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ScienceDirect

Journal of the Chinese Medical Association 78 (2015) 339–344

www.jcma-online.com

Original Article

Ampullectomy versus pancreaticoduodenectomy for ampullary tumors

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Received May 4, 2014; accepted October 6, 2014

Abstract

Background: Considerable controversy surrounds the treatment of ampullary neoplasms. This report describes the authors' experiences regarding the choice of either ampullectomy or pancreaticoduodenectomy for treatment of ampullary tumors.
Methods: Demographics, statistical findings concerning diagnosis, surgical risks including morbidity and mortality, and outcomes were evaluated and compared between the ampullectomy and pancreaticoduodenectomy groups for ampullary tumors retrieved from a prospectively collected computer database of 992 periampullary tumors resected during the period from 1965 to 2013.
Results: A total of 377 patients with ampullary tumors were included; 15 underwent ampullectomy and 362 underwent pancreaticoduodenectomy. The overall false-negative rate for diagnosis of ampullary malignancy was 11.2%, specificity was 50.0%, positive predictive value was 98.3%, negative predictive value was 12.2%, and the overall accuracy was 87.6% (77.5% by preoperative endoscopic biopsy and 83.9% by intraoperative frozen-section biopsy). Ampullectomy was associated with shorter postoperative stays and lower surgical morbidity. There was no statistical difference observed between the two groups regarding surgical mortality, pancreatic leakage, or gastric atonia. The tumor recurrence rate was lower after pancreaticoduodenectomy, but the difference between the groups was not significant. Overall, there was no difference in survival observed between the two groups.
Conclusion: Because biopsy is not routinely reliable, pancreaticoduodenectomy is preferable to ampullectomy for an ampullary tumor of uncertain diagnosis. Ampullectomy is associated with lower surgical morbidity and should therefore remain in the armamentarium of the pancreatic surgeon when comorbidity precludes major surgery.

Keywords: ampullary tumor; ampullectomy; pancreaticoduodenectomy

1. Introduction

Two surgical procedures have historically been used in the treatment of ampullary tumors: ampullectomy, a local resection of the ampulla of Vater, was described in 1899 by Halsted,[1] and pancreaticoduodenectomy was introduced by Whipple et al in 1935.[2] However, ampullectomy has not achieved widespread acceptance because of its lesser radicality and the higher rates of tumor recurrence associated with it (range, 20–100%).[3–6] By contrast, pancreaticoduodenectomy (also known as the Whipple procedure) is a more radical form of surgery and has long been considered the only alternative for patients with malignant periampullary diseases.[7–10] In addition, many centers have developed the expertise for reducing the surgical risks associated with pancreaticoduodenectomy, which is currently considered the superior treatment option for benign or premalignant diseases of the ampulla of Vater.[7,9,10] Nonetheless, pancreaticoduodenectomy is clearly associated with high perioperative morbidity, and the quality of life of patients after undergoing this radical surgery is much poorer than that following local resection with ampullectomy.[8–10]

Conflicts of interest: The authors declare that there are no conflicts of interest related to the subject matter or materials discussed in this article.

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http://dx.doi.org/10.1016/j.jcma.2015.02.002

Because it is characterized by more limited resection, lesser morbidity, and lower surgical risk as compared with pancreaticoduodenectomy, ampullectomy represents a potentially attractive alternative for removal of certain benign ampullary lesions and may be more appropriate for those rare patients with a malignancy and who are unfit for major surgery.[7,8,10–12] A recent review of the literature revealed that the number of patients undergoing ampullectomy is relatively small. Consequently, the clinical features and outcomes for these patients have not been well-described, indications for this procedure remain controversial, and the limitations of this form of resection remain unclear.[6,8,11]

This report presents the experiences of members of the Department of Surgery, Taipei Veterans General Hospital regarding ampullectomy and pancreaticoduodenectomy in the treatment of ampullary tumors. The two surgical procedures were evaluated and compared with respect to demographics, clinical presentations, diagnostic accuracy, associated surgical risks, and patient outcome.

