

omentum, extra-abdominal sites). Other indications of unresectability include vascular encasement (i.e., more than one half of the vessel's circumference), occlusion or thrombus of the superior mesenteric vein (SMV) or the SMV–portal vein confluence, or direct involvement of the superior mesenteric artery, inferior vena cava, aorta, celiac axis, or hepatic artery, as defined by the absence of a fat plane between the tumor and these structures on CT. For tumors of the tail of the pancreas, encasement of the splenic vein does not necessarily obviate resectability.

Selective preoperative ERCP with biliary stent placement is recommended for patients with obstructive jaundice when symptoms of intractable pruritus or cholangitis occur or when surgery must be delayed for several weeks. At the time of stent placement, ERCP tissue sampling techniques can confirm a diagnosis of pancreatic malignancy (sensitivity of 30% to 60%), but the sensitivity is lower than that of EUS-guided fine-needle aspiration.

The standard operation for pancreatic cancer of the head or uncinata process is the Whipple procedure (i.e., pancreaticoduodenectomy). Whipple resection consists of removal of the pancreatic head, distal common bile duct, gallbladder, duodenum, proximal jejunum, gastric antrum, and regional lymph nodes. Reconstruction requires pancreaticojejunostomy, hepaticojejunostomy, and gastrojejunostomy. The surgical mortality rate for this procedure is approximately 3% when performed by experienced pancreatic surgeons. Patients who have undergone surgical resection should receive adjuvant treatment using gemcitabine alone or in combination with fluorouracil-based chemoradiation therapy, which improves progression-free and overall survival rates.

The term *borderline resectable* is reserved for cases with focal (less than one half of the circumference) tumor abutment of the visceral arteries or short-segment occlusion of the SMV or SMV–portal vein confluence or hepatic artery. Some centers are performing resection and reconstruction of a short segment of the portal vein or SMV in selected patients. Arterial resection and reconstruction (mostly of the superior mesenteric and hepatic arteries) are performed infrequently, and the morbidity and mortality rates for the operation increase markedly when these arteries are included. The use of preoperative neoadjuvant chemoradiation therapy in an effort to convert patients with unresectable locoregionally advanced disease to a resectable status has increased the overall resection rate, but no difference in survival has been demonstrated.

### Palliation

For patients with inoperable cancers or poor performance status, palliative interventions to alleviate jaundice, pain, and intestinal obstruction often become the focus of therapy. When advanced disease is observed operatively, the surgeon must determine whether to perform additional palliative surgery. Biliary bypass is indicated in patients with obstructive jaundice. Duodenal

bypass is indicated when features suggest impending gastric outlet obstruction. Alternative palliative endoscopic approaches are available for patients not undergoing exploratory surgery.


### Chemoradiation Therapy for Advanced Disease

Systemic chemotherapy provides benefit for patients with advanced pancreatic cancer, improving disease-related symptoms and survival compared with the best supportive care alone. Studies comparing gemcitabine with 5-fluorouracil indicate very low objective response rates for both single agents but superiority for gemcitabine in terms of clinical response based on improvement in symptoms (i.e., pain and weight loss) and performance status. For patients with advanced disease, gemcitabine may be combined with a platinum agent, erlotinib (i.e., epidermal growth factor receptor inhibitor), or a fluoropyrimidine.

### Prognosis

Carcinoma of the pancreas accounts for approximately 5% of cancer deaths in the United States. The overall prognosis is poor because less than 20% of patients are alive beyond the first year after diagnosis, and only 1% to 3% are alive beyond the fifth year. Although 15% to 20% of patients have resectable disease at initial diagnosis, most have locally advanced or metastatic cancer. Median survival is 8 to 12 months for patients with locally advanced unresectable disease and 3 to 6 months for those with metastases at diagnosis.

A Whipple resection for pancreatic head cancers is the only chance for cure; however, the median survival after surgery is 15 to 20 months. The overall 5-year survival rate is 10% to 25%, and up to 50% of those who survive 5 years ultimately die of recurrent cancer. Poor prognostic factors include a high tumor grade, a large tumor, high levels of CA 19-9 before and after surgery, tumor-positive surgical margins, and lymph node metastases.

 For a deeper discussion of these topics, please see Chapter 144, "Pancreatitis," and Chapter 194, "Pancreatic Cancer," in Goldman-Cecil Medicine, 25th Edition.

### SUGGESTED READINGS

- Forsmark CE: Management of chronic pancreatitis, *Gastroenterology* 144:1282–1291, 2013.
- Hidalgo M: Pancreatic cancer, *N Engl J Med* 362:1605–1617, 2010.
- Paulson AS, Cao HS, Tempero MA, et al: Therapeutic advances in pancreatic cancer, *Gastroenterology* 144:1316–1326, 2013.
- Tenner S, Baillie J, DeWitt J, et al: American College of Gastroenterology guideline: management of acute pancreatitis, *Am J Gastroenterol* 108:1400–1415, 2013.
- Van Brunshot S, Bakker OJ, Besselink MG, et al: Treatment of necrotizing pancreatitis, *Clin Gastroenterol Hepatol* 10:1190–1201, 2012.
- Whitcomb DC: Genetic risk factors for pancreatic disorders, *Gastroenterology* 144:1292–1302, 2013.
- Wu BU, Banks PA: Clinical management of patients with acute pancreatitis, *Gastroenterology* 144:1272–1281, 2013.
- Yadav D, Lowenfels AB: The epidemiology of pancreatitis and pancreatic cancer, *Gastroenterology* 144:1252–1261, 2013.

