

World Journal of *Clinical Cases*

World J Clin Cases 2018 August 16; 6(8): 161-232



**EDITORIAL**

- 161 Biosimilars: Review of current applications, obstacles, and their future in medicine
Kaida-Yip F, Deshpande K, Saran T, Vyas D

REVIEW

- 167 PNPLA3 rs738409 underlies treatment response in nonalcoholic fatty liver disease
Wang JZ, Cao HX, Chen JN, Pan Q

MINIREVIEWS

- 176 Risk factors for gastroesophageal reflux disease and analysis of genetic contributors
Argyrou A, Legaki E, Koutserimpas C, Gazouli M, Papaconstantinou I, Gkiokas G, Karamanolis G

ORIGINAL ARTICLE**Basic Study**

- 183 Antiviral effects of hepatitis B virus S gene-specific anti-gene locked nucleic acid in transgenic mice
Xiao SR, Xu GD, Wei WJ, Peng B, Deng YB

Case Control Study

- 192 Negative impact of hepatitis B surface seroclearance on prognosis of hepatitis B-related primary liver cancer
Lou C, Bai T, Bi LW, Gao YT, Du Z

Retrospective Study

- 200 Machine learning to relate PM2.5 and PM10 concentrations to outpatient visits for upper respiratory tract infections in Taiwan: A nationwide analysis
Chen MJ, Yang PH, Hsieh MT, Yeh CH, Huang CH, Yang CM, Lin GM

Clinical Trials Study

- 207 Combined exercise improves gastrointestinal motility in psychiatric in patients
Song BK, Kim YS, Kim HS, Oh JW, Lee O, Kim JS

CASE REPORT

- 214 Pancreaticoduodenectomy with combined superior mesenteric vein resection without reconstruction is possible: A case report and review of the literature
Jouffret L, Guilbaud T, Turrini O, Delpero JR



- 219 Multimodal treatments of right gastroepiploic arterial leiomyosarcoma with hepatic metastasis: A case report and review of the literature
Seo HI, Kim DI, Chung Y, Choi CI, Kim M, Yun S, Kim S, Park DY
- 224 Must Peutz-Jeghers syndrome patients have the *LKB1/STK11* gene mutation? A case report and review of the literature
Duan FX, Gu GL, Yang HR, Yu PF, Zhang Z

Contents

World Journal of Clinical Cases
Volume 6 Number 8 August 16, 2018

ABOUT COVER

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World Journal of Clinical Cases (*World J Clin Cases*, *WJCC*, online ISSN 2307-8960, DOI: 10.12998) is a peer-reviewed open access academic journal that aims to guide clinical practice and improve diagnostic and therapeutic skills of clinicians.

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World Journal of Clinical Cases (*WJCC*) is now indexed in PubMed, PubMed Central, Science Citation Index Expanded (also known as SciSearch®), and Journal Citation Reports/Science Edition. The 2018 Edition of Journal Citation Reports cites the 2017 impact factor for *WJCC* as 1.931 (5-year impact factor: N/A), ranking *WJCC* as 60 among 154 journals in Medicine, General and Internal (quartile in category Q2).

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NAME OF JOURNAL
World Journal of Clinical Cases

ISSN
ISSN 2307-8960 (online)

LAUNCH DATE
April 16, 2013

FREQUENCY
Monthly

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World Journal of Clinical Cases
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PUBLICATION DATE
August 16, 2018

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Pancreaticoduodenectomy with combined superior mesenteric vein resection without reconstruction is possible: A case report and review of the literature

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Author contributions: Jouffret L wrote the manuscript; Guilbaud T drawn the illustration of case report; Turrini O reviewed the manuscript; Delpero JR performed the surgery.

Informed consent statement: Patient authorized publication of case report.

Conflict-of-interest statement: No potential conflicts of interest relevant to this article were reported.

