

# Severe intestinal bleeding due to left-sided portal hypertension after pancreateoduodenectomy with portal resection and splenic vein ligation

## Abstract

Pancreateoduodenectomy (PD) with portal vein (PV)/superior mesenteric vein (SMV) resection is well accepted for pancreatic head cancer because of the improvement in margin-negative resection and survival rates, without increasing postoperative morbidity and mortality in high volume centers. There is controversy in the surgical literature regarding the safety of splenic vein (SV) ligation during a PD with PV-SMV resection. Simple SV ligation has been associated with the development of left-sided portal hypertension, gastrointestinal bleeding and hypersplenism over the long term. We report a rare case of severe intestinal bleeding due to left-sided portal hypertension in patient who underwent a PD with PV-SMV confluence segmental resection and splenic ligation, preserving left gastric vein and inferior mesenteric vein, for cephalic pancreatic adenocarcinomas, seven months previously.

**Keywords:** left-sided portal hypertension, pancreateoduodenectomy, pancreatic cancer, portal vein resection, intestinal bleeding

Volume | Issue | - 2017

Piero Chirletti,<sup>1</sup> Luca Sacco,<sup>1</sup> Mario Corona,<sup>2</sup> Francesco Farelli,<sup>1</sup> Chiara Benucci,<sup>1</sup> Monica Schiratti,<sup>1</sup> Giampaolo Prezioso,<sup>1</sup> Roberto Caronna<sup>1</sup>

<sup>1</sup>Department of Surgical Science, General Surgery and Pancreatic Diseases Unit-Policlinico Umberto I, Sapienza University of Rome, Italy

<sup>2</sup>Department of Radiology, Interventional Radiology Unit-Policlinico Umberto I, Sapienza University of Rome, Italy

**Correspondence:** Piero Chirletti, General Surgery and Pancreatic Diseases Unit-Policlinico Umberto I, Sapienza University of Rome, Italy, Email piero.chirletti@uniroma1.it

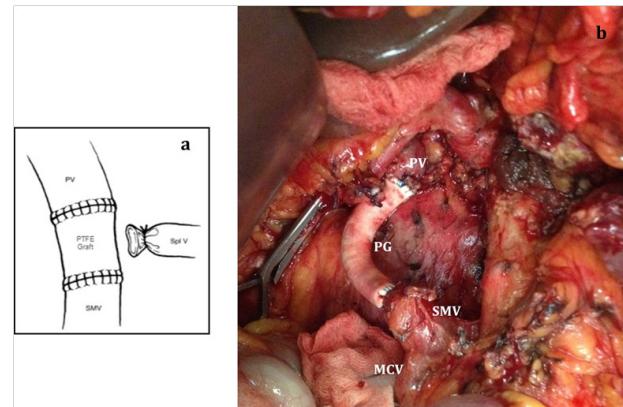
Luca Sacco, Department of Surgical Science, General Surgery and Pancreatic Diseases Unit-Policlinico Umberto I, Sapienza University of Rome, Italy, Email lucasacco87@gmail.com

**Received:** September 04, 2017 | **Published:** September 12, 2017

**Abbreviations:** PV, Portal Vein; SMV, Superior Mesenteric Vein; PD, Pancreateoduodenectomy; SV, Splenic Vein; IMV, Inferior Mesenteric Vein

## Introduction

In patients with pancreatic head cancer, tumor invasion of the portal vein (PV) or superior mesenteric vein (SMV) is common because of the close anatomical relationship of the pancreatic head and uncinate process to the venous portal system. Pancreateoduodenectomy (PD) with portal vein or superior mesenteric vein resection is well accepted for pancreatic head cancer because of the improvement in margin-negative resection and survival rates, without increasing postoperative morbidity and mortality in high volume centers.<sup>1-4</sup> When tumor infiltration involves PV-SMV confluence the splenic vein (SV) is ligated to achieve a margin negative resection. However, SV ligation may result in sinistral (left-sided) portal hypertension and gastrointestinal bleeding. Usually, compression of the splenic vein causes backpressure in the left portal venous system and subsequent gastric varices but, in the postoperative state, the pathophysiologic condition is altered and makes it difficult to diagnose.<sup>5-10</sup> We report a case of severe intestinal bleeding due to left-sided portal hypertension in patient who underwent a PD with PV-SMV confluence segmental resection and splenic ligation, for pancreatic adenocarcinoma, seven months previously that have required a massive haemostatic resuscitation and surgical procedure (Figure 1).



