



Robotic Portal Tumor Thrombectomy during Pancreatoduodenectomy for Acinar Cell Carcinoma

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Acinar cell carcinoma (ACC) of the pancreas is a rare malignant tumor that accounts for 1–2% of all pancreatic neoplasms. ACC is an extremely aggressive tumor with low resectability and a high recurrence rate, often metastatic at diagnosis.¹ However, aggressive surgical resection and the achievement of an R0 resection can still improve long-term survival rates. The prognosis is better than that with ductal carcinoma, with a 5-year survival rate of 36–73% in resected patients. Therefore, rigorous surgical resection with negative margins should be pursued.¹

We present a video of a 73-year-old man with abdominal pain who underwent an ultrasound scan that revealed a 7 cm mass in the head of the pancreas. MRI revealed ACC. MRI showed no dilatation of the bile duct or pancreatic duct, but a neoplastic thrombus was detected in the porto-mesenteric vein (Fig. 1). After a thorough examination, it was felt that the pancreatic tumor could be resected. At the same time, a portal vein (PV) tumor thrombectomy was possible, which offered the possibility of an R0 resection. The multidisciplinary team then opted for an upfront pancreatoduodenectomy. Neoadjuvant chemotherapy was discussed in detail by the multidisciplinary team. However, the team was afraid that a venous thrombus could progress, occlude the PV system, and lead to inoperability. The literature on this topic is scarce, and Sun et al.² have described the use of neoadjuvant chemotherapy to make the patient resectable. In our case, the patient was already resectable. We proposed a robotic approach and received approval.

A PV thrombus is rare in patients with ductal adenocarcinoma of the pancreas.² However, it has been observed in certain malignant pancreatic tumors such as pancreatic neuroendocrine tumors, ACC, and Ewing's sarcoma. Venous thrombectomy has proven successful in patients with hepatocellular carcinoma with a PV thrombus and in patients with renal cell carcinoma with a thrombus of the inferior vena cava. Robot-assisted PV thrombectomy has also been reported in patients with gastric cancer and colorectal liver metastases.³ However, PV thrombectomy is rarely performed in patients with pancreatic malignancies.² The biggest concern is the risk of tumor seeding, especially with soft tumor thrombi such as the one in this patient. However, we have previously addressed tumor thrombi in the PV³ and believe that opening the PV with adequate isolation of the surgical field can completely and safely remove the thrombus. End-to-end resection and anastomosis could be an option but would mean resection of the splenic vein and probably a higher surgical risk.

Robotic pancreatoduodenectomy with superior mesenteric artery (SMA) first approach was performed as usual.⁴ The SMA first approach is our preferred technique. It is helpful in cases where PV resection is indicated. With this approach, the surgical specimen is only connected to the PV/superior mesenteric vein (SMV) axis through its invasion, which facilitates venous resection and reconstruction. In cases where the PV is not invaded, the SMA first approach simplifies the resection of the uncinate process and, in our opinion, makes this step safer. The total operation time was 340 minutes, with an estimated blood loss of 120 mL. The resection time was 224 minutes, and the tumor thrombectomy and vein reconstruction took 27 minutes (Fig. 2). After removal of the thrombus, complete visualization of the PV was performed along with intraoperative ultrasound, which showed no residual disease. The patient received 5000 UI systemic heparin immediately before clamping the PV. After