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Manuscript source: Unsolicited manuscript

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Received: March 9, 2018
Peer-review started: March 9, 2018
First decision: April 4, 2018
Revised: April 10, 2018
Accepted: June 7, 2018
Article in press: June 8, 2018
Published online: August 16, 2018

Abstract

We report the case of a 56-year-old woman with pancreatic adenocarcinoma (PA) discovered during an episode of febrile jaundice. A computed tomography (CT) scan showed a mass in the head of the pancreas with circumferential infiltration of the superior mesenteric vein (SMV) and dilatation of the biliary and pancreatic ducts without metastases. The patient benefited from neoadjuvant chemotherapy (FOLFIRINOX) followed by radio-chemotherapy (45 Gy) and chemotherapy (LV5FU2). The revaluation CT revealed SMV thrombosis without portal vein (PV) thrombosis. There was no contact of the tumor with the PV. Pancreatoduodenectomy with combined resection of the SMV was performed with no reconstruction of this venous axis after confirmation of adequate PV, splenic, and left gastric venous flow and the absence of bowel ischemia. The pathological diagnosis was pT4N1R0 PA. There were no bowel angina issues during the follow-up period. At 15 mo after surgery, the patient died of metastatic recurrence.

Key words: Pancreatic ducts; Locally advanced; No reconstruction; Pancreatic adenocarcinoma; Superior mesenteric vein

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Core tip: This case report showed that a short superior mesenteric vein resection could be achieved during pancreaticoduodenectomy without venous reconstruction, when an appropriate small bowel venous outflow is ensured by inferior mesenteric vein.

Jouffret L, Guilbaud T, Turrini O, Delpero JR. Pancreaticoduodenectomy with combined superior mesenteric vein resection

without reconstruction is possible: A case report and review of the literature. *World J Clin Cases* 2018; 6(8): 214-218 Available from: URL: <http://www.wjgnet.com/2307-8960/full/v6/i8/214.htm> DOI: <http://dx.doi.org/10.12998/wjcc.v6.i8.214>

INTRODUCTION

Tumor resection is the only effective treatment option in patients with pancreatic adenocarcinoma (PA), and achieving macroscopic and microscopic complete resection (R0) is critical for long-term survival^[1]. When the tumor involves either the superior mesenteric vein (SMV) or the portal vein (PV), SMV/PV resection is necessary at the time of pancreaticoduodenectomy (PD) to obtain histologically negative surgical margins^[2,3]. Venous reconstruction is not usually a technical challenge, and end-to-end anastomosis is routinely performed with good 5-year patency rates^[4]. In some cases, involvement of first-order branches of the SMV increases the difficulty of venous reconstruction. We report the case of a patient presenting with PA with circumferential infiltration of the SMV and first-order branches in whom no venous reconstruction was performed.

CASE REPORT

A 56-year-old woman underwent abdominal computed tomography (CT) because of febrile jaundice. The CT scan revealed a mass (29 mm × 20 mm) in the head of the pancreas with circumferential infiltration of the SMV and dilatation of the biliary and pancreatic ducts. There was no metastasis.

An echo-endoscopy with retrograde catheterization was realized with stenting of the biliary duct. This exam affirmed the diagnosis of locally advanced PA. Neoadjuvant therapy was planned before surgical reevaluation. The patient received neoadjuvant chemotherapy with 6 cycles of FOLFIRINOX followed by radiochemotherapy at 45 Gy over 5 wk associated with LV5-FU2 chemotherapy. The reevaluation CT performed after neoadjuvant therapy revealed SMV thrombosis but no PV thrombosis and no contact with the tumor (Figure 1). There was no argument for a tumor origin of thrombosis, it was not enhanced by contrast product. There were some collateral vessels from SMV to the Inferior Mesenteric Venous (IMV). A multidisciplinary tumor board decided on surgical resection, and PD was planned.

On exploration, there was no evidence of metastasis or peritoneal nodularity. We first approached the superior mesenteric artery to be sure of the resectability of the tumor. The intraoperative frozen-section analysis result of the superior mesenteric artery margins was negative. After dissection, we found a point of tumor contact with the SMV. There was SMV thrombosis, but the PV and splenomesaraic confluence were tumorfree. PD combined with SMV resection was performed to



Figure 1 Initial computed tomography scan, axial section: Tumor of the pancreatic head (green arrow) with adjacent thrombus of the superior mesenteric vein (red arrow)

obtain a negative surgical margin. We mechanically sectioned the distal extremity of the SMV and selectively ligated the ileum and jejunum veins under the tumor. No reconstruction of this venous axis was realized after confirming, by a clamping test, adequate PV, splenic, and left gastric venous flow and the absence of bowel ischemia. We performed a Child reconstruction with pancreatojejunostomy and external pancreatic duct stenting and drainage (Figure 2). Surgery lasted 10 hours. There was less bleeding, and no transfusion. We inked the tumor margins to differentiate areas of venous, arterial and posterior margin resection. The pathological diagnosis was PA with poor differentiation, lymph node metastasis (2N+/5), vascular and perineural invasion, and SMV wall infiltration, ypT3N1M0. All resection margins were tumor-free.

