Letter to the Editor

Laparoscopic radical distal pancreatectomy with portal venous tumor thrombectomy for the treatment of pancreatic acinar cell carcinoma after neoadjuvant chemotherapy

Mengqing Sun, Xuesong Bai, Xiaoyan Chang, Huanwen Wu, Yuejuan Cheng, Xiaodong He, Xianlin Han

Peking Union Medical College Hospital, Chinese Academy of Medical Sciences, Beijing, China

Correspondence to: Xianlin Han, MD. Peking Union Medical College Hospital, Chinese Academy of Medical Sciences, Shuaifuyuan, Dongcheng District, Beijing 100005, China. Email: hanxianlin@pumch.cn.

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We have read the article "Current status and future prospect of surgical treatment for pancreatic cancer", published in *HepatoBiliary Surgery and Nutrition* in 2020 (1). This article mentions that in the past two decades, there has been significant development and progress in the surgical treatment of pancreatic cancer, significantly improving the tumor resection rate and reducing perioperative mortality and the incidence of severe complications. In particular, the development of laparoscopy and robotic minimally invasive surgery is gradually replacing traditional open surgery. At the same time, the introduction of preoperative neoadjuvant therapy has also helped improve the prognosis of patients with pancreatic cancer. As a pancreatic surgeon, the author has deep experience in this area and is willing to report a case of pancreatic acinar cell carcinoma (ACC) with extensive tumor thrombus in the portal vein (PV). After preoperative chemotherapy, both the primary lesion and the tumor thrombus in the PV significantly decreased in size. We performed laparoscopic radical distal pancreatectomy, with PV thrombectomy.

All procedures performed in the case were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this article and accompanying images. A copy of the written consent is available for review by the editorial office of this journal. The patient was a 63-year-old female with intermittent postprandial abdominal distension for over a year before admission. Eleven months before admission, the patient visited a local hospital where the abdominal ultrasound revealed a mass in the distal pancreas with suspected thrombus in the PV. Further evaluation at our hospital included abdominal-pelvic contrast-enhanced computed tomography (CT), showing a low-enhancing mass in the distal pancreas, diffuse filling defects in the main trunk and branches of the PV, and the splenic vein (SpV), suggesting the possibility of tumor thrombus. The positron emission tomography (PET)-CT indicated increased metabolic activity in the pancreatic tail, suggesting a malignant lesion. There was also significant dilation and increased metabolic activity in the PV and its branches and the proximal segment of the SpV and the superior mesenteric vein (SMV), suggesting tumor thrombus formation. The endoscopic ultrasonography (EUS)-guided fine-needle aspiration (EUS-FNA) was performed, and the histopathological examination revealed poorly differentiated adenocarcinoma with degeneration.

Oncologist consulted this patient, and genetic sequencing was prescribed. Genetic sequencing revealed a pathogenic germline mutation in BRCA2. The patient received tegafur in combination with oxaliplatin chemotherapy nine months before surgery. After completing six cycles of neoadjuvant chemotherapy, a follow-up PET-CT scan showed a significant reduction in metabolic activity and size of the original pancreatic tail mass and a decrease in metabolic activity and size of the original PV tumor thrombus. The tumor thrombus in the PV branches, SpV, and SMV had essentially disappeared (*Figure 1*). The CT scan showed similar signs (*Figure 2*).

