

# Pancreatic Head Carcinoma-Implications and Correlations in a Romanian Population

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**ABSTRACT:** Introduction: Pancreatic cancers are often an aggressive type of malignancy, with a 5-year survival rate estimated at around 5%. The main purpose of our study was to determine whether or not tumor dimensions influence the presence of jaundice and the diameters of the CBD and Wirsung duct. Material and methods: The study group included 32 patients (19 males, 13 females) diagnosed with various histological types of pancreatic head cancers who were hospitalized in the Surgery Department of the County Clinical Emergency Hospital of Craiova during 2016-2018. All 32 patients underwent an initial abdominal ultrasonography (US), followed by an abdominal computed tomography (CT) scan and an abdominal magnetic resonance imaging (MRI) with magnetic resonance cholangiopancreatography (MRCP) sequences. Results: Based on tumor dimensions, 19 (59.38%) were equal to or larger than 30mm, while 13 (40.62%) were smaller than 30mm. The average age of male patients was 65.15 years, while the average age of female patients was 60.07 years. Tumor dimensions ranged between 22mm and 52mm (33.53mm on average). Furthermore, the diameter of the CBD ranged from 5mm to 20mm (13.40mm on average), while the diameter of the Wirsung duct ranged from 3mm to 12mm (5.75 mm on average). Conclusion: In conclusion, our study reached its' initial purpose and revealed a significant association between the tumor dimensions and the diameter of the Wirsung duct and also between the diameter of the CBD and the presence of jaundice.

**KEYWORDS:** Common bile duct, adenocarcinoma, tumor dimensions, Wirsung duct

## Introduction

The pancreas is one of the most important retroperitoneal organs and fulfills both endocrine and exocrine functions. Pancreatic cancers are often an aggressive type of malignancy, with a 5-year survival rate estimated at around 5%, thus being one of the leading causes of cancer mortality worldwide [1,2].

According to GLOBOCAN 2018, over 458,000 new cases of pancreatic cancer were reported worldwide in 2018, out of which approximately 132,000 were reported in Europe and around 3,100 in Romania alone.

For example, in Asia, 214,499 new cases of pancreatic cancers were reported in 2018, compared to Africa where only 16,059 new cases were declared.

In 2018, the incidence rate of pancreatic cancer in Romania for all ages and both sexes was 7.4 per 100,000, while the mortality rate was 6.9 per 100,000.

Pancreatic cancer is associated with multiple risk factors: smoking, family history of pancreatic cancer, diabetes, obesity, chronic pancreatitis and alcohol consumption.

Furthermore, pancreatic neoplasms usually target elderly men [3].

Pancreatic neoplasms can develop in the head (65%), body (15%) or tail (15%) of the pancreas. The remaining 5% is represented by malignant tumors that diffusely affect the pancreas [4].

Regarding histology, the most common type of pancreatic head cancer affecting the exocrine component is adenocarcinoma (around 80-90% of all cases).

Other less frequently encountered histological types developing in the exocrine pancreatic tissue include acinar cell carcinomas (5%), cystadenocarcinomas (1%), pancreatoblastomas and pancreatic mucinous cystic neoplasms [5,6].

Patients with cancers affecting the head region of the pancreas are usually diagnosed in late stages with cholestatic jaundice, a dilated common bile duct (CBD) and/or a dilated Wirsung duct. The main purpose of our study was to determine whether or not tumor dimensions influence the presence of jaundice and the diameters of the CBD and Wirsung duct.

## Material and methods

The study group included 32 patients (19 males, 13 females) diagnosed with various histological types of pancreatic head cancers who were hospitalized in the Surgery Department of the County Clinical Emergency Hospital of Craiova during 2016-2018.

The resection pieces were analyzed in the Pathology Department of the County Clinical Emergency Hospital of Craiova.

All patients expressed their agreement to be a part of this study.

All 32 patients underwent an initial abdominal ultrasonography (US), followed by an abdominal computed tomography (CT) scan and an abdominal magnetic resonance imaging (MRI) with magnetic resonance cholangiopancreatography (MRCP) sequences as suggested by Fumihiko Miura et al [7].