2. Methods

Data on two series of consecutive patients, those who underwent ampullectomy and those who underwent pancreaticoduodenectomy, were retrieved from a prospectively collected computer database of 992 periampullary tumors resected during the period from 1965 to 2013 at the Taipei Veterans General Hospital. Informed consent was obtained from each patient. The study protocol was approved by our Institutional Review Board. We did not improperly disclose any personal data of the patients, and furthermore there was no safety concern for the patients in this study. Pancreaticoduodenectomy for radical tumor removal has been the treatment of choice at this institution for ampullary tumors, with ampullectomy reserved for patients at high surgical risk or who refuse a more radical surgery.

Demographics, clinical presentations, statistical findings concerning diagnosis, surgical risks including morbidity and mortality, follow-up periods, and survival outcomes were evaluated and then compared between these two surgical groups. Based on the definitions of the International Study Group on Pancreatic Fistula,[13] pancreatic leakage was defined as grade B or C postoperative pancreatic fistula, and gastric atonia was defined as grade B or C delayed gastric emptying according to the definition by the International Study Group of Pancreatic Surgery.[14] Surgical mortality was defined as death occurring perioperatively and within 30 days following surgery or during the initial hospital stay if 30 or more days had elapsed.

Ampullectomy was performed to achieve a wide excision, which included a portion of the duodenal wall, distal segments of the distal common bile and pancreatic ducts, and a wedge of pancreatic parenchyma. Resection margins of the biliary and pancreatic ducts (frozen section) were sent for pathological analysis to confirm that surgical resection was complete. To reconstruct the defect, the pancreatic and common bile ducts were sutured together in a common septum (common wall) fashion, and the surrounding duodenal wall was then reapproximated to the joined pancreatic and common duct openings.

Pancreaticoduodenectomy was performed at this institution with a standard resection and without extensive retroperitoneal lymph node dissection. Whether the classic pancreaticoduodenectomy procedure would utilize either a distal gastrectomy or a pylorus-preserving resection was generally left to the discretion of the surgeon. A pancreaticogastrostomy or pancreaticojejunostomy was chosen for pancreatic reconstruction; vagotomy was not routinely performed.

Statistical analyses were performed using Statistical Product and Service Solutions (SPSS) version 21.0 software (SPSS Inc., IBM, Armonk, NY, USA). All continuous data are presented as median and mean ± standard deviation, and frequencies are presented when appropriate to the type of data. The mean values of continuous variables were compared using a two-tailed Student *t* test. Nonparametric statistical tests were used if the variables did not follow normal distribution. Categorical variables are presented as numbers and percentages, and were compared using Pearson χ^2 test or Fisher exact test contingency tables. The Kaplan–Meier method was used for the calculation of median survival and survival analysis. For all analyses, a p value less than 0.050 was considered statistically significant.

3. Results

Of the 992 patients in the database who underwent periampullary tumor resection, 377 with ampullary lesions were enrolled in this study; of this total, 15 underwent ampullectomy (Table 1) and 362 underwent pancreaticoduodenectomy. Therefore, ampullectomy was performed in 1.5% (15/992) of cases of resected periampullary tumors and 4.0% (15/377) of cases of resected ampullary tumors. Reasons for selection of ampullectomy included high surgical risk due to severe comorbidity in eight patients, obesity in two patients, and patient preference due to the small size and unclear characteristics of the tumor in five patients. Among the ampullectomy group, eight cases were malignant and in two (25%) of these cases death occurred due to tumor recurrence; the latter involved carcinomatosis at 67 months following ampullectomy for a pT2 ampullary adenocarcinoma in one patient and liver metastasis at 88 months following ampullectomy for a carcinoma *in situ* tumor (pTis) in the other. The cut margins for the resected specimens were all proved to be free from malignancy in the ampullectomy patients. No statistical difference was observed between the ampullectomy and pancreaticoduodenectomy groups with respect to sex, age, duration of symptoms, tumor size, and serum tumor markers including carbohydrate antigen 19-9 and carcinoembryonic antigen. Regarding clinical presentation, more patients without symptoms (20.0% vs. 3.6%, $p = 0.021$) and fewer patients with jaundice (33.3% vs. 76.0%, $p = 0.001$) were observed in the ampullectomy group as compared with the pancreaticoduodenectomy group (Table 2).

Table 3 presents the statistical parameters for diagnosis of ampullary malignancy before resection. Forty-six (12.2%)