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HISTOPATHOLOGICAL SPECTRUM OF WHIPPLE PROCEDURE AT A TERTIARY CARE HOSPITAL OF RAJASTHAN

Oncopathology

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ABSTRACT

Aim- To document the indications and analyze the histopathological spectrum of lesions in Whipple's specimen (Pancreaticoduodenectomy). **Method**- A total of 76 specimens of Whipple's procedure over a duration of 22 months (Jan 2021—Oct 2022) were received in our department and were subjected to detailed gross examination. Histopathological reporting of the specimens was done according to the CAP protocol. **Results-** Out of 76 cases of Pancreaticoduodenectomy, malignancy was observed in 73 cases with 45 cases (59%) of Ampullary and Periampullary Adenocarcinoma, 12 cases (16%) of Pancreatic Adenocarcinoma, 6 cases (8%) of Cholangiocarcinoma, 6 cases (8%) of Duodenal Adenocarcinoma, 2 cases (2.5%) of Neuroendocrine tumor of Head of Pancreas and 2 cases (2.5%) of Neuroendocrine tumor of duodenum. 1 case (1.3%) each of chronic pancreatitis, autoimmune pancreatitis, and adenomatous proliferation of terminal bile duct were also reported. The neoplastic lesions were observed to have male preponderance and a mean age of 55.9 years. **Conclusion** - Detailed and thorough gross examination of the Whipple's specimen is of utmost importance. Moderately dif ferentiated Adenocarcinoma was the most common histologic variant. Subtyping the tumor, reporting margin clearance, and lymphovascular and perineural invasion have great prognostic implications. Under rare conditions, Whipple's procedure may be done for non-neoplastic conditions as well.

KEYWORDS

Whipple's specimen, Pancreaticoduodenectomy, Pancreas

INTRODUCTION

Pancreatic surgery is one of the most challenging endeavors for the surgeon due to its retroperitoneal position, proximity to other organs, and life-threatening complications. Broadly, there are two types of pancreaticoduodenectomies, the "Classic Whipple" and the "pylorus sparing pancreaticoduodenectomy" (1). Pylorus-sparing pancreaticoduodenectomy involves the removal of the head of the pancreas, most of the duodenum, and the distal segment of CBD while the "Classic Whipple" procedure also consists of resection of the pylorus and a segment of the stomach antrum.

Whipple procedure is indicated in malignancies of the head of the pancreas, ampulla of Vater, common bile duct or duodenum as well as in a few benign conditions like pseudocyst of the pancreas, chronic pancreatitis, para duodenal pancreatitis, and severe trauma to the pancreas (2,3).

Pancreatic cancer is the fourth most common cause of death with a 5-year survival rate of only about 12%, despite advancements in medical care, radiotherapy, chemotherapy, and molecular biology. (4) The morbidity and mortality associated with pancreaticoduodenectomy, and its postoperative complications are high, indicating more vigilant postoperative care. Important complications include delayed gastric emptying, pancreatic fistula, post pancreatectomy hemorrhage, surgical site infection, intra-abdominal abscess, etc. (5,6)

The prognosis of patients with pancreatic tumors is predicted by factors like tumor site, size, extension, degree of differentiation, lymphovascular or perineural invasion, status of resected lymph nodes, and surgically resected margins. (7)

The purpose of this study is to document the indications and analyze the histopathological spectrum of lesions in Whipple's specimen received over 22 months (Jan 21—Oct 22).

MATERIALS AND METHODS

A retrospective observational study was conducted over a period of 22 months (January 2021 to October 2022) in the Department of Pathology, SMS Medical College, Jaipur, Rajasthan, and a total of 76 cases of resected Whipple's specimens were included in the study by applying inclusion and exclusion criteria.

Inclusion Criteria

(1) Formalin-fixed biopsies or specimens of Pancreaticoduodenecto my received in the Department of Pathology S.M.S Medical College, Jaipur, Rajasthan.
(2) Patients with written informed consent.