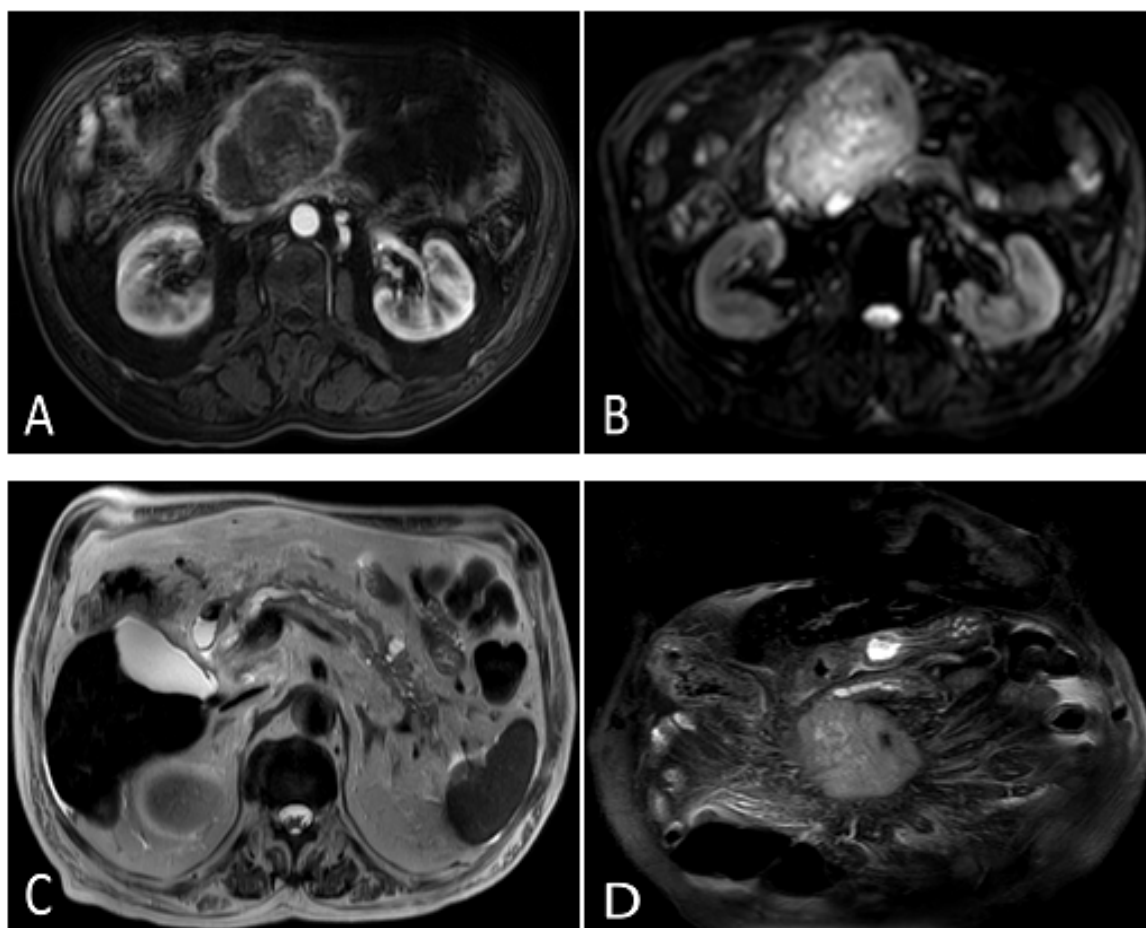
The tumor dimensions and the diameters of the CBD and Wirsung duct were measured on the MRI examinations.

We considered the normal diameter of the CBD to be 6mm, while the normal diameter of the Wirsung duct <4mm [8].

We performed a statistical analysis of the data we collected using One-way ANOVA test and Chi-square. Regarding software, we used IBM SPSS Statistics 20. Values less than 0.05 for p were considered statistically significant.

## Results

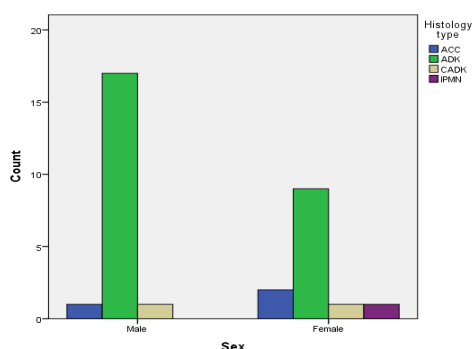
Based on tumor dimensions, 19 (59.38%) were equal to or larger than 30mm, while 13 (40.62%) were smaller than 30mm (Fig.1).