**Figure 1** Schematic drawn (A) and intraoperative view (B) of reconstruction, using prosthetic graft interposition, after Portal Vein-Superior Mesenteric Vein confluence resection.

PV, Portal Vein; PG, Prosthetic Graft; SMV, Superior Mesenteric Vein; MCV, Medium Colic Vein.

## Case presentation

A 58-year-old man with pancreatic head cancer and no comorbidity has been undergone, at our institution, a PD with Total Mesopancreas Excision, PV-SMV confluence segmental resection with prosthetic

graft interposition, splenic ligation with no reimplantation. We did not observe postoperative complications. Contrast-enhanced Multidetector Computed Tomography performed in VII postoperative day, showed graft patency with no signs of thrombosis (Figure 2). The preoperative diagnosis of pancreatic adenocarcinoma and the neoplastic invasion of PV wall up to the tunica media were both confirmed in the pathologic specimen. The patient started adjuvant chemotherapy with gemcitabine according to international guidelines on management of pancreatic cancer. After seven months of surgery the patient was readmitted to our hospital for a severe intestinal bleeding, subsequent to continuous melena, with severe anemia (Hb 6.6 g/dL; normal range 11.2-14.5 g/dL). The serum levels of liver enzymes and the other laboratory data were in the normal ranges. The causes of bleeding were not identified by several endoscopy including upper, lower gastrointestinal tract and small bowel. An abdominal-CT scan showed signs of portal hypertension, with slight dilation of the SMV and the presence of venous peripheral and perigastric collateral circles. Varicose veins in the gastro-digestive anastomosis were also noted, with signs of hyperemia of anastomized joints. No active arterial bleeding was identified. During the examination period, the anemia rapidly progressed and the patients needed numerous blood transfusions (total 56 units during 29 days), fresh froze plasma and platelets units. Then, he developed massive melena, with subsequent hypotension. An urgent angiography was performed to identify the cause and to treat the bleeding. A pseudoaneurysm of ileum-colic branches was showed by selective arteriography of superior mesenteric artery and it was treated by embolization with three metal spirals.

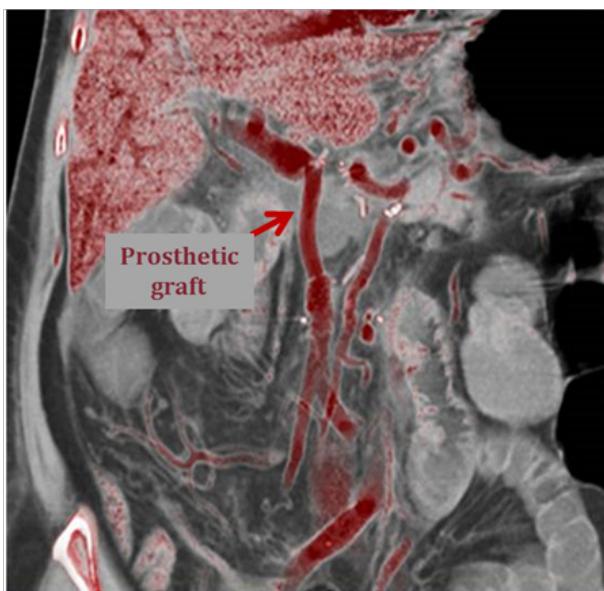


Figure 2 Contrast-enhanced multidetector computed tomography.

It looked like the bleeding had stopped but, twenty-four hours later, the patient presented a new episode of massive melena. Trans hepatic portography showed portal graft patency with normal mesenteric-portal axis pressure (PV pressure 5-6cm H<sub>2</sub>O, SMV pressure 11-12cm H<sub>2</sub>O) (Figure 3). The posterior and short gastric veins were also slightly dilated. This atypical drainage developed collateral vessels mainly adjacent to the pancreas and proximal jejunum and we considered it as so-called sinistral portal hypertension. Splenic artery embolization followed by splenectomy was performed stopped the

bleeding and abdominal CT scan one month later showed reduction in the size of the collateral vessels.