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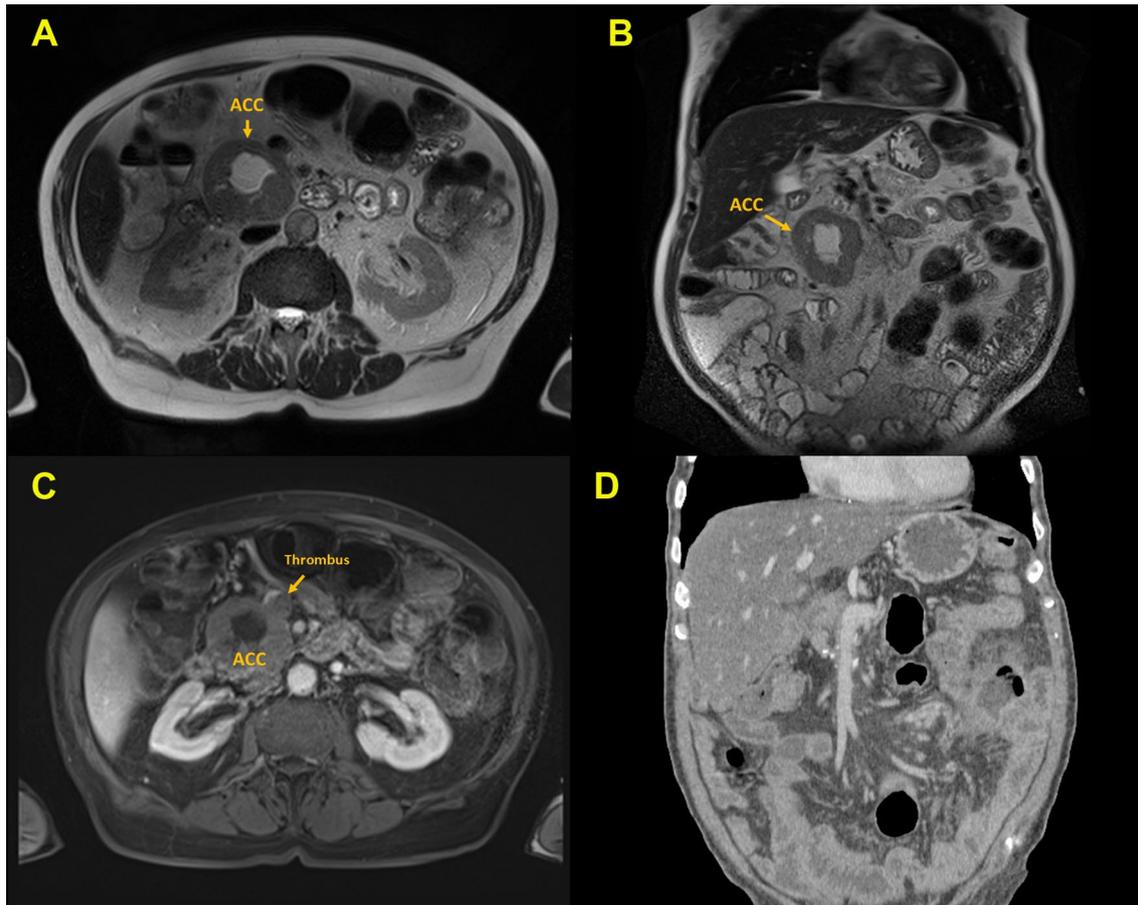


FIG. 1 Preoperative imaging of robotic pancreatoduodenectomy for acinar cell carcinoma (ACC). **A** The preoperative magnetic resonance (MR) image in axial view shows a large heterogeneous tumor with central necrosis in the pancreatic head. The pancreatic and bile ducts are not dilated. **B** The preoperative MR image in coronal view shows a large heterogeneous tumor with central necrosis in the pancreatic

head. The pancreatic and bile ducts are not dilated. **C** The preoperative MR image in axial view shows an ACC in the pancreatic head and tumor thrombus in the superior mesenteric vein (SMV)/portal vein (PV) axis. **D** The postoperative computed tomography image in coronal view shows an open SMV

partial resection of the PV, its extension precluded lateral suturing, and a transverse anastomosis was necessary to minimize the risk of stenosis of the SMV (Fig. 3). This technique precluded the use of a patch graft.⁵ In our experience with vascular reconstruction in pancreatoduodenectomy, we use the transverse closure technique whenever possible.⁵ In addition, the PV was dilated by the thrombus, so transverse closure was our first choice. In cases where the vein resection is more than one-third of the circumference, we use a bovine pericardial patch to reconstruct the vein.⁶

Recovery was uneventful, and the patient was discharged on postoperative day 6. The patient received 5000 UI heparin

subcutaneously (three times daily) during hospitalization, and oral rivaroxaban 10 mg was maintained for 3 months after discharge. The patient's pathology confirmed an ACC measuring 7.0 cm with free margins, stage T3N1 (1/41). The patient received adjuvant chemotherapy with Folfirinox. At 6 months after surgery, the patient is healthy and has no signs of disease. The control computed tomography scan shows a patent PV. ACC has a better prognosis than ductal carcinoma, so R0 resection should also be attempted in patients with a tumor thrombus that can be safely operated on with the robotic platform. This video can help oncologic surgeons perform this complex procedure.

FIG. 2 Robotic pancrea-
toduodenectomy with tumor
thrombectomy for acinar cell
carcinoma. **A** Intraoperative
view during resection. Intra-
operative ultrasound shows
a tumor thrombus within
the superior mesenteric vein
(SMV)/portal vein (PV) axis.
B Intraoperative view shows
tumor invasion in the SMV/
PV axis. **C** Intraoperative view
during resection. The SMV/PV
axis is temporarily clamped
and the vein is resected. The
tumor thrombus is visible (arrow). **D**
Intraoperative view after surgi-
cal resection of the specimen.
The SMV/PV axis is tempo-
rarily clamped and the tumor
thrombus is carefully removed