During the postoperative course, the patient developed isolated chylous ascites that disappeared spontaneously in a few weeks. Control CT after surgery showed an aspect of aspecific colitis with edema in the mesenteric structures of the colon. The patient was released from the hospital after fifteen days. A multidisciplinary tumor board decided there were no indications for adjuvant therapy because of clinical and nutritional state of patient. Subsequently, the patient experienced metastatic evolution with hepatic and pulmonary lesions at 6 mo. Unfortunately, the patient died of metastatic progression, 15 mo after the surgery, with no evidence of local recurrence.

DISCUSSION

In this case, no reconstruction after venous resection without the use of autologous or prosthetic grafts was feasible. As SMV thrombosis was observed before the surgery, venous drainage of the small bowel was achieved via the lower mesenteric and splenic veins, and reconstruction of the SMV was not necessary. PD with SMV resection and without reconstruction was performed in two other cases, as described by Hashimoto *et al.*^[5],

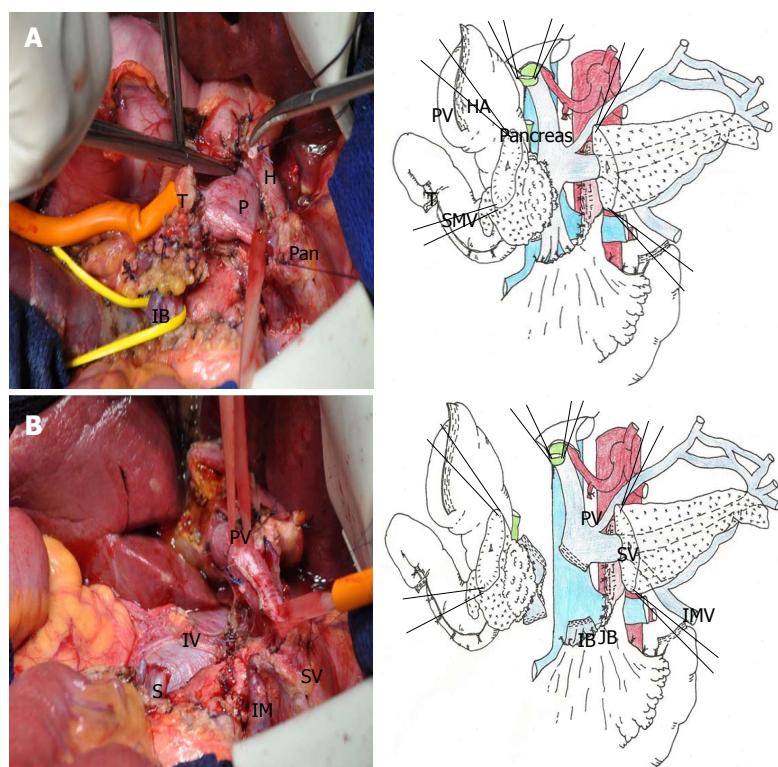


Figure 2 Operative view and illustration at the initial surgery. A: Involvement of pancreatic tumor (T) in the superior mesenteric vein (SMV) without involvement of the portal vein (PV); ileal branch of the SMV (IB); jejunal branch of the SMV (JB); hepatic artery (HA); stump of transected pancreas; B: No SMV reconstruction after tumor resection; venous return by inferior mesenteric vein (IMV) and splenic vein (SV); inferior vena cava (IVC).

after confirming adequate PV flow and no small intestine congestion, and by Tang *et al*^[6], who performed the same operation with anastomosis between the splenic vein and PV without SMV reconstruction.