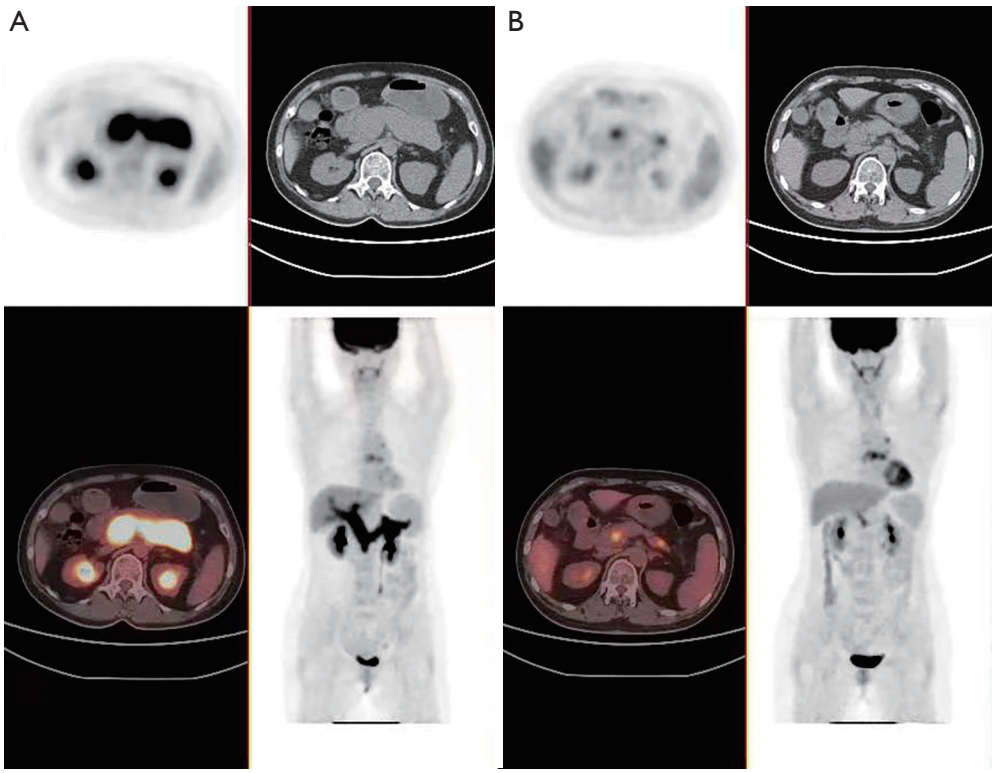

Figure 1 Comparison of PET-CT images before and after neoadjuvant chemotherapy. (A) Before chemotherapy. (B) After chemotherapy, showing a significant reduction in the size of the original portal vein tumor thrombus. PET, positron emission tomography; CT, computed tomography.

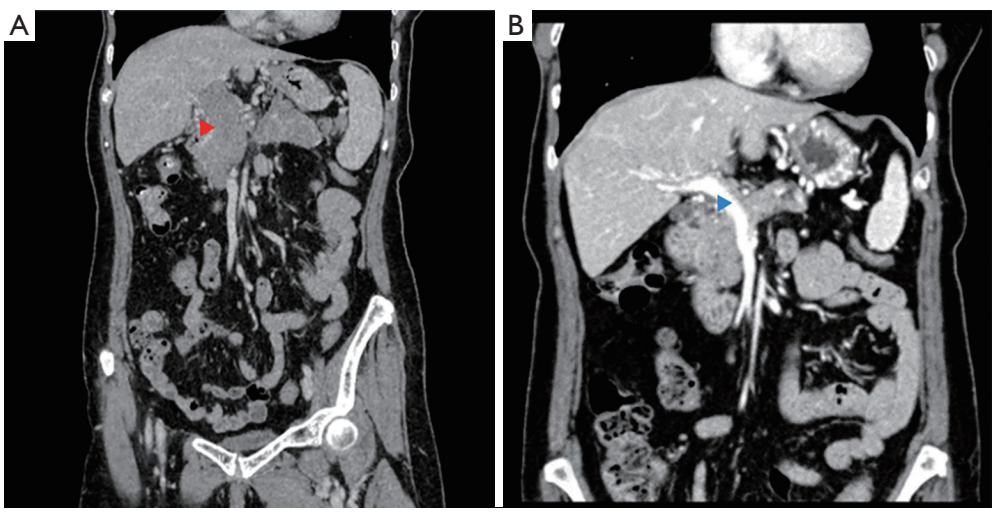

Figure 2 Comparison of contrast-enhanced CT images before and after neoadjuvant chemotherapy. (A) Before chemotherapy, red triangle: PV system filled with tumor thrombus. (B) After chemotherapy, blue triangle: PV-SMV is mostly patent, with a significant reduction in the size of the tumor thrombus compared to before. CT, computed tomography; PV, portal vein; SMV, superior mesenteric vein.

