



Prediction of Resectability and Surgical Outcome of Periapillary Tumors

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Abstract

Background: Pancreatic cancer is a devastating malignancy with nearly as many deaths as newly diagnosed cases each year with 5-years overall survival rate approximately 7%. Our aim was to assess prediction of resectability of patients with periapillary tumors to avoid unnecessary laparotomy in inoperable patients and evaluation of early outcome of surgical intervention.

Methods: 23 patients were included in this study. All the patients were subjected to assessment by contrast enhanced triphasic MDCT abdomen and who were probably resectable were operated and in patients that had resectable tumor, Whipple's operation was done and in patients that had unresectable tumor, double bypass was done.

Results: Twelve patients (52.8%) were considered resectable with unresected tumor, the remaining 11 patients (47.8%) were considered unsuitable for tumor resection according to MDCT criteria.

Conclusion: Early surgical intervention for periapillary tumors using accurate preoperative diagnosis has an accepted early morbidity and mortality related to its advantages.

Keywords: Periapillary tumors; Resectability; Multi detector CT; Pancreatic tumors

Introduction

Periapillary tumors describe tumors arising from periapillary region which is located in the surroundings (within 2 cm) of the ampulla of Vater, including the pancreas, distal common bile duct, duodenum, and the ampulla of Vater itself [1]. Overall, Periapillary cancers account for 5% of all gastrointestinal tract malignancies [2,3]. In the absence of specific clinical symptoms, early diagnosis is delayed, back pain often leading to misdiagnosis as an orthopedic problem. It is not until disease progression that jaundice, pain, and weight loss direct the diagnosis towards periapillary tumor [4]. Only 10% to 20% of the patients with periapillary adenocarcinoma are candidates for resection at presentation [5-7]. Therefore, it is necessary to reliably identify patients who might benefit from major surgical intervention by employing the appropriate staging methods [8]. Multi-Detector Computed Tomography (MDCT) obtained is one of the useful tests, providing correct diagnosis, staging and assessment of operability and postoperative follow up [9]. Pancreaticoduodenectomy (PD) is the mainstay of treatment for periapillary malignancies and is the only curative option for patients with these malignancies [10]. Decreased operative mortality after PD resulted in a more optimistic view towards resection, and increased survival after PD has been reported [11]. Although the short-term mortality appears to have decreased in recent years, the morbidity rate remains high. Recent results indicated that the occurrence of early post-operative complications may be a predictor of a poor prognosis after PD [12]. The aim of this study was to assess prediction of resectability and surgical outcome of periapillary tumors.

Patients and Methods

Cohort study that was conducted on patients presented with periapillary tumors in the department of surgery at Suez Canal University hospital from 2013 to 2015. All patients were subjected to triphasic MDCT abdomen with pancreatic protocol and reviewed by 2 radiologists at least. Then we exclude any patient with criteria of unresectable tumor (infiltration of peripancreatic fat planes, the hepatoduodenal ligament and the mesentery; >180° encasement of the portal or superior mesenteric vein or of the hepatic or superior mesenteric artery; or infiltration of the vessel), distant metastasis or ascites. Patients with probably resectable tumors underwent surgical operation. In cases of resectable tumor, PD was performed with either the pylorus preserving modification or classic resection including antrectomy and reconstruction of pancreatic body with Pancreatico

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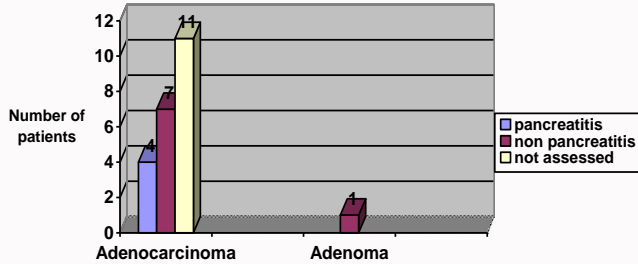


Figure 1: Types of pathology in the resected specimens and biopsies in unresectable patients.

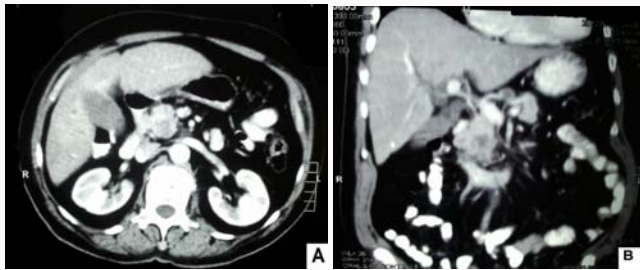


Figure 2: Axial MDCT (A) with coronal reformation (B) (arterial phase) in a 70 years old man shows a small hypodense pancreatic head mass (2 cm) that was probably resectable but during exploration there was 2 superficial metastatic liver nodules and no vascular invasion.

