



## Gastric Varices after Spleen-Preserving Distal Pancreatectomy

Sho Yamada\*, Kazuya Maeda and Yasuo Hashizume

Department of Surgery, Fukui Prefectural Hospital, Japan

### Abstract

**Introduction:** Laparoscopic Spleen-Preserving Distal Pancreatectomy (LSPDP) is indicated for benign and low-grade malignant tumors of the body and the tail of the pancreas. However, there are few reported cases of gastric varices requiring treatment after LSPDP with preservation of the splenic vessels.

**Case Presentation:** A 44-year-old woman underwent LSPDP for a cystic pancreatic neoplasm in 2012. In 2017, an Esophagogastroduodenoscopy (EGD) performed at a health check-up revealed gastric varices that were red in color. A Computed Tomography (CT) scan revealed splenic vein occlusion, which caused the gastric varices. We performed laparoscopic splenectomy for the gastric varices. There were no gastric varices on the postoperative EGD or CT.

**Conclusion:** We considered strongly drawing on the tape encircling the splenic vein and cutting the splenic vein branches without preserving its root with clip or energy device as the mechanism for splenic vein occlusion. Intraoperative procedures that affect the splenic vein must be carefully observed when performing LSPDP.

**Keywords:** Gastric varices; SPDP; Left-sided portal hypertension; EGD

### Introduction

There have been an increasing number of reports of Spleen-Preserving Distal Pancreatectomy (SPDP), which is indicated for benign and low-grade malignant tumors of the body and tail of the pancreas. SPDP can be performed with either preservation of the splenic vessels, according to Kimura's method, or with dissection of these vessels, according to Warshaw's method [1]. There are few reported cases of gastric varices that require treatment after Kimura's spleen-preserving distal pancreatectomy. Here, we report a case of laparoscopic splenectomy.

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#### \*Correspondence:

Sho Yamada, Department of Surgery,  
Fukui Prefectural Hospital, Japan,  
E-mail: devilock\_ape@yahoo.co.jp

Received Date: 20 May 2020

Accepted Date: 10 Jun 2020

Published Date: 12 Jun 2020

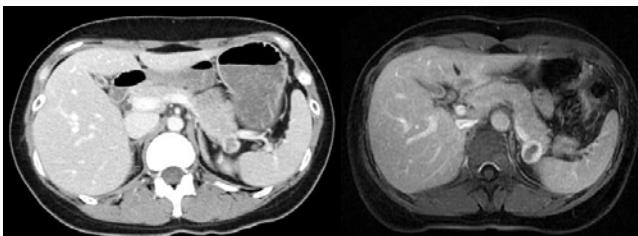
#### Citation:

Yamada S, Maeda K, Hashizume Y.  
Gastric Varices after Spleen-Preserving  
Distal Pancreatectomy. Clin Surg.  
2020; 5: 2835.

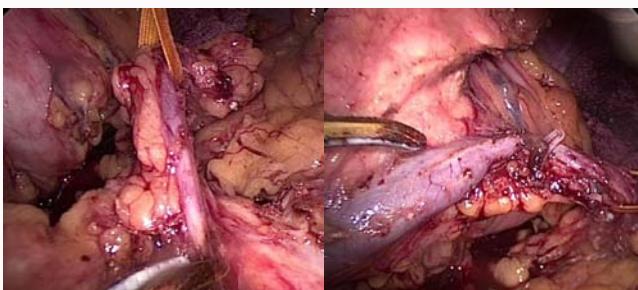
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### Case Presentation

A 44-year-old woman was referred to our hospital because of a cystic lesion of the pancreas in 2012. A Computed Tomography (CT) revealed that a cyst identified in the pancreatic tail displayed thickening of the cystic wall. The cyst was 20 mm in diameter (Figure 1a). On Magnetic Resonance Imaging (MRI), the cystic wall displayed contrast on the T1-weighted image (Figure 1b). A Positron Emission Tomography Computed Tomography (PET-CT) scan of the cystic wall revealed abnormal uptake of Fluorodeoxyglucose (FDG). For preoperative diagnosis of mucinous cystic tumor, she underwent a Laparoscopic Spleen-Preserving Distal Pancreatectomy (LSPDP) for the cystic pancreatic neoplasm in 2012. The splenic vein and artery were encircled and taped on the right side of the cystic pancreatic neoplasm. It was difficult to isolate the pancreatic parenchyma from the splenic vein because of inflammatory adhesions. We had to draw strongly on the tape encircling the splenic vein (Figure 2a). We cut the splenic vein branches without preserving its root with clip or energy device. It could cause constriction or thermal damage and cause splenic vein thrombus or occlusion (Figure 2b). The splenic vein and artery were preserved without dissection of the short gastric vessels, but we had to dissect the left gastroepiploic vessels for better visibility. The pancreas was dissected using an Endo GIA. The operation lasted 250 min, and 10 ml of blood loss occurred. Pathological examination showed an epithelial cyst. The patient was treated with antibiotics for the pancreatic fistula and was discharged on postoperative day 11. In 2017, an Esophagogastroduodenoscopy (EGD) performed at a health check-up revealed gastric varices that were red in color. A CT scan revealed splenic vein occlusion, which had caused the gastric varices (Figure 3a). There were no symptoms, but an EGD revealed gastric varices in the fundus (Lg-cf, F2, Cw, RC2+) (Figure 3b). Splenic vein occlusion causes left-sided portal hypertension. We performed



**Figure 1:** CT revealed that a cyst identified in the pancreatic tail displayed thickening of the cystic wall. The cyst was 20 mm in diameter (a). MRI showed that the cystic wall displayed contrast on T1-weighted images (b).

