



# Hand-assisted laparoscopic spleen-preserving distal pancreatectomy combined with laparoscopic distal gastrectomy for the treatment of pancreatic neuroendocrine tumor with early gastric cancer: Report of a case



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## ABSTRACT

**INTRODUCTION:** In a distal pancreatectomy combined with a distal gastrectomy, the splenic artery and vein must be conserved. However, it is not easy in pure laparoscopic surgery. We performed a hand-assisted laparoscopic spleen-preserving distal pancreatectomy (HALS-SPDP) combined with a laparoscopic distal gastrectomy (LDG) for the treatment of a pancreatic neuroendocrine tumor (NET) with early gastric cancer.

**PRESENTATION OF CASE:** A 67-year-old male was hospitalized with no complaint. He was diagnosed with a pancreatic tail tumor (1.5 cm in diameter) and early gastric cancer. He had undergone an endoscopic submucosal dissection (ESD). The pathohistology of the dissected tissue demonstrated that the histology was moderately differentiated adenocarcinoma, and the depth of the gastric cancer was pT1b2 (submucosal layer ~1000  $\mu$ m). First, a pancreatectomy was performed extracorporeally under direct vision after detaching the spleen and the distal pancreas from the retroperitoneum under a hand-assisted laparoscopy. After the distal pancreatectomy, an LDG with a D1 lymphadenectomy was performed intracorporeally. The postoperative course was not eventful. Six months after surgery, an enhanced computed tomography (CT) scan revealed the patency of the splenic artery.

**CONCLUSION:** An HALS-SPDP combined with an LDG is beneficial and safe for the patients who have a pancreatic benign or low-grade malignant tumor and gastric cancer.

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## 1. Introduction

In a distal pancreatectomy combined with a distal gastrectomy, the splenic artery and vein must be conserved [1]. Because, after distal gastrectomy with lymphadenectomy, only short gastric artery feeds a remnant stomach. Both hand-assisted laparoscopic or laparoscopic surgery, as a less invasive surgery, are accepted for a low-grade malignant pancreatic tumor and early gastric cancer. We performed hand-assisted laparoscopic spleen-preserving distal pancreatectomy (HALS-SPDP) combined with laparoscopic

distal gastrectomy (LDG) for the treatment of a pancreatic tail neuroendocrine tumor (NET) with early gastric cancer. To the authors' knowledge, this is the first report of an HALS-SPDP combined with an LDG.

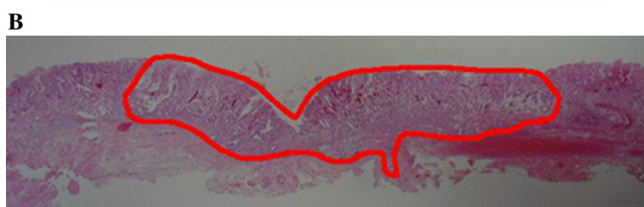
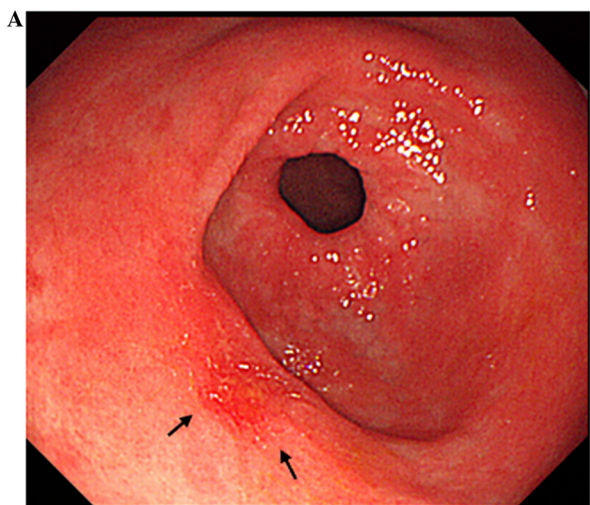
## 2. Case report

### 2.1. Preoperative evaluation

A 67-year-old male was hospitalized with no complaint. His medical history showed that he had been suffering from diabetes mellitus for 30 years. He had no abnormality on physical examination. He was diagnosed with early gastric cancer by a health check and had undergone endoscopic submucosal dissection (ESD). The pathohistology of the dissected tissue demonstrated that the histology was moderately differentiated adenocarcinoma, and the depth of the gastric cancer was pT1b2 (submucosal layer: ~1000  $\mu$ m, tumor size: 10 mm  $\times$  10 mm) with vertical and horizontal negative

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**Fig. 1.** A. Gastric endoscopy revealed the cancer in antrum. The arrow shows the gastric cancer. B. Hematoxylin and eosin (H.E.) stained dissected tissues of stomach.