**Fig.1. Pancreatic head carcinoma in a 76 year old male patient-MRI examination: A) T1 postcontrast-arterial phase; B) Diffusion Weighted Imaging (DWI); C) T2W; D) T2-SPAIR**

Based on the tumor histological type, 26 (81.25%) were classified as adenocarcinomas (ADK), 3 (9.375%) were considered acinar cell carcinomas (ACC), 2 (6.25%) were described as

cystadenocarcinomas (C-ADK) and 1 (3.125%) was classified as intraductal papillary mucinous neoplasm (IPMN) (Fig.2).

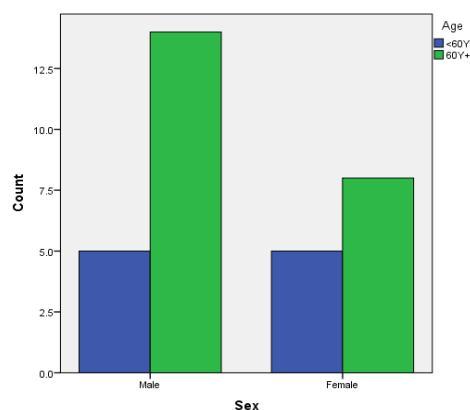


**Fig.2. Tumor histological types distributed on sexes**

The patients included in the study group were aged between 51 and 78, with an average age of 63.46 years. Furthermore, 10 patients (31.25%) were younger than 60 years, while 22 patients (68.75%) were aged 60 or above. The study group included 19 males (59.375%) and 13 females (40.625%).

Out of 19 males, 5 (26.31%) were younger than 60 years and 14 (73.69%) were aged 60 or above.

Out of 13 females, 4 (30.76%) were younger than 60 years and 9 (69.24%) were aged 60 or above (Fig.3).



**Fig.3. Patients' age distributed on sexes**

**Table 1. The structure of the study group based on the tumor dimension, histological type, patient age, sex and smoking status**

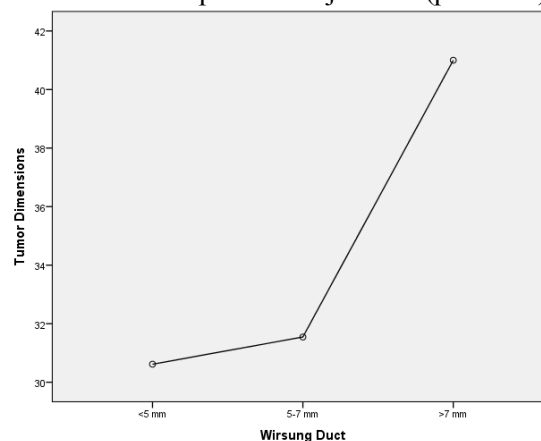
Characteristics	Parameters	Number of patients	Percent of patients (%)
Tumor dimension	<30mm	13	40.62%
	≥30mm	19	59.38%
Tumor histological type	Adenocarcinoma	26	81.25%
	Acinar cell carcinoma	3	9.375%
	Cystadenocarcinoma	2	6.25%
	IPMN	1	3.125%
Age	<60Y	10	31.25%
	≥60Y	22	68.75%
Sex	Male	19	59.375%
	Female	13	40.625%
Smoking	Yes	21	65.62%
	No	11	34.38%

The average age of male patients was 65.15 years, while the average age of female patients was 60.07 years. Also, 21 patients (65.62%) were smokers, while the rest (34.38%) denied smoking (Table 1). Twenty patients (62.5%) presented with jaundice.

Tumor dimensions ranged between 22mm and 52mm (33.53mm on average). Furthermore, the diameter of the CBD ranged from 5mm to 20mm (13.40mm on average), while the diameter of the Wirsung duct ranged from 3mm to 12mm (5.75mm on average).

The highest CBD diameter was encountered in a 29mm tumor, while the lowest CBD diameter was recorded in a 39mm tumor. Tumor dimensions were not significantly associated with either the diameter of the CBD (p=0.102) or the presence of jaundice (p=0.621). However, tumor dimensions were significantly associated with the diameter of the Wirsung duct (p=0.018<0.05) (Fig.4).