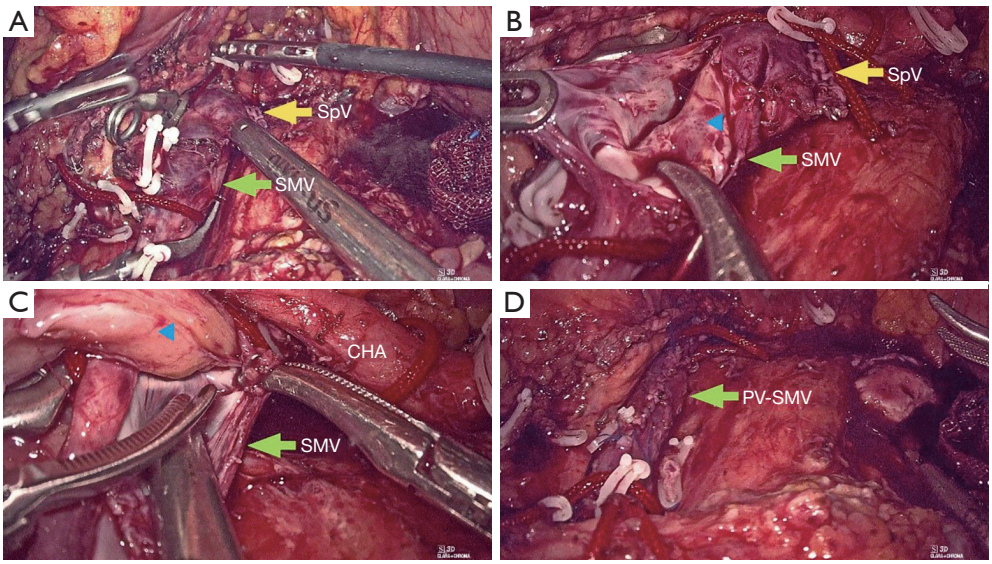

Figure 3 Intraoperative images. (A) Vascular clamps occluding the PV-SMV at the proximal and distal ends. (B) Incision of the PV-SMV venous wall, exposing the tumor thrombus. (C) Removal of the thrombus. (D) Longitudinal closure of the venous wall. Blue triangle: tumor thrombus within the PV-SMV. SpV, splenic vein; SMV, superior mesenteric vein; CHA, common hepatic artery; PV, portal vein.

After thorough evaluation, it was considered that the primary pancreatic tumor in this patient could be resected after neoadjuvant chemotherapy. At the same time, tumor thrombectomy through venotomy for the PV thrombus was possible, providing an opportunity for R0 resection. We performed laparoscopic radical resection of the distal pancreas, combined with PV thrombectomy. During the surgery, the distal pancreas and spleen were first resected. The major branches of the PV-SMV, including the Henle's trunk, the first jejunal vein, and the coronary vein, were sequentially dissected and ligated. After isolating PV and SMV at the proximal and distal ends of the thrombus, vascular occlusion clamps were used to block the PV and SMV. A longitudinal incision was made near the end of the SpV, and the thrombus was completely removed (*Figure 3*). The venous wall was closed with a 5-0 vascular suture. The clamps were released, and good filling of the PV and satisfactory blood supply to the intestines were observed. The PV occlusion time was 43 minutes. The patient had a smooth postoperative recovery and started an oral diet on the third day after surgery. The drainage tubes from the splenic bed and the pancreatic stump were removed on the fourth and fifth days after surgery. The patient was discharged on the seventh day after surgery. The postoperative pathology report revealed pancreatic ACC in the pancreatic body and tail, infiltration into the peripancreatic adipose tissue, and evidence of perineural invasion [College of American Pathologists (CAP) grade 2 response]. No lymph node metastasis was observed (0/8) (*Figures 4,5*). As of the submission, the patient has undergone two cycles of adjuvant chemotherapy with tegafur in combination with oxaliplatin. Currently, it has been 6 months postoperatively, and the recent follow-up abdominal-pelvic enhanced CT scan showed no tumor recurrence. The PV is patent, and no tumor thrombus is observed (*Figure 6*).

ACC is a rare malignant tumor, accounting for only 1–2% of all pancreatic exocrine tumors (2). ACC is a highly aggressive tumor with low resectability and high recurrence rates, often presenting with metastasis at diagnosis. However, aggressive surgical resection and achieving R0 resection can still improve long-term survival rates (2). Due to its low incidence, there is a lack of high-quality evidence, such as randomized controlled trials, for chemotherapy regimens in ACC. However, molecular targeted therapies specific to ACC show promising prospects. Among them, BRCA1/2 gene mutations have received attention (3). A literature review found that up to 22% of ACC patients have BRCA1/2 gene defects (4). In patients with ACC harboring BRCA2 gene mutations, platinum-based chemotherapy drugs have shown particular sensitivity, and regimens such as FOLFIRINOX have achieved good results (3,5,6). In this

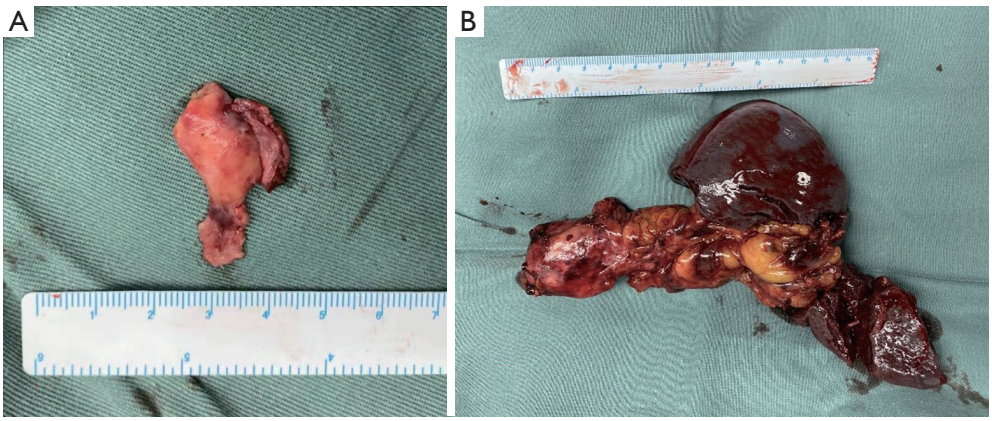

Figure 4 Macroscopic photographs of the resected specimen. (A) Tumor thrombus. (B) Distal pancreas and spleen.