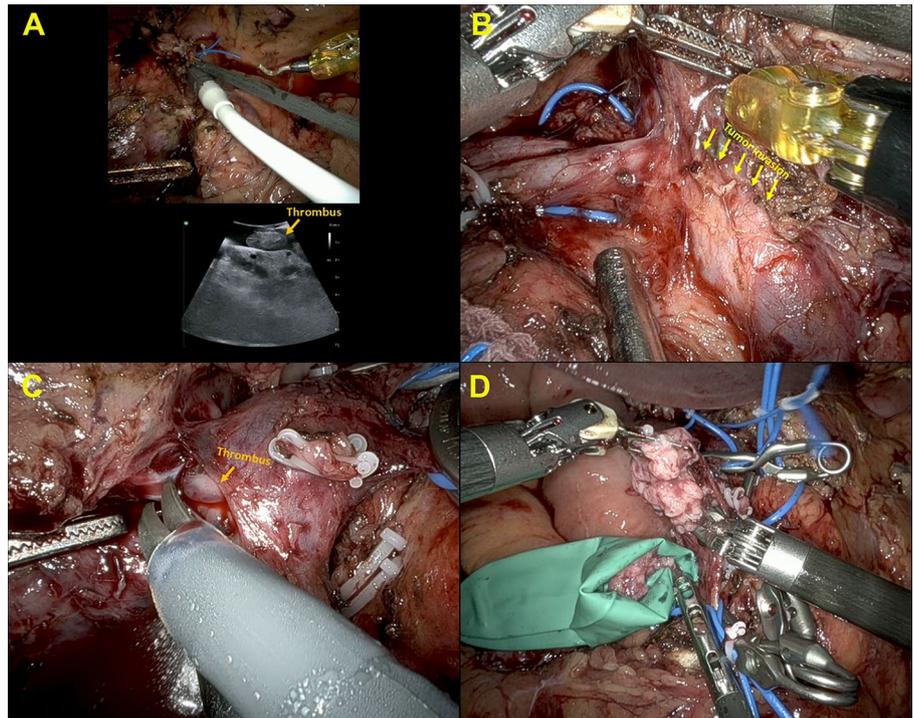
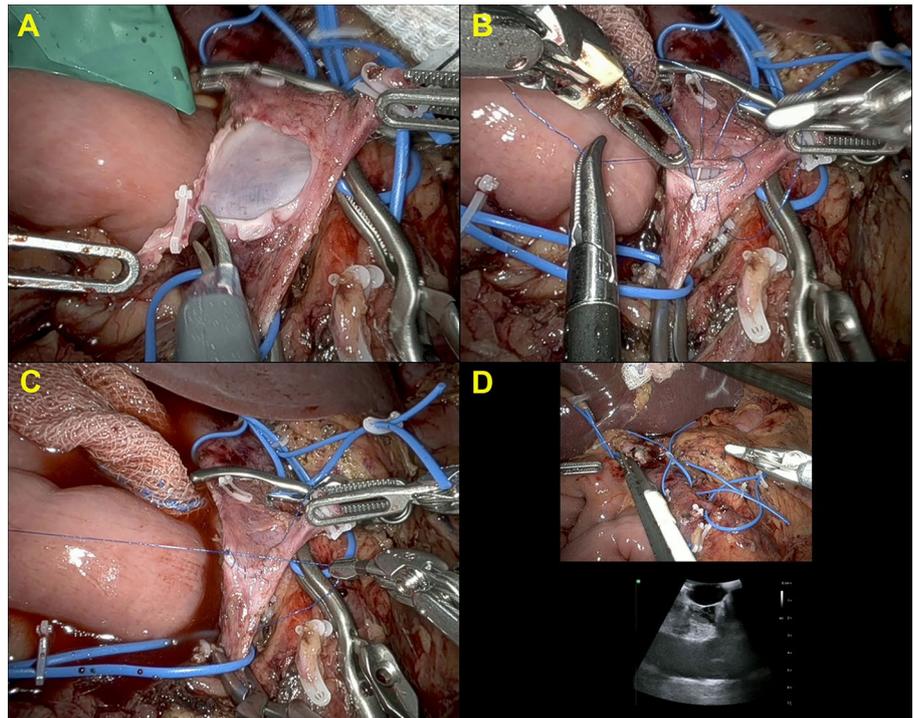


FIG. 3 Robotic pancrea-
toduodenectomy with tumor
thrombectomy for acinar cell
carcinoma. **A** Intraoperative
view. The vein wall is parti-
ally resected to obtain free
edges. **B** Intraoperative view of
transverse reconstruction of the
superior mesenteric vein with
running 5-0 Prolene suture. **C**
The intraoperative view shows
the completion of the vein
reconstruction. **D** Intraoperative
view after venous reconstruc-
tion. The intraoperative ultra-
sound examination shows an
open superior mesenteric vein/
portal vein axis without residual
thrombi



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