Gastrostomy (PG). In cases of unresectable tumor, surgical double bypass was done by Roux-en-Y choledochojunostomy with gastrojejunostomy. All complications were recorded together with postoperative death. Perioperative mortality is defined as in-hospital death or death within 30 days of surgery. Postoperative morbidity includes pancreatic fistula, bile leak, intra-abdominal abscess, intra-abdominal hemorrhage, wound infection, delayed gastric emptying, pneumonia, and cardiac complications. Postoperative Pancreatic Fistula (PF) was defined by the International Study Group on Pancreatic Fistulas (ISGPF) as “output via an operatively placed drain (or a subsequently placed, percutaneous drain) of any measurable volume of drain fluid on or after postoperative day 3, with an amylase content greater than 3 times the upper normal serum value.” Delayed gastric emptying is defined as nasogastric intubation or inability to tolerate a regular diet for more than 10 postoperative days.

Results

Demographic and preoperative data

Age distribution of our study patients ranged from 21 to 72 years with a mean age of 51 ± 15.8 years. Study population included 16 males and 7 females. All patients presented with obstructive jaundice except for one patient in group A presented with epigastric pain only, 4 patients presented with vomiting due to gastric outlet obstruction in addition to jaundice.

Resectability

Tumor site was identified including head of pancreas, ampulla of Vater, duodenum and distal CBD. Most of patients had pancreatic head mass (52.2%) and most of them were unresectable (66.6%) with resectability rate (33.3%). On the contrary, patients with ampullary mass were less (30.4%) and most of them were resectable (85.7%) with resectability rate (85.7%). All patients underwent surgical operation within 5-18 days after diagnosis with CT. Out of 23 patients, 12 patients (group A) were found to be resectable and non-pylorus preserving

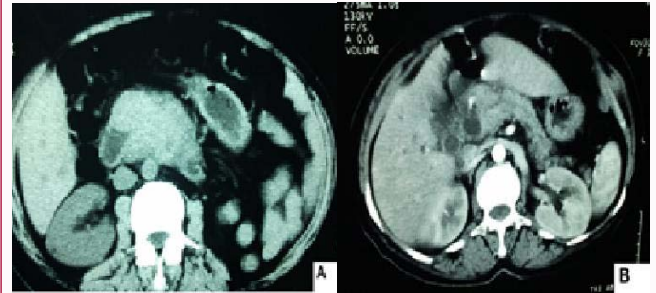


Figure 3: (A), axial MDCT in a 45 years old woman that shows enlarged pancreatic head, there was transverse colon and mesocolon invasion; (B), axial MDCT in a 45 years old woman shows a heterogeneous pancreatic head mass, there is undistorted fat plane between the head and SM vessels while during laparotomy unexpected SMV invasion was detected with failed surgical resection.

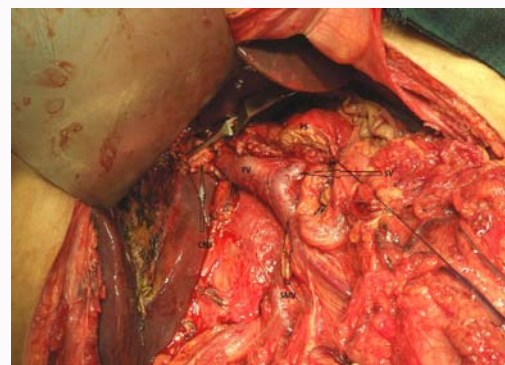


Figure 4: The Field after pancreaticoduodenectomy. CBD, common bile duct; PV, portal vein; SMV, superior mesenteric vein; SV, splenic vein; PS, pancreatic stump.

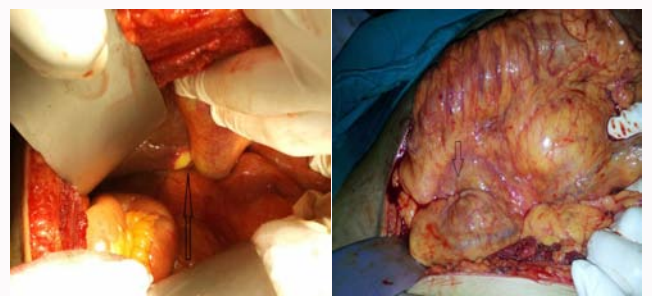


Figure 5: Superficial liver metastatic nodule (left) and invasion of transverse mesocolon (right) that were causes of unresectability.