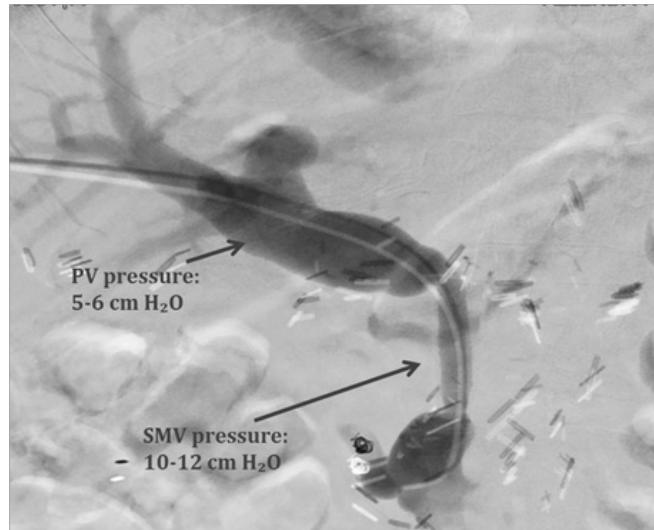


Figure 3 Trans Hepatic Portography.

PV, Portal Vein; SMV, Superior Mesenteric Vein.

This patient is still alive after forty-one months after PD, in good general conditions, but developed lung metastases treated by chemotherapy.

## Discussion

Greenwald and Wasch<sup>11</sup> first reported, in 1939, sinistral (left-sided) portal hypertension. It is a localized form of portal hypertension that occurs as a result of isolated thrombosis or obstruction of the splenic vein.<sup>12-14</sup> The features distinguishing it from other forms of portal hypertension are preserved liver function and a patent extrahepatic portal vein. There is controversy in the surgical literature regarding the safety of SV ligation during a PD with PV-SMV resection.<sup>9-15</sup> Some authors state that it is safe but others claim that sequelae of left-side portal hypertension may follow. Consequently, some authors have advocated reimplantation of the SV into the SMV or into the left renal vein in order to decompress the left portal system.<sup>15-18</sup> On the other hand, some surgeons report that reconstruction of the SV is not necessarily required, especially when the left gastric vein and inferior mesenteric vein (IMV) are preserved.<sup>19-21</sup> When the IMV was not divided, the blood flow from the spleen may pass through the IMV or arc of Barkow to the colonic marginal vein and finally into the PV. If the left gastric vein is not divided, the blood flow from the spleen passes through the short gastric vein and it drains into the PV via the left gastric vein<sup>9</sup> also described the important anatomy of venous flow patterns from the spleen via the colic marginal vein after PD with SV ligation. In the present case when PD with PV-SMV resection, SV ligation was performed, left gastric vein and inferior mesenteric vein was preserved therefore SV was not reimplanted. Despite that the patient developed left-side portal hypertension and severe bleeding. In these cases it would be useful to associate splenectomy. In conclusion, we presented a case of severe intestinal bleeding caused by atypical sinistral portal hypertension and we hypothesize that other mechanisms not yet well understood could exist that in some patients may cause left-sided portal hypertension. In order to avoid these complications, if not contraindicated, it is mandatory to associate splenectomy

## Acknowledgements

All authors of this work have met all of the following criteria:

- a. Substantial contributions to the conception or design of the work, or the acquisition, analysis, or interpretation of data for the work.
- b. Drafting the work or revising it critically for important intellectual content.
- c. Final approval of the version to be published.

## Conflict of interest

Authors declare there is no conflict of interest in publishing the article.

## Patient consent form

Informed consent was obtained from patient.