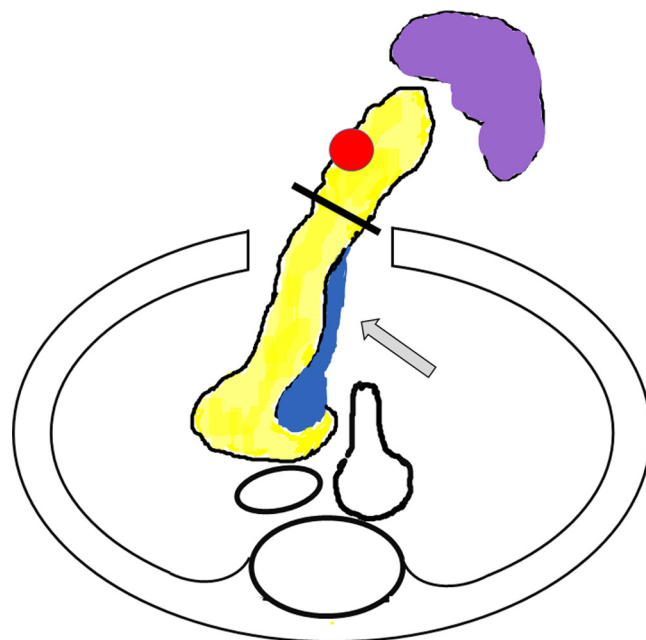


**Fig. 2.** Computed tomography (CT) scan that was performed preoperative, revealed a tumor in the pancreatic tail.

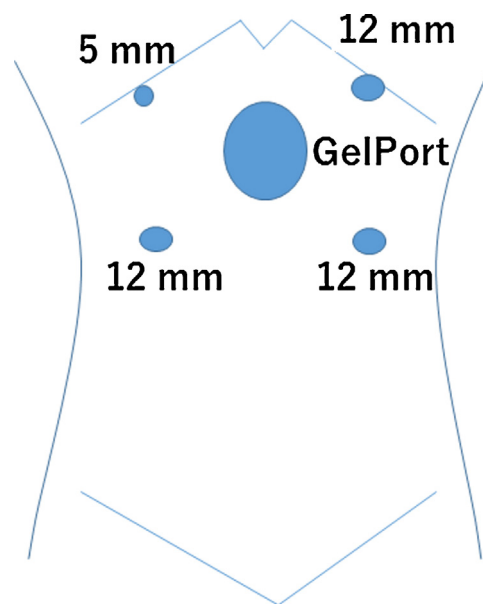
margins (Fig. 1). Computed tomography (CT) scan and magnetic resonance imaging (MRI) revealed a tumor, 1.5 cm in diameter, in the pancreatic tail; however, no metastatic lymph node was revealed (Fig. 2). These findings showed an early gastric cancer and a low-grade malignant pancreatic tumor. An EUS-FNA was performed for the lesion; however, it could not diagnose the lesion.

**2.2. Operative procedure**

We performed an HALS-SPDP combined with an LDG for the pancreatic tail tumor and lymph node dissection of the gastric cancer. First, an upper midline, small incision laparotomy was performed (8 cm in diameter), and a GelPort® was inserted. Then, two other ports were inserted in left abdomen. The pancreatic



**Fig. 3.** A scheme of the pancreas dissected from the postperitoneal cavity using hand-assisted laparoscopy.



**Fig. 4.** A scheme of the ports that were inserted in the surgery.

tail and spleen were dissected from the postperitoneal cavity using hand-assisted laparoscopy. The short gastric artery was conserved. A pancreatectomy was performed extracorporeally under direct vision after detaching the spleen and the distal pancreas from the retroperitoneum under hand-assisted laparoscopy (Fig. 3). The pancreatic tumor in the pancreatic body was detected under visual and ultrasonography. A distal pancreatectomy preserving the splenic artery and vein was performed. After the distal pancreatectomy, an LDG with a D1 lymphadenectomy was performed intracorporeally without hand assist. Another two ports were inserted, resulting in five ports, including the GelPort® (Fig. 4). The left gastroepiploic artery was divided laparoscopically because the laparoscopic confirmation of the artery was easier than the small open operative field. After a distal gastrectomy, a gastroduodenostomy was performed using a Delta-shaped anastomotic technique



**Fig. 5.** Computed tomography (CT) scan that was performed six months after surgery, revealed the patency of the splenic artery and vein.

