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The laparoscopic approach to distal pancreatectomy for ductal adenocarcinoma results in shorter lengths of stay without compromising oncologic outcomes



Susan M. Sharpe, M.D.^a, Mark S. Talamonti, M.D.^b,
Edward Wang, Ph.D.^b, David J. Bentrem, M.D.^c, Kevin K. Roggin, M.D.^a,
Richard A. Prinz, M.D.^b, Robert D. W. Marsh, M.D.^b,
Susan J. Stocker, C.C.R.P.^b, David J. Winchester, M.D.^b,
Marshall S. Baker, M.D., M.B.A.^{b,*}

^aDepartment of Surgery, Pritzker School of Medicine, University of Chicago, Chicago, IL, USA;

^bDepartment of Surgery, NorthShore University HealthSystems, Evanston, IL, USA; ^cDepartment of Surgery, Northwestern University Feinberg School of Medicine, Chicago, IL, USA

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Abstract

BACKGROUND: The oncologic equivalence of laparoscopic distal pancreatectomy (LDP) to open pancreatectomy (ODP) for ductal adenocarcinoma (DAC) is not established.

METHODS: The National Cancer Data Base was used to compare perioperative outcomes following LDP and ODP for DAC between 2010 and 2011.

RESULTS: One hundred forty-five patients underwent LDP; 625 underwent ODP. Compared with ODP, patients undergoing LDP were older (68 ± 10.1 vs 66 ± 10.5 years, $P = .027$), more likely treated in academic centers (70% vs 59%, $P = .01$), and had shorter hospital stays (6.8 ± 4.6 vs 8.9 ± 7.5 days, $P < .001$). Demographic data, lymph node count, 30-day unplanned readmission, and 30-day mortality were identical between groups. Multivariable regression identified a lower probability of prolonged length of stay with LDP (odds ratio .51, 95% confidence interval .327 to .785, $P = .0023$). There was no association between surgical approach and node count, readmission, or mortality.

CONCLUSION: LDP for DAC provides shorter postoperative lengths of stay and rates of readmission and 30-day mortality similar to OPD without compromising perioperative oncologic outcomes.

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The laparoscopic approach for distal pancreatectomy has gained widespread acceptance as an effective treatment modality for benign or premalignant lesions of the pancreatic body and tail. Multiple, single institutional, prospective studies and several larger multi-institutional retrospective reviews have examined perioperative outcomes following laparoscopic and open distal pancreatectomy.¹⁻⁵ In general,

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* Corresponding author. Tel.: +1-847-570-1327; fax: +1-847-570-2930.

E-mail address: MBaker3@northshore.org

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these studies demonstrate that laparoscopic pancreatectomy is associated with a shorter hospital stay and less intraoperative blood loss than the open approach.

There has, to date, been one multi-institutional examination of laparoscopic distal pancreatectomy specifically for cancer.² This study examined perioperative outcomes for 23 laparoscopic distal pancreatectomies and compared them with 189 contemporaneous open distal pancreatectomies. There have been no well-powered studies investigating the use of laparoscopic distal pancreatectomy compared with open resection for ductal adenocarcinoma with regard to perioperative oncologic outcomes and the oncologic equivalence of laparoscopic distal pancreatectomy to open distal pancreatectomy has not been demonstrated. In this study, we use a large National Cancer Data Base (NCDB) to determine the potential difference in perioperative outcomes between laparoscopic and open approaches for the management of pancreatic cancer in the body and tail of the pancreas. We hypothesize that the laparoscopic group would have a shorter length of stay, but that there would be no difference between the laparoscopic and open approaches in rates of readmission and postoperative mortality, and several perioperative oncologic outcomes, including lymph node count and rates of margin negative resection.

Patients and Methods

Data source

The NCDB is a joint project of the Commission on Cancer of the American College of Surgeons and the American Cancer Society; it captures information from approximately 1,500 Commission on Cancer-accredited hospitals and greater than 70% of all newly diagnosed malignancies in the United States. It contains specific details about patient demographics, facility type and location, tumor characteristics, treatment course, and outcomes. All data within the NCDB are deidentified of specific patient factors and are compliant with the Health Insurance Portability and Accountability Act; this study is therefore exempt from approval from our Institutional Review Board.

Study population

The NCDB was queried to identify all patients greater than or equal to 18 years old diagnosed with pancreatic adenocarcinoma who underwent a laparoscopic or open partial pancreatectomy between 2010 and 2011. Tumor histology was classified according to the International Classification of Disease for Oncology, Third Edition. Patients were excluded if they had metastatic disease or concomitant cancer diagnoses.

Patient age at diagnosis was analyzed as younger than 45, between ages 45 and 64, and 65 years or older. The race of each patient was categorized into White, Black, Hispanic, Asian/Pacific Islander, Native American/Alaskan

Native, and Other. Insurance status was examined as private, Medicaid, Medicare, and uninsured/unknown.

Facility type included Community Cancer Program, Comprehensive Community Cancer Program, and Academic/Research/National Cancer Institute Program and are distinguished according to the number of newly diagnosed cancer patients treated and if postgraduate medical education is offered. Specifically, Community Cancer Programs treat between 100 and 500 newly diagnosed cancer patients each year; Comprehensive Community Cancer Programs treat more than 500 cases a year. Academic/research facilities treat more than 500 new cancer cases and offer postgraduate medical education and are grouped with NCI-designated cancer centers.

Facility location was categorized into the following regions as defined in the 2010 United States Census: New England (CT, MA, ME, NH, RI, VT), Middle Atlantic (NJ, NY, PA), South Atlantic (DC, DE, FL, GA, MD, NC, SC, VA, WV), East North Central (IL, IN, MI, OH, WI), East South Central (AL, KY, MS, TN), West North Central (IA, KS, MN, MO, ND, NE, SD), West South Central (AR, LA, OK, TX), Mountain (AZ, CO, ID, MT, NM, NV, UT, WY), and Pacific (AK, CA, HI, OR, WA).

Statistical analysis

Statistical analyses were performed using SAS version 9.4 (SAS institute, Inc, Cary, NC). *P* values less than or equal to .05 were considered statistically significant. Age, demographic factors, comorbid condition (Charlson score), facility factors (type and location), pathologic features (tumor size, number of positive lymph nodes, grade, and stage), treatment factors (neoadjuvant chemotherapy or radiation therapy), and perioperative outcomes (number of lymph nodes examined, margin status, length of stay, 30-day readmission rate, and 30-day mortality rate) for patients who underwent laparoscopic resection were compared with those for patients undergoing open resection. Data for overall survival are available only if a patient was diagnosed 5 years or earlier; therefore, the most recent year that provides for survival is 2006 and thus, in this study, the difference in overall survival between the 2 groups was not investigated. Disease-specific survival is not captured by the database at this time and that outcome was not evaluated. Comparisons among groups were performed using the Student *t*-test for continuous variables or chi-square or Fisher's exact test for categorical variables as appropriate. Patient, tumor, and facility factors were analyzed in multivariable logistic regression models to identify variables associated with length of stay longer than the median of 7 days, lymph node count greater than the median of 12, positive margin status, 30-day unplanned readmission, and 30-day mortality.

Results

A total of 769 patients underwent distal pancreatectomy for ductal adenocarcinoma: 625 (81%) had an open

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