Exclusion criteria-

(1) Poorly fixed specimens.
(2) Patients with a prior history of Neoadjuvant chemotherapy.
(3) Patient not willing to be a part of the study.

All the clinical details and previous radiological and serological investigations were gathered from the patient's requisition form. The specimen was then subjected to detailed gross examination and sections were taken as per Grossing of Surgical Oncology Specimens by Tata Memorial Hospital manual. Routine Hematoxylin and Eosin staining was carried out along with special stains wherever required. Detailed histopathological examination of the H&E stained slides was carried out and tumor cases were reported as per CAP protocol (Version 4.0 and 5.0) and staged according to AJCC TNM classification (8th edition).

RESULTS

A total of 76 patients underwent Whipple pancreaticoduodenectomy procedure over a 22 months duration from January 2021 to October 2022, of which 51 patients (67%) were male and 25 patients (33%) were female, with male: female ratio being 2:1. The majority of the patients belonged to the age range of 40-50 years (34.3%) and 50-60 years (22.3%) with mean age being 54.1 years [Table 1].

Table1: Age presentation

Age (in years)	No. Of cases	Percentage
30-40	6	8 %
40-50	26	34.3 %
50-60	17	22.3%
60-70	15	19.7%
70-80	12	15.7%

Out of total 76 cases, malignancy was observed in 73 cases (96%) with 45 cases (59%) reported as Ampullary and Periampullary Adenocarcinoma, 12 cases (16%) as Pancreatic Adenocarcinoma, 6 cases (8%) as Cholangiocarcinoma, 6 cases (8%) as Duodenal Adenocarcinoma and 2 cases (2.5%) each as Neuroendocrine tumor of Head of Pancreas and of duodenum. The remaining 3 benign cases were reported as 1 case (1.3%) each of chronic pancreatitis, autoimmune pancreatitis and adenomatous proliferation of terminal bile duct [Table 2]. Out of total 69 (91%) Adenocarcinoma specimens, 29 (42%) were reported as well differentiated while 40 (58%) were

reported as moderately differentiated adenocarcinoma.

Table2: Histopathological spectrum of Whipple lesions			
Nature of lesion	**Diagnosis**	**No. Of cases**	**Percent age**
Malignant	Ampullary & Periampullary Adenocarcinoma	45	59%
	Pancreatic Adenocarcinoma	12	16%
	Cholangiocarcinoma	6	8%
	Duodenal Adenocarcinoma	6	8%
	Neuroendocrine tumor of HOP	2	2.5%
	Neuroendocrine tumor of duodenum	2	2.5%
Benign	Chronic pancreatitis	1	1.3%
	Autoimmune pancreatitis	1	1.3%
	Adenomatous proliferation of terminal bile duct	1	1.3%

Lymphovascular invasion was seen in 32/76 cases (42.1%) and Perineural invasion in 13/76 cases (17.1%). Most of the tumors were in the size range of 1-2cm (28/76 cases; 36.8%) and 2-4cm (25/76 cases; 32.8%). 2 cases (2.6%) had a tumor of <0.5cm size, 5 cases (6.5%) were in the size range of 0.5-1cm and 13 cases (17.1%) had tumor of >4cm size. On assessing the pathological nodal stage of the malignant cases, 45/76 cases (59%) had the N0 stage, 17/76 cases (22.3%) had the N1 stage, and 9/76 cases (11.8%) had the N2 stage. Nodal status could not be assessed (Nx) of 2 malignant cases (2.7%) [Table 3].