Pancreaticoduodenectomy was done with positive predictive value of CT for resectability 52.2% and accuracy of 52.2%, and 11 patients (group B) were found unresectable and bypass surgery was done. The causes of unresectability were due to metastasis (superficial small liver metastasis, peritoneal carcinomatosis) in 4(36.4%) patients and locally advanced tumor (transverse colon and/or mesocolon invasion and superior mesenteric vein invasion) in 7(63.6%) patients. Out of 23 patients only one patient (4.3%) had vascular invasion and accuracy in detection of vascular invasion was 95.7%.

Operative data

Hospital stay: Hospital stay in patients of group A ranged from 13 to 30 days with mean length of hospital stay 19 ± 3.5 days. In group B, it ranged from 6 to 11 days with mean length of hospital stay 7 ± 1.8 days.

Table 1: Postoperative complications.

		Group A		Group B	
		No.	percent	No.	percent
surgical site complications	Pancreatic fistula	1	8.3%		
	DGE	1	8.3%		
	Wound infection	2	16.6%	1	9.1%
Non-surgical site complications	Metabolic acidosis	2	16.6%	0	0
	Polyuria	2	16.6%	0	0
	Chest infection	1	8.3%	1	9.1%
Affected patients		7	58.3%	2	18.2%
Non-complicated patients		5	41.7%	9	81.8%
Total		12	100%	11	100%

Operative time: The operative time in patients of group A ranged from 350 to 520 minutes with mean time 420 ± 56 minutes. In group B, it ranged from 150 to 220 minutes with mean time 170 ± 22 minutes.

Intraoperative blood loss: Estimated amount of intraoperative blood loss in group A ranged from 500 cc to 2000 cc with mean blood loss 1190 ± 410 , while in group B, it ranged from 250 cc to 500 cc with mean blood loss 380 ± 80 .

Blood transfusion: Blood transfusion was needed intraoperative in 10 patients in group A with average 2 blood units and 3 patients needed postoperative transfusion of one unit. In group B, there was no need for blood transfusion.

Morbidity: Postoperative complications in group A were pancreatic fistula in one patient, delayed gastric emptying in one patient, chest infection in one patient, metabolic acidosis in 2 patients, polyuria in 2 patients, wound infection in 2 patients that needed secondary closure in one of them (Table 1). Postoperative complications in group B were chest infection in one patient and wound infection in one patient. There was no leakage from the bilio-enteric and gastro-jejunal anastomoses in both groups (Table 1).

Mortality: There was one perioperative mortality in group A and none in group B. The patient was 59 years old with ampullary carcinoma; the patient developed intraoperative metabolic acidosis and kept on mechanical ventilation postoperative in ICU till death on the 6th day. The mortality rate in all patients in perioperative period was 4.3%.

Histopathology: All patients in the study group showed only two types of pathology that was adenocarcinoma in 22 patients and tubulo-villous adenoma with high grade dysplasia in one patient. There was chronic pancreatitis in the specimens of 4 patients in group A (Figure 1) the total number of lymph nodes retrieved per patient ranged from 10 to 21 with a mean of 14 ± 2 LNs. The surgical margins (pancreatic, gastric, hepatic duct, jejunal and retroperitoneal) were free (R0, complete resection with no residual tumor) in 11 patients in group A, only one patient had flushed pancreatic margin with malignant cells in some areas (R1, microscopic residual tumor). But no gross tumor tissue was left in any patient (R2, macroscopic residual tumor).

Discussion

Periampullary tumors are increasingly growing diseases, which call for high quality care and dedication from medical team. The