## References

1. Bockhorn M, Uzunoglu FG, Adham M, et al. Borderline resectable pancreatic cancer: a consensus statement by the International StudyGroup of Pancreatic Surgery (ISGPS). *Surgery*. 2014;155(6):977–988.
2. Ramacciato G, Nigri G, Petrucciani N, et al. Pancreatectomy with Mesenteric and Portal Vein Resection for Borderline Resectable Pancreatic Cancer: Multicenter Study of 406 Patients. *Ann Surg Oncol*. 2016;23(6):2028–2037.
3. Tang D, Zhan JO, Wang DR. Long Term Results of Pancreatectomy with Portal/Superior Mesenteric Vein Resection for Pancreatic Carcinoma: A Systematic Review. *Hepato-Gastroenterology*. 2011;58:623–631.
4. Marangoni G, Sullivan G, Faraj W, et al. Pancreatectomy with synchronous vascular resection—an argument in favour. *The surgeon: journal of the Royal Colleges of Surgeons of Edinburgh and Ireland*. 2012;10(2):102–106.
5. Ozaki K, Sanada J, Gabata T, et al. Severe intestinal bleeding due to sinistral portal hypertension after pylorus-preserving pancreateoduodenectomy. *Abdom Imaging*. 2010;35(6):643–645.
6. Tseng JF, Tamm EP, Lee JE, et al. Venous resection in pancreatic cancer surgery. *Best Pract Res Clin Gastroenterol*. 2006;20(2):349–364.
7. Tamura K, Sumi S, Koike M, et al. A splenic-inferior mesenteric venous anastomosis prevents gastric congestion following pylorus preserving pancreateoduodenectomy with extensive portal vein resection for cancer of the head of the pancreas. *Int Surg*. 1997;82(2):155–159.
8. Ferreira N, Oussoultzoglou E, Fuchshuber P, et al. Splenic vein-inferior mesenteric vein anastomosis to lessen left-sided portal hypertension after pancreatectomy with concomitant vascular resection. *Arch Surg*. 2011;146(12):1375–1381.
9. Ono Y, Matsueda K, Koga R, et al. Sinistral portal hypertension after pancreaticoduodenectomy with splenic vein ligation. *Br J Surg*. 2015;102(3):219–228.
10. Christians KK, Riggle K, Keim R, et al. Distal splenorenal and temporary mesocaval shunting at the time of pancreatectomy for cancer: initial experience from the Medical College of Wisconsin. *Surgery*. 2013;154(1):123–131.
11. Greenwald HM, Wasch MG. The roentgenologic demonstration of esophageal varices as a diagnostic aid in chronic thrombosis of the splenic vein. *J Pediatr*. 1939;14:57–65.
12. Ghelfi J, Thony F, Frandon J, et al. Gastrointestinal bleeding due to pancreatitis-induced splenic vein thrombosis: Treatment with percutaneous splenic vein recanalization. *Diagn Interv Imaging*. 2016;97(6):677–679.
13. Stone PA, Phang D, Richmond B, et al. Splenic artery embolization for the treatment of bleeding gastric varices secondary to splenic vein thrombosis. *Ann Vasc Surg*. 2014;28(3):737.e7–737.e11.
14. Rosado ID, Bhalla S, Sanchez LA, et al. Pattern of Venous Collateral Development after Splenic Vein Occlusion in an Extended Whipple Procedure (Whipple at the Splenic Artery) and Long-Term Results. *J Gastrointest Surg*. 2017;21(3):516–526.
15. Addeo P, Nappo G, Felli E, et al. Management of the splenic vein during a pancreatectomy with venous resection for malignancy. *Updates Surg*. 2016;68(3):241–246.
16. Ferreira N, Oussoultzoglou E, Fuchshuber P, et al. Splenic vein-inferior mesenteric vein anastomosis to lessen left-sided portal hypertension after pancreatectomy with concomitant vascular resection. *Arch Surg*. 2011;146(12):1375–1381.
17. Christians KK, Riggle K, Keim R, et al. Distal splenorenal and temporary mesocaval shunting at the time of pancreatectomy for cancer: initial experience from the Medical College of Wisconsin. *Surgery*. 2013;154(1):123–132.
18. Tamura K, Sumi S, Koike M, et al. A splenic-inferior mesenteric venous anastomosis prevents gastric congestion following pylorus preserving pancreateoduodenectomy with extensive portal vein resection for cancer of the head of the pancreas. *International Surgery*. 1997;82:155–159.
19. Weitz J, Kienle P, Schmidt J, et al. Portal vein resection for advanced pancreatic head cancer. *J Am Coll Surg*. 2007;204(4):712–716.
20. Misuta K, Shimada H, Miura Y, et al. The role of splenomesenteric vein anastomosis after division of the splenic vein in pancreatectomy. *J Gastrointest Surg*. 2005;9(2):245–253.
21. Strasberg SM, Bhalla S, Sanchez LA, et al. Pattern of venous collateral development after splenic vein occlusion in an extended Whipple procedure: comparison with collateral vein pattern in cases of sinistral portal hypertension. *J Gastrointest Surg*. 2011;15(11):2070–2079.