

Pathologic findings of Whipple pancreaticoduodenectomy: a 5-year review on 51 cases at Taleghani general hospital

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ABSTRACT

Aim: The aim of this study was to comprehensively analyze histopathologic parameters of Whipple pancreaticoduodenectomy specimens at Taleghani general hospital pathology department.

Background: The Whipple procedure is performed for variety of tumors involving the head of the pancreas, ampulla of Vater, common bile duct, or duodenum.

Patients and methods: Records of all cases of Whipple pancreaticoduodenectomy between 2007 and 2011 were retrospectively reviewed and pathological details of diagnosis and staging were extracted.

Results: A total of 51 patients underwent Whipple procedure during a 5-year period, including 37 males and 14 females. The average age was 57 years (18-82 years). The most frequent presenting symptoms were jaundice and weight loss. Forty-four patients (86.3%) had malignant and 7 (13.7%) had benign lesions. Among malignant lesions, 27 (61.4%) were ampullary carcinomas, 12 (27.3%) were pancreatic carcinomas and 5 (11.4%) were cholangiocarcinomas. The pathological stage of most of the tumors was T3 (50%); followed by T2 (29.5%), and T1 (15.9%); only 4.5% were T4. Mean tumor size was 2.8 cm (0.2-7 cm). Duodenal and common bile duct margins were tumor-free in most cases (95.5%). The pancreatic margin was free in 81.8% of patients; this margin had not been evaluated in 5 patients. Nearly 38.6% of all tumors showed vascular invasion while 68.2% showed perineural invasion. The average number of dissected lymph nodes was 4 (range 1-15); although in 25% of specimens, no lymph nodes had been found. Twelve specimens (35.3%) had lymph node metastases.

Conclusion: The present study demonstrates that most of our patients are diagnosed with malignancy, at advanced stage, and further research is needed to develop practical methods for earlier diagnosis. The fact that 25% of specimens had no lymph nodes needs more consideration.

Keywords: Whipple procedure, Pancreaticoduodenostomy, Pathologic review.

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Introduction

The Whipple operation was first described in the 1935 by Allan Whipple for periampullary carcinoma (1), and then the indications extended

for pancreaticoduodenal resection to include pancreatic cancers (2).

The Whipple procedure is performed for variety of tumors involving the head of the pancreas, ampulla of Vater, common bile duct, or duodenum.

Pathologic assessment of surgical specimens from pancreaticoduodenectomy (Whipple

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operation) needs special attention in order to accurately evaluate many factors that are prognostically important. These factors include tumor location, extension, size, surgical margins status, vascular or perineural invasion and lymph node status (3-5).

In this study we present the results of 5-year review of pathologic findings in pancreaticoduodenectomy surgical specimens in a university-affiliated single institution general hospital that serves as a tertiary referral center for complex pancreaticobiliary surgery.

Patients and Methods

A case series of consecutive patients who underwent Whipple pancreaticoduodenectomy operation between 2007 and 2011 were retrospectively reviewed. Records of pathologic specimens were extracted and details of diagnosis and staging were evaluated.

Results

A total of 51 patients underwent a Whipple pancreaticoduodenectomy procedure during this 5-year period (37 males and 14 females). The average age was 57.0 years (range: 18.0-82.0) and the most frequent presenting symptoms were jaundice and weight loss.

Forty-four patients (86.3%) had malignancy and 7 patients (13.7%) had benign lesions. Among malignant lesions, 27 (61.4%) were ampullary carcinoma, 12 (27.3%) were pancreatic carcinoma and 5 (11.4%) were cholangiocarcinoma. Table 1 shows the final pathologic diagnosis of resected specimens. Pathologic stage of most of the tumors was T3 (50.0%); followed by T2 (29.5%), T1 (15.9%) and only 4.5% for T4.

Most tumors (59.1%) were well-differentiated with poorly differentiated tumors being seen in 4.3% of cases.

Mean tumor size was 2.8 cm (range 0.2-7 cm) and was not significantly different between ampullary and pancreatic tumors. Table 2 shows the detailed pathologic findings of pancreaticoduodenectomy specimens. Duodenal and common bile duct margins were free of tumor in most cases (95.5 %) while the pancreatic margin was free of tumor in 81.8% of patients; the surgical margins had not been evaluated in 5 patients.