The poor prognosis of this condition is partly due to local invasion of the tumor into the tissues around the pancreas. In this case, PD combined with venous resection was performed to treat pancreatic head adenocarcinoma with tumor-vein contact and/or invasion to obtain R0 resection. The rationale for radical surgical excision is based on the poorer survival rate in patients with incomplete resection (R1) (14-21 mo) than in patients with R0 resection (18-28 mo), as determined by the study with the largest series of cases performed in a specialized center^[7-10]. The definition of R1 resection has not been standardized. Chang *et al*^[11] showed that a tumor clearance greater than 1.5 mm in the retroperitoneal section was an independent predictor of long-term survival in a multivariate analysis in 365 patients. Delperio *et al*^[12] demonstrated that the standardized and systematic inking of the retroperitoneal margin increased the rates of R1 resection; additionally, these researchers confirmed the importance of R0 resection with a significantly lower 2-year disease-free survival rate in patients with R1 resection (R1: 26.5% vs R0: 42%; $P = 0.02$). In patients with R1 resection, the site of microscopic involvement impacted survival, and patients with involvement of vascular margins had poorer survival than patients with involvement of

posterior margins^[13].

When a tumor is in contact with the PV, tumor invasion occurs in only 50%-65% of cases, and involvement of the PV is a factor of a poor prognosis^[14,15]. However, venous resection could increase the rate of R0 resection and be justified to increase the clearance of the retroportal resection margins. Additionally, Turrini *et al*^[16] showed better 3-year overall survival in patients with no venous involvement who underwent PV resection than in those who did not (42% vs 22%, $P = 0.04$).

Many studies have not found any significant differences in terms of postoperative morbidity and mortality after venous resection^[17]. Long-term results after PV reconstruction have shown 1- and 5-year patency rates of 50%-80% and 17%, respectively. There have been some cases of early thrombosis after PV reconstruction, with no major complications. Stenosis of the PV reconstruction area has been shown to be associated with local recurrence^[4].

In most cases requiring reconstruction, end-to-end anastomosis is used, but some authors have described the use of autologous venous grafts or prosthetic patches in cases with long resection distances, with similar postoperative outcomes. Therefore, some patients developed thrombosis earlier in their graft, leading to large-volume ascites requiring paracentesis^[18].

The involvement of first-order branches of the SMV is a surgical challenge. In a report by Katz *et al*^[19], segmental resection of one of the two first-order branches

of the SMV could be performed without reconstruction if the remaining branch is preserved and assures collateral mesenteric venous drainage.

Acute thrombosis of the PV and SMV can lead to mesenteric venous ischemia. Thus, the lack of feasible reconstruction has historically been a contraindication of pancreatic resection. Data from the trauma literature suggest that SMV ligation can be performed without dramatic consequences^[20]. Therefore, in cases of chronic SMV obstruction by a tumor or previous thrombosis, the development of collateral flow through the inferior mesenteric and splenic veins allows ligation of the SMV.

In conclusion, before surgery, high-quality CT needs to be performed to identify chronic venous obstructions by tumor involvement or thrombosis, evaluate the development of venous collaterality, and determine the feasibility of resection with or without PV reconstruction.

ARTICLE HIGHLIGHTS

Case characteristics

A 56-year-old woman with a locally advanced pancreatic adenocarcinoma (PA).

Clinical diagnosis

Febrile Jaundicy.

Laboratory diagnosis

Ca 19-9 42, cholestasis decreased after biliary stenting.

Imaging diagnosis

Computed tomography scan revealed superior mesenteric vein (SMV) thrombosis but no PV thrombosis and no contact with head PA.

Pathological diagnosis

PA with poor differentiation, lymph node metastasis (2N+/5), vascular and perineural invasion, and SMV wall infiltration. All resection margins were tumor-free.

Treatment

Pancreatoduodenectomy with SMV resection without reconstruction.

Related reports

No reconstruction of this venous axis was realized after confirming adequate portal venous, splenic, and left gastric venous flow and the absence of bowel ischemia.

Term explanation

Development of collateral flow through the inferior mesenteric and splenic veins allows ligation of the superior mesenteric venous.

Experiences and lessons

This case report showed that a short SMV resection could be achieved during pancreatoduodenectomy without venous reconstruction, when an appropriate small bowel venous outflow is ensured by inferior mesenteric vein.

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