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CORRELATION BETWEEN THE RADIOLOGICAL IMAGING METHODS APPLIED FOR DIAGNOSIS IN THE PREOPERATIVE PERIOD AND THE ACTUAL PATHOLOGY RESULTS IN THE POSTOPERATIVE PERIOD IN PANCREATIC CANCER IN KHMH

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ABSTRACT

Introduction: Pancreatic adenocarcinoma is a disease that has an increasing incidence over the years and has a death probability in 80% of them (1). Curative treatment is surgery. However, only 25% can be resectable at the time of diagnosis. For this reason, preoperative evaluation is important (2). In recent years, it has been proven that the application of surgery after the application of neoadjuvant chemotherapy in tumors, which are borderline according to the radiological preliminary evaluation, is more beneficial in terms of surveillance (3). In our study, we investigate whether there is a correlation between the radiological imaging methods applied for diagnosis in the preoperative period and the actual pathology results in the postoperative period. **Material and Methods:** Demographic data, preoperative imaging findings, and detailed histopathological evaluations of postoperative pathology results of patients operated for obstructive jaundice in the general surgery department of JRMS-KHMC Amman between 2017–2022 were examined. A total of 84 patients whose data was available were included in the study. Number and percentage for categorical data were reported using median (minimum-maximum) because they did not fit the normal distribution for numerical variables. Data normal distribution was evaluated with the Shapiro-Wilks test. Research groups were formed according to gender. Accordingly, two independent groups of Mann-Whitney U tests were used for the comparison of numerical measurements in accordance with data distribution. Chi-square or Fisher's exact test was used for ratio comparisons or relationship studies according to research groups. For statistical significance level, $p<0.05$ will be accepted.

KEYWORDS: Pancreatic tumor; CT scan; Histopathology.

INTRODUCTION

Pancreatic adenocarcinoma is a disease that has an increasing incidence over the years and has a death probability in 80% of them.[1] Curative treatment is surgery. However, only 25% can be resectable at the time of diagnosis. For this reason, preoperative evaluation is important.[2] In recent years, it has been proven that the application of surgery after the application of neoadjuvant chemotherapy in tumors, which are borderline according to the radiological preliminary evaluation, is more beneficial in terms of surveillance.[3]

In our study, we investigate whether there is a correlation between the radiological imaging methods applied for diagnosis in the preoperative period and the actual pathology results in the postoperative period.

MATERIAL AND METHODS

Demographic data, preoperative imaging findings, and detailed histopathological evaluations of postoperative pathology results of patients operated for obstructive jaundice in the general surgery department of JRMS-KHMC Amman between 2017–2022 were examined. A total of 84 patients whose data was available were included in the study.

Number and percentage for categorical data were reported using median (minimum-maximum) because they did not fit the normal distribution for numerical variables. Data normal distribution was evaluated with the Shapiro-Wilks test. Research groups were formed according to gender. Accordingly, two independent groups of Mann-Whitney U tests were used for the comparison of numerical measurements in accordance with data distribution. Chi-square or Fisher's exact test was used for ratio comparisons or relationship studies

according to research groups. For statistical significance level, p<0.05 will be accepted.

RESULTS

In total, 84 patients were operated. Most of the patients were men (M/F: 63.5%/35.3). All patients presented with obstructive jaundice. Biliary drainage was not performed in any of them during the preoperative period due to obstructive jaundice. After the estimated diagnosis was established, all patients underwent surgery. In preoperative imaging, tumor localization could not be detected in half of the patients. Tumor localization was most frequently detected in the head of the pancreas at a rate of 26.9%. The tumor was most frequently observed in the head of the pancreas with 61.9%. Additionally, dilatation in the biliary system could not be detected by imaging methods in the preoperative period in almost half of the patients. SMV, portal vein, and celiac artery invasion findings were detected in 4, 2 and 0 patients, respectively, in preoperative imaging methods. Invasive moderately differentiated ductal adenocarcinoma was detected most frequently in histopathological examinations. Grade 2 was detected with a frequency of 76.9% as a histological grade. According to the AJCC 8th edition, stage 2B pathology (21.4%) was detected the most in the pathological stage evaluation. In the final pathologies, no tumor was found in the uncinate process, duodenal, biliary duct and gastric margin, except for the pancreatic parenchymal margin as the surgical margin. Pancreatic parenchymal margin (+) was detected in 10 patients. The surgical margin was found to be <1mm in 1 patient. While tumor extensions were not detected in 24.2%; peripancreatic, duodenal wall, ampulla and CBD were detected with a rate of 56.1%. Additionally, as a result of all these evaluations, no statistical difference was found in terms of gender in the comparison of clinical and pathological data (tables 1 and 2). In 29% of those with a (+) margin in the excision material, lymph node (+) presence was also detected in the final pathology. This difference was statistically significant (p=0.036) (table 3).