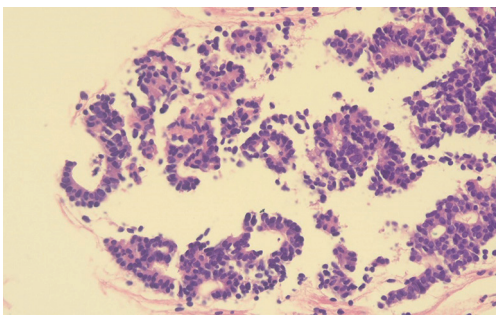

Figure 5 Histopathological sections of the resected specimen. Clusters of tumor cells showed tubular or cribriform arrangement (HE, ×4 objective). HE, hematoxylin-eosin.

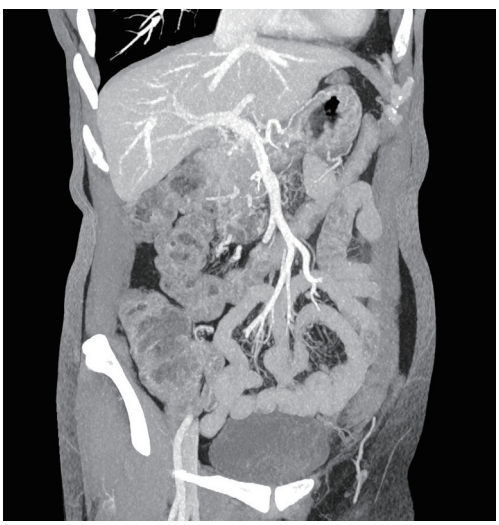

Figure 6 The postoperative follow-up enhanced CT scan at 6 months shows a patent portal vein and no evidence of tumor recurrence. CT, computed tomography.

case, thanks to the targeted therapy based on the BRCA2 germline mutation detected through genetic testing, platinum-based chemotherapy was used as neoadjuvant chemotherapy, and satisfactory results were achieved before surgery, converting the previously unresectable tumor into a potentially resectable one.

PV thrombus is uncommon in patients with pancreatic ductal adenocarcinoma (PDAC). However, it can be observed in certain pathological types of pancreatic malignant tumors such as pancreatic neuroendocrine tumors (pNETs), ACC, and Ewing's sarcoma (7,8). Venous thrombectomy has been well-established in patients with hepatocellular carcinoma (HCC) combined with PV thrombus, as well as in patients with renal cell carcinoma (RCC) combined with inferior vena cava (IVC) thrombus (9,10), wherein the IVC thrombectomy has been successfully performed using minimally invasive techniques such as laparoscopy and robot-assisted surgery (11,12). Robot-assisted PV thrombectomy has also been reported for patients with gastric cancer and PV tumor thrombosis after neoadjuvant therapy (13). However, PV thrombectomy in patients with pancreatic malignancies and PV tumor thrombosis is still cautiously performed. Prakash *et al.* reported three cases of pNET with PV thrombosis, in which the thrombus was successfully removed through a PV incision after distal pancreatectomy. The technique completely removed the free-floating thrombus from the SpV stump and repaired the venous defect with a patch (7). This procedure is indicated only when the PV-SMV thrombus is an appendage to the SpV thrombus and is sufficiently detached within the PV-SMV, allowing smooth retrieval through the SpV opening. If the thrombus or tumor itself

invades the PV-SMV or causes luminal stenosis, combined venous resection and reconstruction are required.

In this case, preoperative contrast-enhanced CT showed a small residual thrombus with good mobility, allowing the surgical team to attempt venous thrombectomy. Prior to performing the thrombectomy, it was necessary to adequately mobilize and pre-occlude the proximal and distal portions of PV-SMV, and to selectively ligate major branches for hemorrhage control. During the procedure, after opening the venous wall, it was observed that the thrombus was slightly adhered to the venous wall. No venous sidewall or segmental resection was performed. This procedure was entirely performed under laparoscopy. We are still following up this patient regularly.

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Footnote

Provenance and Peer Review: This article was a standard submission to the journal. The article has undergone external peer review.

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Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://hbsn.amegroups.com/article/view/10.21037/hbsn-23-395/coif). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in the case involving human participants were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this article and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

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