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ORIGINAL ARTICLE

Patient outcomes after total pancreatectomy: a single centre contemporary experience

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Abstract

Introduction: Total pancreatectomy (TP) is associated with significant metabolic abnormalities leading to considerable morbidity. With the availability of modern pancreatic enzyme formulations and improvements in control of diabetes mellitus, the metabolic drawbacks of TP have diminished. As indications for TP have expanded, we examine our results in patients undergoing TP.

Materials and methods: Retrospective study of 47 patients undergoing TP from January 2002 to January 2008 was performed. Patient data and clinical outcomes were collected and entered into a database. Disease-free survival and overall survival were estimated using the Kaplan–Meier method.

Results: Fifteen males and 32 females with a median age of 70 years underwent TP for non-invasive intraductal papillary mucinous neoplasms (IPMN) (21), pancreatic adenocarcinoma (20), other neoplasm (3), chronic pancreatitis (2) and trauma (1). Median hospital stay and intensive care stay were 11 days and 1 day, respectively. Thirty-day major morbidity and mortality was 19% and 2%, respectively. With a median follow-up length of 23 months, 33 patients were alive at last follow-up. Estimated overall survival at 1, 2 and 3 years for the entire cohort was 80%, 72% and 65%, and for those with pancreatic adenocarcinoma was 63%, 43% and 34%, respectively. Median weight loss at 3, 6 and 12 months after surgery was 6.8 kg, 8.5 kg and 8.8 kg, respectively. Median HbA1c values at 6, 12 and 24 months after surgery were 7.3, 7.5 and 7.7, respectively. Over one-half of the patients required re-hospitalization within 12 months post-operatively.

Conclusion: TP results in significant metabolic derangements and exocrine insufficiency, diabetic control and weight maintenance remain a challenge and readmission rates are high. Survival in those with malignant disease remains poor. However, the mortality appears to be decreasing and the morbidities associated with TP appear acceptable compared with the benefits of resection in selected patients.

Keywords

Total pancreatectomy, pancreatic cancer, survival, diabetes mellitus

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Introduction

Total pancreatectomy (TP) was first successfully performed by Priestley in 1944[1] for a patient with a non-localizable symptomatic insulinoma. In the ensuing decades, the enthusiasm for TP for malignant disease varied and was mostly performed in those with pancreatic adenocarcinoma. In the 1970s, as a result of the significant morbidity of a subsequent pancreatic fistula, concerns about multicentric pancreatic cancer and theoretical survival benefits with an extended lymphadenectomy, TP became a more accepted option over partial pancreatic resection in selected patients.[2–4] However, more recent data from polymerase chain reaction (PCR) studies of pancreatic cancer specimens have indicated that multicentric pancreatic cancer may not be as common as once

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thought,[5] and that survival is not improved by TP over partial pancreatectomy.[6] Furthermore, recent experience indicates improved outcomes and decreased surgical morbidity with partial pancreatectomy over TP for malignancy.[7]

Most recently, there has been a renewed interest in TP as an option in benign pancreatic disease[8] and again in select malignant disease. Since the description of intraductal papillary mucinous neoplasms (IPMN) in 1982,[9] there has been an increased use of TP as a treatment for diffuse pancreatic involvement of this premalignant lesion.[10–15] Furthermore, recognition of familial pancreatic cancer syndromes has only recently been appreciated, leading to more aggressive approaches including TP in those patients with genetic abnormalities.[16] For these reasons, there has been an increased utilization of TP. According to a surveillance epidemiology and end results (SEER) database review, the percentage of TP performed compared with partial pancreatectomy for pancreatic adenocarcinoma has risen from 9.3% of patients in 1998 to 14.3% of patients in 2004.[17]

TP remains a significant undertaking and is associated with major metabolic abnormalities such as difficulties in glucose control and malabsorption leading to multiple medical problems and decreased quality of life.[18] However, with the availability of modern pancreatic enzyme formulations and improvements in control of diabetes mellitus, the metabolic drawbacks of TP may have diminished from historic controls. Recognizing the recent increased utilization of TP as well as improved diabetic management tools in the recent decade, the aim of this study was to review our experience with TP and report the outcomes.

Materials and methods

This retrospective study was conducted in accordance with the Helsinki Declaration. After the study had been approved by the Mayo Clinic Institutional Review Board (registration 08000743; 4 March 2008), all patients undergoing pancreatic resection between January 2002 and January 2008 were identified and the subgroup undergoing TP was reviewed in detail.

Data collected included: patient demographics, presenting clinical features, operative and pathological details, peri-operative outcomes and long-term outcomes. Follow-up was obtained through internal and external medical records and patient interview. If no follow-up could be attained, the national social security index was searched for date of death.

Pathology data on pancreatic tumour staging were collected according to the tumor, node, metastases (TNM) staging system. IPMN pathology was described as per WHO criteria. Pancreatic adenocarcinoma arising in the background of IPMN was considered to have arisen from premalignant IPMN, whereas pancreatic adenocarcinoma specimens without any evidence for IPMN were considered as pancreatic adenocarcinoma de novo.

Operative strategy

In this series, TP was performed in a standard open fashion, adhering to oncological principles when appropriate.[19] The abdomen was explored for occult metastatic disease and the tumour assessed for resectability. TP was performed with both pylorus preserving and standard technique as well as with and without the spleen sparing technique. If a partial pancreatic resection was attempted, the pancreatic margin was analysed by frozen section. If found to be involved with invasive carcinoma, further margins were analysed and completion TP was performed if multiple margins were involved and the patient was felt to be able to tolerate a TP. Generally, further margin analysis with conversion to completion TP was performed for pancreatic margins found to have carcinoma *in situ* or severe dysplasia, especially in a young fit patient. Commonly, further margin analysis or completion TP were not performed for findings of moderate dysplasia or adenomatous changes for patients undergoing pancreatic resection.

Post-operative complications were graded according to methods previously described[20] and limited to complications seen within 30 days of surgery or within the index hospitalization. A score of 0–5 was assigned based on the most severe post-operative complication experienced by each patient. Grade 0 indicates no complications were recorded. Grade 1 indicates minor complications requiring observation or minor outpatient intervention (e.g. oral antibiotics). Grade 2 indicates complications requiring moderate intervention (e.g. wound debridement, intravenous antibiotics). Grade 3 indicates major intervention (e.g. CT-guided drainage of intra-abdominal fluid collection, surgery). Grade 4 indicates permanent disability (e.g. stroke with residual paresis or paralysis, chronic ventilator dependence) or discharge to long-term care facility. Grade 5 indicates death. Grade 1 and 2 complications were considered minor and Grade 3, 4 and 5 complications were considered major. Complications were further differentiated into 'medical' and 'surgical' complications and recorded in addition to graded complications to fully characterize their nature. International consensus guidelines were used to evaluate complications when available.[21,22]

Numerical variables were summarized with the sample median, minimum and maximum. Categorical variables were summarized with number and percentage. The Kaplan–Meier method was used to estimate overall survival and disease-free survival after surgery. Weight loss after surgery was compared according to presence of pylorus preserving using a Wilcoxon rank sum test. P-values ≤ 0.05 were considered statistically significant. Statistical analyses were performed using the SAS software package (SAS Institute; Cary, NC, USA).

Results

From January 2002 to January 2008, a total of 397 pancreatic resections were performed. These included: 234 (59%) proximal pancreatectomies (pancreaticoduodenectomies), 116 (29%) distal pancreatectomies and 47 (12%) TPs. The 47 patients undergoing TP [32 females, median age of 70 (range 32–83)] were included in the study.