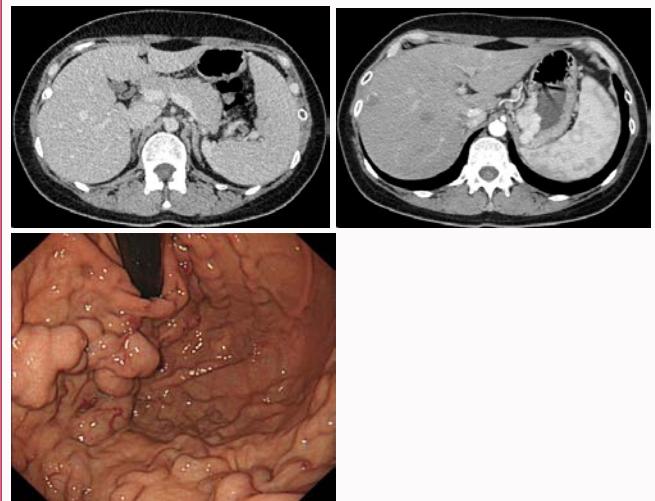


**Figure 2:** Because the pancreas was widely attached to the splenic vein by inflammation, we had to draw on the tape encircling the splenic vein strongly (a). We cut the SPV branches without preserving its root with clip or energy device (b). Consequently, the splenic vein was occluded.

a laparoscopic splenectomy for the gastric varices because of the risk of bleeding in those varices. The postoperative course was uneventful, and the patient was discharged on postoperative day 15. There were no gastric varices in the postoperative EGD or CT.

## Discussion

Malignant tumors of the body and tail of the pancreas require a Distal Pancreatectomy with Splenectomy (DPS). Conversely, benign and low-grade malignant tumors of the pancreas do not require splenectomy in term of the oncology. In a previous study, there were no differences between the SPD and DPS groups with respect to operative time, operative blood loss, and requirement for blood transfusion, pancreatic fistulas, thromboses, postoperative bleeding, wound infections and re-operation rates [2]. A splenectomy is associated with a lifelong risk for Overwhelming Post-Splenectomy Infection (OPSI). OPSI occurs at a frequency of 1% to 5% and has a mortality rate of 50% to 70% [3]. Patients who undergo a splenectomy require preoperative vaccinations and lifetime antibiotics to prevent sepsis. In 985 patients who underwent a splenectomy, the risk of total cancer increased by 40% over 5 to 9 years [4]. Therefore, preserving the spleen has many benefits throughout the lifetime. Kimura's SPD is technically difficult and is a time-consuming method to preserve the splenic vessels. A meta-analysis of Kimura's SPD found that it required a longer operation time, but the frequencies of gastric varices and splenic infarction after this procedure were less than after Warshaw's SPD [5]. Yongfei reported that patients who underwent Kimura's SPD had a lower incidence of postoperative gastric varices (2%) compared to Warshaw's SPD (22%) [6]. We prefer Kimura's SPD because of the lower incidence of gastric varices. LSPDP is a newly developed operative procedure, but a laparoscopic Kimura's SPD requires more time and effort than a laparotomy. In this case, we had to draw strongly on the tape encircling the splenic vein to separate and isolate the pancreatic parenchyma from them. Drawing



**Figure 3:** A CT-scan revealed splenic vein occlusion, which caused gastric varices (3a). EGD revealed gastric varices in the fundus (Lg-cf, F2, Cw, RC2+) (3b).

the tape strongly occludes the splenic vein flow, subsequently resulting in splenic vein thrombosis. We cut the splenic vein branches without preserving its root with clip or energy device. It could cause constriction or thermal damage and cause splenic vein thrombus or occlusion. Splenic vein thrombosis is associated with a form of left-sided portal hypertension. Drainage of the spleen is redirected through the short and posterior gastric vessels to the coronary veins and through the gastroepiploic veins to the superior mesenteric vein. The submucosal venous reticulum of the gastric fundus represents the anatomic bridge between the short and posterior gastric veins and the coronary veins and, as a consequence of the increased pressure, may dilate into varices [7]. In this case, dissecting the left gastroepiploic vein brought no inflow to the superior mesenteric vein. That action increased outflow to the coronary veins through the short and posterior gastric veins, resulting in gastric varices. Gastric variceal bleeding with portal hypertension is a severe and life-threatening condition. Treatment options for gastric varices include Endoscopic Injection Sclerotherapy (EIS), Partial Splenic Artery Embolization (PSE) and splenectomy. PSE reduces venous inflow into the portal vein and decreases portal vein pressure. The side effects of PSE include splenic abscesses, acute pancreatitis, sepsis and the so-called postinfarction syndrome, which manifests as high fever, abdominal pain, and vomiting. Death may also occur [8]. A splenectomy is an effective treatment because it interrupts the arterial supply that feeds the drainage vein of gastric varices. Moreover, laparoscopic splenectomy has better results than open splenectomy in terms of intraoperative and postoperative complications. Laparoscopic splenectomy is a safe and feasible minimally invasive procedure [9]. Kimura's SPD has a lower incidence of postoperative gastric varices. However, we must pay attention to the intraoperative procedures of the splenic vein to prevent splenic vein occlusion.

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