



Vascular Resections During the Whipple Procedure

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Keywords

- Whipple procedure • Pancreas • Portal vein • Superior mesenteric vein
- Pancreas cancer • Vascular resection • Vascular reconstruction

Key points

- Pancreatic cancer is currently the third leading cause of cancer death in the United States.
- Margin negative surgical resection remains a critical component of cure.
- Preoperative computed tomography or MRI is essential in determining resectability.
- An experienced team is critical when performing complex vascular resections and reconstructions in this patient cohort.

INTRODUCTION

Pancreatic ductal adenocarcinoma (PDA) remains a formidable challenge for surgeons and oncologists alike. Overall, 5-year survival rates remain less than 5% for patients with such cancers. Currently the third leading cause of cancer death in America, it is predicted that by 2020 to 2030 PDA will become the second leading cause of cancer-related deaths in the United States. Combination chemotherapy regimens, such as gemcitabine plus albumin-bound paclitaxel (Abraxane), or fluorouracil, leucovorin, irinotecan, and oxaliplatin have gained increasing use in the armamentarium of medical oncologists. To date, the only truly targeted agent approved in the treatment of PDA is the epidermal growth factor receptor inhibitor erlotinib, which has been shown

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to have a slight advantage over gemcitabine alone as a chemotherapeutic. Progress in the treatment of PDA has been largely incremental, and has been hampered by the genetic diversity and instability of PDA cells. A recent review by Knudsen and colleagues [1] nicely summarizes the current state of opportunities for precision medicine in the treatment of PDA.

Notwithstanding some of the recent progress in medical oncology against PDA, surgical resection, notably resection margin negative (R0) surgical resection remains the cornerstone of the potential curative treatment of this disease. Importantly, the determination of the relationship of the primary tumor to the mesenteric vasculature, and detection of metastatic disease in the liver or peritoneum via either pancreatic multiphase computed tomography (CT) or MRI scans are critical elements of patient assessment and treatment planning. In the absence of metastatic disease, when the primary tumor does not involve either the celiac axis, the hepatic artery, the superior mesenteric artery (SMA), the superior mesenteric vein (SMV), or the portal vein (PV), lesions can be defined as clearly resectable. Mesenteric venous resection with the appropriate reconstruction has been touted for decades as helping to achieve an R0 resection in borderline resectable or locally advanced tumors involving the SMV or the PV. Two recent International Study Group of Pancreatic Surgery (ISGPS) consensus papers have provided some clarity in defining standard lymphadenectomy and borderline resectable pancreatic cancer. The first, by Tol and colleagues [2], concluded that extended lymphadenectomy during the Whipple operation showed no survival benefit compared with standard lymphadenopathy, and thus noted that extended lymphadenectomy could not be recommended. The second ISGPS consensus statement by Bockhorn and colleagues [3] proposed a new classification of extrahepatic mesenteric-portal venous resection and provided a consensus definition.

In this second consensus statement by Bockhorn and colleagues [3], the following criteria regarding venous resection were agreed on based on National Comprehensive Cancer Network (NCCN) guidelines. The updated version 2.2015 is provided in Table 1:

- The criteria for borderline resectability should be applied using a specialized pancreatic protocol CT performed in the previous 4 weeks that includes all of the abdomen and pelvis. Multidetector CT with high resolution, multiplanar reconstructions facilitates accurate stratification (strong recommendation).
- All cases should be discussed and managed by a multidisciplinary team in high-volume centers (strong recommendation).
- The ISGPS supports the imaging-based NCCN criteria for borderline resectability in cases of venous mesenteric-portal axis involvement, including encasement of the SMV or PV confluence, and even short segment occlusions and arterial involvement (strong recommendation) [3].

One of the major controversies in this field deals with upfront operative resection in the presence of mesenteric-portal axis involvement versus the application of neoadjuvant treatment in such patients. Neoadjuvant treatment in patients with borderline resectable pancreatic cancer continues to be debated, but the pendulum seems to be swinging toward treating such patients with

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