Table 1: Ω: Mann-Whitney U test, *: Chi Square test.

		Total	Male	Female	p value
Tumor site	Pancreatic head		36 – 67.9%	16 – 55.2%	*0.679**
	CBD		1 –1.9%	1 – 3.4%	
	Ampulla		4 – 7.5%	4 – 13.8%	
	Distal Pancreas		2 – 3.8%	0	
	Periampullary		2 – 3.8%	1 – 3.4%	
	Pancreatic tail		3 – 5.7%	4 – 13.8%	
	Pancreatic body		5 – 9.4%	3 – 10.3%	
Histological Diagnosis	Invasive moderately differentiated ductal adenocarcinoma		32 – 60.4%	14 – 48.3%	*0.301**
	Invasive ductal adenocarcinoma		2 – 3.8%	1 – 3.4%	
	Pseudopapillary tumor		0	3 – 10.3%	
	Poorly differentiated adenocarcinoma		4 – 7.5%	2 – 6.9%	
	Invasive moderately differentiated adenocarcinoma of ampulla		2 – 3.8%	2 – 6.9%	
	Infiltration by large b cell lymphoma		0	1 – 3.4%	
	Pleomorphic liposarcoma		1 - 1.9%	0	
	Extrahepatic cholangiocarcinoma		1 – 1.9%	0	
	IPMN		4 – 7.5%	1 – 3.4%	
	Undifferentiated carcinoma		1 – 1.9%	0	
	Mucinous cystic neoplasm with invasive carcinoma		1 – 1.9%	1 – 3.4%	
	Invasive poorly differentiated ampullary adenocarcinoma and mixed ductal neuroendocrine carcinoma		2 – 3.8%	0	
	Solid pseudopapillary		0	1 – 3.4%	

	tumor				
	Metastatic RCC		0	1 – 3.4%	
	Well-differentiated neuroendocrine tumor		3 – 5.7%	1 – 3.4%	
	Metastatic adenocarcinoma primary colon		0	1 – 3.4%	
Histological grade	Grade 1		4 – 9.8%	3 – 12.5%	*0.564**
	Grade 2		32 – 78%	18 – 75%	
	Grade 3		5 – 12.2%	2 – 8.3%	
	Grade 4		0	1 – 4.2%	
Tumor Extension	None		9 – 21.4%	7 – 29.2%	*0.642**
	1) Peripancreatic		13 – 31%	4 – 16.7%	
	2) Duodenal wall		8 – 19%	5 – 20.8%	
	3) Ampulla		0	1 – 4.2%	
	4) Gastric wall		0	0	
	5) Perineural and peripancreatic LN		5 – 11.9%	5 – 20.8%	
	6) Spleen		1 – 2.4%	1 – 4.2%	
	7) CBD		1 – 2.4%	1 – 4.2%	
	8) 1+2+3		4 – 9.5%	1 – 4.2%	
	9) 1+2+3+7		1 – 2.4	0	
Stage	Stage 1 A		1 – 2.6%	3 – 12.5%	*0.385**
	Stage 1 B		7 – 17.9%	7 – 29.2%	
	Stage 2 A		10 – 25.6%	4 – 16.7%	
	Stage 2 B		12 – 30.8%	6 – 25%	
	Stage 3		9 – 23.1%	4 – 16.7%	
Tumor size		40 (10–180) mm	40 (10–100) mm	40 (20–180) mm	*0.540Ω*
Total Lymph nodes		13 (0–39)	15 (0–38)	10.5 (0–39)	*0.270Ω*
Metastatic Lymph nodes		0 (0–10)	0 (0–10)	0 (0–5)	*0.565Ω*
Met/Total Lymph nodes		0.45 (0–0.38)	0.06 (0–0.38)	0 (0–0.38)	*0.420Ω*

Table 2: *: Chi Square test.