Table 3: LVI, PNI & Nodal status	
LYMPHOVASCULAR &PERINEURAL INVASION	
Lymphovascular Invasion	32
Perineural Invasion	13
NODAL STATUS	
Nx	2
N0	45
N1	17
N2	9

DISCUSSION

Whipple surgery is performed as a life-saving procedure for tumors of the ampulla of Vater, the head of the pancreas, the common bile duct, or duodenum. That involves high surgical expertise and is associated with high morbidity and mortality. (8)

Out of a total of 76 cases collected over 22 months duration, from January 2021 to October 2022, 67% were male, while the remaining were female. Similar findings were observed in the study conducted by Imam et.al (2022) (9) with a male predominance of 58%. In our study, most patients were 40-60 years (56.6%) with a mean age of 54.1 years. In the study conducted by Shah M et.al (2018) (10), the maximum number of patients belonged to the age group of 40-70 years i.e. 77.3%. Similar findings were observed in the studies conducted by Ashima et.al (2020) (11) and Imam et. al(2022)(9).

Out of a total of 76 cases, malignancy was observed in 73 (96%) cases out of which 91% were adenocarcinoma and the remaining 5% were neuroendocrine tumors. Similar findings were observed in the study conducted by Ashima et.al (2020)(11) and Imam et.al (2022)(9). Suneetha et.al conducted a similar study in 2019 and observed 49.9% cases of adenocarcinoma and 8.3% cases of neuroendocrine tumor(12).

In our study, the remaining 3 cases were benign and reported as 1(1.3%) each of chronic pancreatitis, autoimmune pancreatitis, and adenomatous proliferation of terminal bile duct. Ashima et.al (2020)(11) and Imam et al (2022)(9) observed 4.7% and 1.33% cases of chronic pancreatitis respectively. In the study conducted by Suneetha et.al (2019) (12), 29.1% of cases of chronic pancreatitis were observed.

In the present study, lymphovascular invasion (LVI) and perineural invasion (PNI) of tumors were observed in 42.1% and 17.1% of cases respectively. In the study conducted by Ashima et.al (2020) (11), LVI was observed in 46.7% and PNI was observed in 73.3%. In the study conducted by Kokandakar et.al (2020) (13), LVI was observed in 17% of cases and PNI in 41% of cases.

Out of a total of 73 malignant cases, 35.6% cases had metastatic lymph nodes. In the study conducted by Ashima et.al (2020) (11) and Kokandakar et.al (2020) (13), metastatic lymph nodes were observed in 37.21% and 17% of cases respectively.

CONCLUSION

Whipple's (Pancreaticoduodenectomy) is a radical surgery performed for resectable tumors of Ampulla of Vater, head of the pancreas, CBD, or duodenum. Meticulous grossing of the resected specimen with thorough sectioning, careful examination of the tumor dimensions and margins along with adequate lymph node sampling predicts patient survival outcome. In the present study, the maximum number of cases were seen in 40-60 years of age group with male predominance. Ampullary and Periampullary adenocarcinomas were the most common histologic type followed by pancreatic adenocarcinomas. Under rare conditions, Whipple's procedure may be done for non-neoplastic conditions as well.

Images

Fig 1: Classic Whipple Specimen demonstrating pyloric end of stomach, C-loop of duodenum along with attached pancreatic head.

Fig 2: On opening the specimen, a grey-white ill-defined growth was seen adjacent to Ampulla of Vater

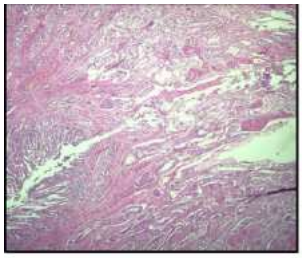

Fig 3: Tortuous irregular gland in dense collagenous stroma.

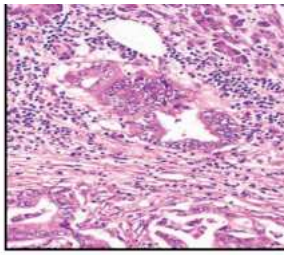

Fig 4: Tumor shows ductal pattern with marked variation in size and shape of neoplastic glands. Cells of these malignant glands show anisonucleosis with prominent nucleoli.

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