[2]. Then, two drains were set by the pancreatic stump; by anastomosis, the wounds were closed. The operation time was 520 min, and the blood loss was 593 mL.

### 2.3. The course after surgery

The patient had no postoperative complications, including no pancreatic fistula. A pathohistology of the resected stomach demonstrated no residual cancer and no dissected lymph node metastasis (Stage I). A pathohistology of the resected pancreas demonstrated that the tumor was a NET, G1. He needed to stay in the hospital for 26 days postoperatively to recover from the surgical stress and to regain control of his blood glucose levels. Six months after surgery, an enhanced CT scan revealed the patency of the splenic artery and vein and no infarction of the spleen (Fig. 5).

### 3. Discussion

A laparoscopic SPDP with the conservation of the splenic artery and vein for a pancreatic benign or low-grade malignant tumor has been accepted. However, a thrombus of the splenic vein is a complication of the operation [3,4], but it is rare to have a thrombus of the splenic vein in an HALS-SPDP [5]. The pancreatectomy was performed extracorporeally under direct vision after detaching the spleen and the distal pancreas from the retroperitoneum under hand-assisted laparoscopy [5,6]. In addition, an SPDP has an advantage compared to a laparoscopic SPDP concerning the control of bleeding; however, it has a disadvantage concerning the invasiveness. We performed an LDG intracorporeally with an HALS-SPDP. An LDG must follow an HALS-SPDP because a total gastrectomy has to be performed in the case of conservation failure of the splenic artery and vein. To our knowledge, this is the first report of an LDG combined with an HALS-SPDP.

Warshow et al. reported the first SPDP. The advantage of preserving the spleen is the reduction of infectious diseases. In this case, Warshow's method was not accepted because the blood supply of the residual stomach is only the short gastric artery after the distal gastrectomy with a D1 lymphadenectomy. Eom et al. reported the benefits of another spleen-preserving method that preserves both the splenic artery and vein [7]. They reported a laparoscopy-assisted distal gastrectomy combined with a laparoscopic SPDP for the treatment of early gastric cancer with a pancreatic cystic neoplasm [7]. However, the splenic vein patency is lower in a laparoscopic surgery compared to an open surgery [8]. We chose an HALS-SPDP because a hand-assisted laparoscopic distal pancreatectomy preserving the splenic artery and vein is a

less invasive surgery than an open distal pancreatectomy. In addition, an HALS-SPDP has the advantage of a hand suture for a thick pancreatic stump because closing the pancreatic remnant with a stapling device was associated with an increased risk of surgical morbidity [9–11].

Recent papers reported that lymph node metastasis was observed in the patients who had early gastric cancer with submucosal invasion [12–14]. Therefore, we had to perform a gastrectomy with a lymphadenectomy in this case.

An HALS-SPDP combined with an LDG is beneficial and safe for the patients who have a pancreatic benign or low-grade malignant tumor and gastric cancer. Specifically, it has an advantage of the patency of the splenic vein after surgery compared to pure laparoscopic surgery.

### Conflict of interest

The authors have no financial or other potential conflicts of interest to disclose.

### Funding

The authors have no funding for our research.

### Ethical approval

Ethical approval was not required and patient identifying knowledge was not presented in this report.

### Consent

Patient identifying knowledge was not presented in this report. However, written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

### Author's contribution

Dr Hiroki Sugita: case report concept and writing the manuscript.  
 Dr Hideyuki Kuroki: literature review and data collection.  
 Dr Takahiko Akiyama, Dr. Nobuya Daitoku, Dr. Rumi Tashima, Dr. Hiroshi Tanaka, and Dr. Shinobu Honda: literature review.  
 Masahiko Hirota: manuscript revision.

### Registration of research studies

It is not required, because this paper is a case report.

### Guarantor

Dr. Hiroki Sugita.

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