Preop CT Findings		Male	Female	p value
Site	None	23 – 44.2%	16 – 61.5%	*0.283**
	Head	16 – 30.8%	5 – 19.2%	
	Uncinate	4 – 7.7%	0	
	Body	5 – 9.6%	1 – 3.8%	
	Tail	2 – 3.8%	3 -11.5%	
	Periampullary	2 – 3.8%	1 – 3.8%	
Duct	None	26 – 51%	12 – 46.2%	*0.936**
	1) Dilated pancreatic duct	4 – 7.8%	1– 3.8%	
	2) Dilated CBD	3 – 5.9%	2– 7.7%	
	3) Dilated IHBD	3 – 5.9%	1 – 3.8%	
	1+2+3	10 – 19.6%	6 – 23.1%	
	2+3	5 – 9.8%	4 – 15.4%	
SMV	Patent	48 – 94.1%	24 – 96%	*0.730**
	Thrombosed	3 – 5.9%	1 – 4%	
Portal vein	Patent	50 – 96.2%	26 – 100%	*0.311**
	Thrombosed	2 – 3.8%	0	
Celiac	Patent	52 – 100%	26 – 100%	
	Thrombosed	0	0	
Lymph nodes	None	35 – 67.3%	23 – 88.5%	*0.283**
	Regional	1 – 1.9%	0	
	Paraaortic	2 – 3.8%	1 – 3.8%	
	Peripancreatic	10 – 19.2%	2 – 7.7%	
	Retroperitoneal	4 – 7.7%	0	

	Aortocaval	0	0	
Free fluid	None	45 – 86.5%	23 – 92%	*0.209**
	Peripancreatic	4 – 7.7%	0	
	Minimally	1 – 1.9%	2 – 8%	
	Mild	2 – 3.8%	0	

Table 3: *: Chi Square test.

Histopathological Evaluation		LN (-)	LN (+)	p value
Excision	Complete	31 – 91.2%	22 – 71%	***0.036****
	(+) Margin	3 – 8.8%	9 – 29%	

DISCUSSION

Our study had two important results. In the radiological and histopathological evaluations, gender is not a determinant in pancreatic cancers. Additionally, if there is a (+) surgical margin, the tumor is probably at a more advanced stage and LN (+) will be detected at a higher rate, and as a result, tumor behavior and disease surveillance will be low.

Pancreatic cancers generally present in the late period clinically. They are generally detected at an advanced stage. For this reason, a small amount may be operable. SMV, portal vein, and hepatic artery invasion are important indicators of operability. For this purpose, CT with multiphasic pancreas protocol is preferred in the preoperative period. This is important in evaluating both tumor resectability and tumor clinical stage, as well as tumor response after neoadjuvant chemotherapy.[4–7] In our study, CT images of all patients were evaluated preoperatively, operability and tumor staging, and the number of patients with vascular invasion was 6 in total. However, in the pathological stages of these 6 patients, it is seen that en bloc resection can be performed with no (+) in the surgical margins. Surgical margin (+) was detected at the pancreatic parenchyma border, which was found to be associated with local recurrence in the literature.[8] To reduce local recurrence, it was recommended to perform frozen section during surgery. However, if (+) is still found in the final pathology, it was recommended to add radiotherapy and chemotherapy.[9,10] In our center, we apply the frozen section to all patients during surgery.

Pancreatic cancer is more common in men[11], but in our study, no gender-related difference related to tumor histopathological staging was found. According to Ranganath et al., similar results were encountered in the Asian Pacific community.[12]

There are some limitations in our study. The fact that it is a retrospective and single-centre contribution is lacking in terms of data diversity and generalization. Moreover, we believe that the inclusion of survey analyzes may be more appropriate for histopathological comparison of surgical results according to the stage of the patients.

CONCLUSION

Gender is not an important factor in the histopathological and radiological evaluation of pancreatic cancers. We recommend studying frozen section during surgery to prevent the (+) surgical margin, especially in advanced-stage tumors.

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