Table 1. The final pathologic diagnoses of the resected pancreaticoduodenectomy specimens

	Number
Periampullary carcinoma	
Pancreatic	27
Ampullary ca.	12
Cholangiocarcinoma	5
Others	
Chronic pancreatitis	1
Pancreatic stone	1
GIST*	1
neuroendocrine tumor	1
Pancreatic serous cystadenoma	2
Solid pseudopapillary neoplasm	1

* Gastrointestinal stromal tumor

Table 2. Detailed pathologic findings of pancreaticoduodenectomy specimens

	Ampullary ca. (n=27)	Pancreatic ca. (n=12)	Colangio ca. (n=5)
Tumor diameter (cm)			
Mean	2.7	2.9	4.1
Median	2.5	2.5	3.5
Tumor differentiation (%)			
Well	66.7	58.3	40
Moderate	33.3	33.3	40
Poor	0	8.3	20
Node status (%)			
Negative	46.4	33.3	100
Positive	32.1	25	0
Not included	21.4	41.7	0

Nearly 38.6% of tumors showed vascular invasion while 68.2% showed perineural invasion. No significant difference was seen in vascular or perineural invasion between ampullary and

pancreatic carcinomas ($p= 0.2$ and 0.4 respectively).

The average number of dissected lymph nodes was 4 (range 1-15). This did not differ between ampullary and pancreatic carcinomas; although in 25% of specimens, no lymph node had been found. Twelve specimens (35.3%) had evidence of lymph node metastases, 3 of these were ampullary carcinomas and 9 pancreatic carcinomas.

Discussion

This study was done in a university affiliated referral hospital that is one of the most experienced centers in pancreaticobiliary surgery in Iran. The Whipple procedure is one of the most complex surgeries performed for the management of a variety of tumors involving the head of the pancreas, ampulla of Vater, common bile duct, or duodenum. It has been reported that in many complicated cases of chronic pancreatitis presenting as a periampullary mass, the Whipple procedure is now considered reasonable (6). Our study shows valuable findings:

First of all, in 7 patients (13.7%) no malignant lesion was identified and benign lesions such as chronic pancreatitis or benign neoplasms were mimicking malignancy.

The literature reports that around 7% of the histology obtained at a Whipple resection are benign (6). However, in some studies this percentage is higher. Margijske et al. reported 15% benign lesions in their series (7). Also, in analysis of 650 Whipple specimens, Yeo reported that 32% of specimens had various benign lesions including chronic pancreatitis in 71 patients (11%), neuroendocrine tumors in 31 patients (5%), pancreatic cystadenoma in 25 patients (4%), ampullary adenoma in 21 patients (3%), and gastrointestinal stromal tumors in 10 patients (2%) (8).

Although pre-operative imaging helps in differentiating some benign lesions from malignant lesions, rare benign pathology may still

mimic malignant conditions leading to a Whipple resection. Shyr et al. reported two cases of Whipple procedure for suspected pancreaticobiliary cancer in whom the final histology revealed rare benign lesions including a cholesterol polyp in the distal common bile duct and an ampullary intramural ectopic gland hyperplasia. Neither of these patients underwent an endoscopic retrograde cholangiopancreatography (ERCP) pre-operatively and this procedure may have enabled biopsy of the lesions in the ampulla and distal CBD. This shows the importance of pre-operative diagnosis to do a limited resection rather than a formal Whipple procedure (9).

Secondly, proximal and distal duodenal surgical margins were free of tumor in most cases (95.5 %) and the pancreatic surgical margin was free in 81.8 % of patients. Unfortunately the status of this margin was not mentioned in 5 cases (11%) Yeo also reported 71% and 97% free margins in pancreatic and ampullary carcinoma respectively (8).

Thirdly, most patients have been diagnosed in advanced pathologic stage (T3); this highlights the fact that more precise assessment and evaluation of signs and symptoms, leading to earlier detection of malignant lesions and increased likelihood of operating upon resectable cancers. The present study demonstrates that most of our patients are diagnosed in advanced stages and further research should clarify practical methods for earlier diagnosis.

Fourthly, the number of lymph nodes dissected and involved by tumor is one of the most important prognostic factors in pancreatic and ampullary carcinomas, and this also contributes to more accurate pathologic staging and predicting survival outcomes (10,11). In our review we found that 25% of specimens had no lymph nodes; a fact needs more consideration.

Fifthly, unlike many other case series, in our specimens tumors were mostly well differentiated

(59.1%) with only 4.3 poorly differentiated tumors (8,12).

Surgical pathology reports should be very carefully assessed. Our review on pathology reports of Whipple cases show acceptable precision in reporting key pathologic features including surgical margins, tumor site, tumor local extension, tumor type and lymph node status. This review also shows the necessity of more precise preoperative radiologic and laboratory evaluation to choose appropriate patients for this high-risk operation and avoid unnecessary surgeries.

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