treatment of periampullary tumors remains a great medical and surgical challenge due to the difficulties it presents in all stages throughout its diagnostic and therapeutic processes: clinically, due to severe jaundice, pain, cachexia, and overall weakness caused by these types of tumors, which require prompt relief; diagnostically, because in many cases an accurate diagnosis is not possible until surgical procedure; therapeutically, as the best treatment is still surgical resection which is a major risky operation. Finally, because in some types of tumors, especially pancreatic ductal adenocarcinoma long term survival results continue to be dismal and overall survival rate at 5 years is approximately 7% [13,14]. In this study, 12(52.2%) patients had pancreatic head mass and 8 patients were unresectable with resectability rate (33.3%) which is consistent with a study by Lefebvre et al. [15], who reported 30% pancreatic tumor resection. On the contrary, patients with ampullary mass were less (7 patients, 30.4%) and most of them were resectable (6 patients) with resectability rate (85.7%) and this is a high rate and consistent with a study by kim et al. [2], who stated that ampullary cancer is one of the more favorable of the periampullary cancers, with a resectability rate of 86% (43 out of 50 patients). In this study, out of 23 patients, 12 patients were found to be resectable with positive predictive value of CT for resectability 52.2% and accuracy of 52.2%, and 11 patients were found unresectable and this result is consistent with the resection rate of 60% (excluding patients had locally advanced tumors that required either a vascular resection or an additional visceral resection) in a study by Samra et al. [16], but they reported taking aggressive vascular resection policy as they had 28% of all patients had either PV or SMV resection and 6% had visceral resection. In our series we considered visceral and SMV and PV invasions as a contraindication for resectability. Our results were inconsistent with Schwarz et al. [17], who achieved resectability in 71% of patients and stated that biliary stenting reduced accuracy of CT diagnosis of malignancy from 88% to 73%; and according to Sabater et al. [18], resectability rate was of 77.5%.

In this study, accuracy in detection of vascular invasion was 95.7% which is high and consistent with results mentioned in meta-analysis done by Li et al that the accurate assessment of vascular involvement is more than 90% [19] but it is inconsistent with the results of a meta-analysis done by Zhang et al. [20]. This concluded that CT is underreporting vascular invasion preoperatively in pancreatic cancer with sensitivity of CT in diagnosing vascular invasion of 71%. In group A, postoperative complications were pancreatic fistula in one (8.3%) patient, delayed gastric emptying in one (8.3%) patient, chest infection in one (8.3%) patient, metabolic acidosis in 2 (16.6%) patients, polyuria in 2 (16.6%) patients and

wound infection in 2 (16.6%) patients. There was no leakage from the bilio-enteric and gastro-jejunal anastomoses. The rate of pancreatic fistula is better than series by Bassi et al and Duffas et al. [21,22], that reported pancreatic leakage in 13% and 16% of patients who had PG; and rate of complications was consistent with a study by samra et al. [16], that reported the procedure-related complications were pancreatic fistula (9%), delayed gastric emptying (4%); Sabater et al. [18], reported pancreatic fistula (6.6%), biliary leakage (6.3%), delayed gastric emptying (8.8%) wound infection (7.5%). In group B, there were chest infection in one (9.1%) patient and wound infection in one (9.1%) patient with overall morbidity in 2 (18.2%) patients. These results are consistent with a meta-analysis by Gillen et al. [23], that surgical morbidity after double bypass ranged from 15% to 33%, and it is better than that recorded by Sabater et al. [18], that morbidity in double bypass group was 32% (7 in 22 patients) with Wounded infection in 2(9.1%) patients, high digestive hemorrhages in 2 (9.1%) patients, Abscess/collection in 2 (9.1%) patients and biliary fistula in one (4.5%) patient. In this study, R0 resection was achieved in 92% of patients and R1 in 8% and this result is consistent with results of Berber et al. [24], who achieved R0 resection in 92% of ampullary carcinoma, for 88% of cholangio carcinoma and for all the duodenal carcinoma while Wagner et al. [25], achieved R0 resection in 75.6% for pancreatic carcinoma. Kim et al, [2] reported R0 resection in all patients (43) with ampullary carcinoma. On contrary, Jamieson et al, [26], reported R0 in 26% of patients and R1 in 74% (109 out of 148 patients) and Gaedcke et al. [27] stated that when applying the Royal College of Pathologists' criteria, 46 out of 65 resections were classified R1 (70.8%) and mainly in the mesopancreas. There is now clear evidence that when resection margins are carefully assessed by an experienced pathologist and multiple sections are taken of key resection margins (particularly the periuncinate margin).

Conclusion

CT with pancreatic protocol is very helpful in detection of vascular invasion but it is not helpful in detection of small liver metastases and small peritoneal nodules so it should be used with other tools to improve the overall resectability rate. Resection is the best therapy and must be offered guaranteeing well-defined morbidity and mortality levels. Patients that underwent double bypass for unresectable tumors had satisfactory palliation with no mortality and accepted morbidity. Pancreatic tumors are aggressive with the least resectability rate while ampullary cancers are the most favorable with the highest resectability rate in periampullary tumors. R0 resection was achieved in high percentage of patients.

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