

Midwest Surgical Association

Extended distal pancreatectomy for pancreatic adenocarcinoma with splenic vein thrombosis and/or adjacent organ invasion



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KEYWORDS:

Adenocarcinoma of the
pancreatic body/tail;
Distal pancreatectomy;
Extended resection;
Outcomes

Abstract

BACKGROUND: Patients with adenocarcinoma of the pancreatic body/tail and associated vascular thrombosis or adjacent organ invasion are suboptimal candidates for resection. We hypothesized that extended distal pancreatectomy (EDP) for locally advanced adenocarcinoma is associated with a survival benefit.

METHODS: We retrospectively reviewed a prospectively collected database of patients who underwent distal pancreatectomy (DP) for adenocarcinoma at a single academic institution (1996 to 2011) with greater than or equal to 2 years of follow-up.

RESULTS: Among 680 DP patients, 93 were indicated for pancreatic adenocarcinoma. Splenic vein thrombosis ($n = 26$) did not significantly affect morbidity, mortality, or survival. Standard DP was performed in 70 patients and 23 underwent EDP with no difference in morbidity/mortality. Patients with EDP had a survival comparable with patients with standard DP (disease-free survival 18 vs 12 months = .8; overall survival 23 vs 17 months, $P = .6$). There was no difference in survival between EDP patients with versus without pathologic invasion of adjacent organs, but a trend favored those without.

CONCLUSION: EDP is safe and should be considered in fit patients with locally advanced adenocarcinoma.

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Pancreatic adenocarcinoma is the fourth leading cause of cancer mortality in the United States, with an annual death

rate approximating the incidence (37,390 and 43,920).¹ Adenocarcinoma of the pancreatic body/tail is associated with a poor prognosis in part due to a delay in occurrence of specific symptoms until the tumor grows large and often invades adjacent organs. At diagnosis, pancreatic body/tail adenocarcinoma shows regional infiltration in 35% to 40% of patients.² Patients with vascular thrombosis or invasion of adjacent organs may be suboptimal candidates for resection. A negative margin resection, however, may be the best chance for improvement in survival. Patients with

The authors declare no conflicts of interest.

This article has been accepted for Plenary Session Oral Presentation at 2014 Midwest Surgical Association Annual Meeting, August 3–6, 2014, Mackinac Island, Michigan.

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Manuscript received July 22, 2014; revised manuscript October 14, 2014

locally advanced unresectable tumors have a median survival of 9 months,¹ which is not clearly improved by palliative systemic therapies.³ In an effort to increase resectability, pancreatic surgeons have attempted to push the limits of resection in patients with advanced disease with en bloc resection of the pancreas and adjacent organs and vessels. Pioneered in 1973 by Fortner,⁴ extended distal pancreatectomy with en bloc venous/arterial resection for vascular involvement has since then been documented. Some studies focusing on distal pancreatectomy with major vascular resections (portal vein/superior mesenteric vein confluence, hepatic artery, superior mesenteric artery) have reported that extended/multivisceral resection for pancreatic cancer has acceptable morbidity, with similar long-term prognosis when compared with standard resection, and have thus emphasized the benefits of this procedure.⁵ However, other studies have also recognized that the use of multivisceral resection in the context of major pancreatic surgery increases morbidity.⁶ The long-term benefit of extended resection for locally advanced adenocarcinoma of the pancreatic body/tail remains unclear. We hypothesized that extended distal pancreatectomy is justified in cases of locally advanced pancreatic adenocarcinoma with adjacent organ infiltration/invasion.

Methods

Patient's selection

From 1996 to 2011, data on all patients who underwent distal pancreatectomy at a single university-based medical center were prospectively collected in a database. These data were supplemented by retrospective review of electronic medical records. Patients with incomplete pathological data or whose final pathological diagnosis was not consistent with pancreatic ductal adenocarcinoma were excluded. Patients were also excluded if they were followed less than 2 years after surgery or if follow-up documentation was not available. The type of operation was divided into 2 distinct groups: standard distal pancreatectomy and extended resection. Extended resection was defined as en bloc resection of at least one additional adjacent organ that is not normally removed during the course of the operation but that is required to completely extirpate all local–regional macroscopic disease. Additional organs removed included adrenal gland, stomach, kidney, colon, or small bowel. Splenectomy was performed with standard distal pancreatectomy for adenocarcinoma, and was thus not considered an additional organ. Extended resection was performed with the clinical suspicion (based on preoperative studies and intraoperative assessment) that adjacent organs were invaded by tumor. The intent was to extirpate all local–regional tumor. Patients who underwent an extended resection were compared with patients with a standard distal pancreatectomy. Data were compiled and reported in strict compliance with patient confidentiality guidelines as defined by the Indiana University Institutional Review Board.

Parameters assessed

Demographic data (age, sex), surgical procedure (type of procedure, mortality, complications, length of hospital stay), pathological tumor characteristics (TNM staging⁷, grade, adjacent organ invasion, splenic vein thrombosis, resection margins), and long-term outcomes (recurrence, disease-free survival [DFS] and overall survival [OS]) were assessed. A complication was considered as any event occurring within 30 days of surgery that modified the normal postoperative course and/or required medical treatment, including radiological drainage or other intervention. Postoperative mortality included in-hospital mortality or death within 30 days of surgical resection. Target events included death, local and distal recurrence (metastasis). Survival was calculated from the day of surgery. Follow-up information was regularly obtained from outpatient clinic visits.

Pathology

Only patients with a pathological diagnosis of pancreatic ductal adenocarcinoma were included in this study. Pancreatic tumors other than ductal adenocarcinoma were excluded. Tumor stage was determined according to the 6th edition of the tumor node metastasis classification of the American Joint Committee on Cancer Staging.⁷ Both pancreatic transection margin and radial margin were analyzed by the pathologist. If one margin (or both) was positive for adenocarcinoma, the patient was considered as part of the “positive margin” group.

When resection of adjacent organs was performed, close histological sectioning of those organs was used to determine the presence or absence of pathologic invasion to organs or structures of the extended resection.

Statistical analysis

Data were compiled using Microsoft Excel 2011 (Redmond, WA) and analyzed with GraphPad Prism (GraphPad Software, Inc, La Jolla, CA). Descriptive statistics of continuous data included median, mean, standard error deviation, and range, whereas categorical variables were presented as percentages. Subgroup comparisons on continuous and categorical data were performed with the Student *t*-test and Fisher's exact test, respectively. Actuarial DFS and OS curves were assessed according to the Kaplan–Meier method and compared with the log-rank test. Statistical significance was considered at *P* value less than .05.

Results

Patients' population

Between 1997 and 2011, 680 patients who underwent distal pancreatectomy at Indiana University Hospital were identified from a prospectively maintained database. Of

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