 1 d ago and was admitted to our institution for an emergency.

*History of past illness*

She underwent distal pancreatectomy with *en bloc* resection of the transverse colon for pancreatic cancer.

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**Personal and family history**

The patient had no specific family history.

**Physical examination**

Blood pressure of 134/90mmHg, heart rate of 82 beats/min, resipirate rate 12 breaths/min and body temperature 36.2 °C were noted upon arrival. Upper right abdomen was distended but soft and patient had no abdominal pain.

**Laboratory examinations**
Creatinine and BUN elevated to 2.21 mg/dL (normal range: 0.65-1.1 mg/dL) and 28 mg/dL (normal range: 8-20 mg/dL) respectively. Tumor marker CA19-9 remarkably increased to 6191 U/mL (normal range: 0-45 U/mL).

**Imaging examinations**
Computed tomography on admission revealed a soft tissue mass dorsal to the stomach and nearby duodenojejunal flexure. Further, we found a dilated duodenum and collapsed jejunum (Figure 1). Upper gastrointestinal studies (UGS) showed a dilated duodenum, limited extensibility of the stomach and no gastrografin passage through the duodenojejunal flexure (Figure 2A). Upper gastrointestinal endoscopy revealed stricture at the duodenojejunal flexure due to intraluminal stenosis but revealed no mucosal surface changes (Figure 2B), and a nasogastric tube was placed to decompress the stomach and duodenum (Figure 2C).

**FINAL DIAGNOSIS**
Malignant stenosis of the duodenojejunal flexure caused by local recurrence of pancreatic cancer.

**TREATMENT**
Surgical intervention was essential for symptom relief and induction of chemotherapy. Gastric-jejunal bypass was thought to be difficult due to the stiffness of the stomach, and so we chose to perform duodenojejunostomy. A minimally invasive procedure was necessary for rapid recovery. LDJ was performed 9 d after admission. Decompression of the duodenum with nasogastric tube (Figure 2C) and correction of dehydration by total parenteral nutrition were performed preoperatively.

Operation (Figures 3 and 4): Patient was placed in the open-leg supine position and a 4-port procedure (Figure 3A) was taken with the operator on the left side of the patient. Laparoscopic findings revealed a dilated duodenum, no mobility of stomach and no peritoneal metastasis. With upward traction on the transverse colon, the 2nd and 3rd
portion of the duodenum were exposed and mobilized (Figure 4A). We chose the 3rd portion and jejunum about 30 cm anal to the Treitz ligament for anastomosis (Figure 4B and C). A side-to-side duodenojejunostomy was performed in an antiperistaltic manner using stapling device (Signia™ with 45 mm purple reload, Covidien Japan, Tokyo, Japan) (Figure 4C). The common entry hole was closed with a continuous absorbable V-Loc™ suture (Covidien Japan, Tokyo, Japan) (Figure 4D). The operative time was 90 min with trivial bleeding. No drain was placed. Intraoperative findings are summarized in Figure 3.

OUTCOME AND FOLLOW-UP
Postoperative course was uneventful. Oral fluid intake and meal consumption were started on postoperative day (POD) 2 and 7, respectively. UGS study on POD 5 showed good patency of the anastomosis (Figure 5). The patient was discharged on POD 9, followed by the induction of outpatient chemotherapy (Nab-paclitaxel + Gemcitabine) started on POD 30.

Six months later, (7 mo after the operation), chemotherapy was terminated due to disease progression and the patient’s will for best supportive care. Though she died of pancreatic cancer 10 mo after the operation, she could tolerate meal consumption until just before her death.

DISCUSSION
Single-center case series of LDJ, though for SMAS[4,5,7-11], show no mortality, no anastomotic leaks, short length of stays and no recurrence of symptom (Table 1). With such results, LDJ has been considered to be safe, efficacious and minimally invasive, and has become the standard surgical procedure of SMAS.

Gastrojejunostomy (GJS) used to be performed on SMAS. However, GJS is no longer considered to be a suitable method for SMAS since it had been associated with insufficient duodenal decompression, peptic ulcer, bile gastritis and blind loop...
syndrome\textsuperscript{4,9,10}. LDJ, on the other hand, provides more sufficient duodenal decompression and a more natural and physiological route for food passage.

The obstruction site in our patient resembled that of SMAS since it was located in the duodenojejunal flexure, and so we thought that LDJ could be a suitable method for her. As mentioned before, stiffness of the stomach made GJS a difficult choice. Fortunately, rapid symptom relief and induction of chemotherapy was achieved, thus the selection of LDJ over GJS was an acceptable decision.

Prognosis of rPC after initial curative resection is very poor similar to that of \textit{de novo} metastatic PC\textsuperscript{1-3}. However, new anti-cancer agents and multi-agent chemotherapy have improved overall survival (OS). The median OS for patients with rPC treated by chemotherapy is 10-14 mo compared to 3 mo without treatment\textsuperscript{8}, indicating the significant role of chemotherapy in prolonging the survival of these patients. In terms of our patients, she could gain 10 mo survival comparable to previous report.

Improvement in quality of life (QOL) is also crucial in the multimodal therapy of cancer patients\textsuperscript{12-15}. LDJ had a significant role in our patient by enabling oral food intake until the last few days of her life. High QOL is associated with better prognosis in patients receiving chemotherapy\textsuperscript{12-14}, on the other hand, psychological distress can interfere with treatment\textsuperscript{15}. We also believe that improving QOL is particularly important for patients with poor prognostic disease, and the fact that symptom relief and ability to eat was maintained in our patient shows that LDJ can have a significant role in palliative care of patients with obstruction around the duodenojejunal flexure due to unresectable malignant diseases such as lymphoma, pancreatic cancer, gastrointestinal tumor and peritoneal dissemination.

However, the indication of LDJ for unresectable malignancies remains uncertain since reports of LDJ performed on malignant stenosis is very scarce\textsuperscript{6}. LDJ is a method of palliative care, and so the absence of postoperative complication is crucial for prolonging survival of cancer patients by means of chemotherapy\textsuperscript{16,17}. Preoperative management such as decompression of the duodenum with nasogastric tube and correction of dehydration, electrolyte balances and nutrition are essential for avoiding complications.
such as anastomotic leakage. Chang et al[4] argues the importance of preoperative workup in LDJ for SMAS, and we think this can also apply for cancer patients as well.

To our knowledge, this is the first report on the role of LDJ as a part of a multimodal therapy for unresectable cancer. Many anti-cancer agents expected to prolong survival of cancer patients have been developed up to this day[18], and the role of minimally invasive surgery that preserve QOL will become increasingly significant. We expect more reports on cases of LDJ on malignant obstructions and hope that this procedure will be an acceptable treatment option for patients with unresectable malignant obstruction around the duodenojejunal flexure.

CONCLUSION
LDJ is thought to be a valuable method of palliative care and as a part of multimodal therapy for patients with unresectable malignant stenosis around the duodenojejunal flexure. By preserving QOL, this procedure is expected to be a bridge to chemotherapy for unresectable malignancies.
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