Also, the diameter of the CBD was significantly associated with the presence of jaundice (p=0.0001).



**Fig.4. Significant association between the tumor dimensions and the diameter of the Wirsung duct**

## Discussion

Pancreatic head cancer is one of the leading causes of cancer mortality worldwide and is associated with several risk factors like smoking, family history of pancreatic cancer, diabetes, obesity, chronic pancreatitis and alcohol consumption [1,2,9].

According to Olson SH et al., men in their 6<sup>th</sup> or 7<sup>th</sup> decade are usually targeted by this disease [3].

The findings of our study suggested that pancreatic head carcinoma had a strong predilection for male patients, especially for those aged 60 or above. Furthermore, the average age of the male patients was somewhat higher than the average age of the female patients included in our study (65.15 years vs. 60.07 years), suggesting that women are affected at a younger age compared to men.

In accordance with the data provided by the literature, our findings indicated that the most frequently encountered histological type of pancreatic head cancer was adenocarcinoma (81.25% of all cases included in our study), followed by acinar cell carcinoma (9.375% of all cases included in our study).

Given that the tumor dimensions were not significantly associated with the diameter of the CBD and that the highest diameter of the CBD was encountered in a tumor with below average dimensions, we considered the location of the tumor within the pancreatic head to be significantly more important than the tumor dimensions [10,11].

## Conclusion

In conclusion, our study reached its' initial purpose and revealed a significant association between the tumor dimensions and the diameter of the Wirsung duct and also between the diameter of the CBD and the presence of jaundice.

## Conflict of interests

The authors declare that they have no conflict of interests.

## Author contribution

Lucian Mihai Florescu and Mirela Marinela Florescu equally contributed to the manuscript.

## References

1. Vincent A, Herman J, Schulick R, Hruban RH, Goggins M. Pancreatic cancer. *Lancet*, 2011, 378(9791):607-620.
2. Ilic M, Ilic I. Epidemiology of pancreatic cancer. *World J Gastroenterol*, 2016, 22(44):9694-9705.
3. Olson SH, Kurtz RC. Epidemiology of pancreatic cancer and the role of family history. *J Surg Oncol*, 2013, 107(1):1-7.
4. Avo A, Perry AS, Christina P, Tracey L, Joshua DI, Joseph K. The anatomic location of pancreatic cancer is a prognostic factor for survival. *HPB (Oxford)*, 2008, 10(5): 371-376.
5. Ryan DP, Hong TS, Bardeesy N. Pancreatic adenocarcinoma. *N Engl J Med*, 2014, 371(11):1039-1049.
6. Farrell JJ, Fernández-del Castillo C. Pancreatic cystic neoplasms: management and unanswered questions. *Gastroenterology*, 2013, 144(6):1303-1315.
7. Fumihiko Miura, Tadahiro Takada, Hodaka Amano, Masahiro Yoshida, Shigeru Furui, Koji Takeshita. Diagnosis of pancreatic cancer. *HPB (Oxford)*, 2006, 8(5):337-342.
8. Tanaka S, Nakao M, Ioka T, Takakura R, Takano Y, Tsukuma H, Uehara H, Suzuki R, Fukuda J. Slight dilatation of the main pancreatic duct and presence of pancreatic cysts as predictive signs of pancreatic cancer: a prospective study. *Radiology*, 2010, 254(3):965-972.
9. Merdrignac A, Sulpice L, Rayar M, Rohou T, Quehen E, Zamreek A, Boudjema K, Meunier B. Pancreatic head cancer in patients with chronic pancreatitis. *Hepatobiliary Pancreat Dis Int*, 2014, 13(2):192-197.
10. Meng Z, Xu YK, Zhang YP. Magnetic resonance cholangiopancreatography of pancreaticobiliary duct dilation due to pancreatic carcinoma and chronic pancreatitis. *Nan Fang Yi Ke Da Xue Xue Bao*, 2008, 28(1):113-115.
11. Xiao Ming Zhang, Donald G. Mitchell, Jae Ho Byun, Sachit K. Verma, Diane Bergin, Agnes Witkiewicz. Gallbladder abnormalities in carcinoma of pancreatic head: findings on MR imaging. *Abdominal Imaging*, 2009, 34(4):507-513.