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EUS is Superior to CT in Assessment of Pancreatic Masses

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Abstract:
Introduction: Pancreatic cancer is a highly fatal disease with a 5-year survival rate of approximately 10% in the USA, and it is becoming an increasingly common cause of cancer mortality. EUS is the most suitable modality for detection of pancreatic lesions due to its spatial resolution. CT is considered the gold standard for pancreatic cancer diagnosis. The typical CT appearance of a PDAC is an ill-defined hypoattenuating mass within the pancreas. Smaller lesions may be iso-attenuating, making difficult their identification.
Aim of the work: evaluate and compare between EUS and CT in evaluating pancreatic masses.
Results: This study confirmed superiority of EUS in assessment of nature of pancreatic masses.
Conclusion: EUS is better than CT in detection and assessment of pancreatic lesions.

Keywords: Pancreatic cancer; EUS; CT

1. Introduction

The pancreas is located between the stomach and the spine. It is about 15 centimeters long. Endocrine islets that emit hormones, centro-acinar cells, ductal cells that secrete bicarbonate, and stellate cells are the constituents of a normal, healthy pancreas. Pancreatic cancer occurs when abnormal DNA mutations in the pancreas [1]. Pancreatic cancer is anticipated to become the second biggest cause of cancer death in some locations and routinely ranks the lowest among all cancers in terms of patient prognoses [2]. Pancreatic cancer has a poor 5-year survival rate, ranging from 2% to 9% [3].
Obesity, smoking, alcohol consumption and type 2 diabetes are considered non-familial risk factors for pancreatic cancer. Chronic pancreatitis, cystic fibrosis and intraductal papillary mucinous neoplasm (IPMN) should also be considered [4]. Genetic syndromes predisposing to pancreatic cancer are: Hereditary breast/ovarian cancer syndrome, Familial atypical multiple mole

melanoma syndrome, Peutz-Jeghers 2 syndrome, Familial adenomatous polyposis, Lynch syndrome, Hereditary pancreatitis, Ataxia telangectasia and Li-Fraumeni syndrome [5].
MDCT is considered the gold standard for diagnosis of pancreatic tumor. The typical CT appearance of a PDAC is an ill-defined hypodense mass within the pancreas. Smaller lesions may be iso-dense, making them difficult to be identified [6]. Secondary signs of PDAC include dilatation of the pancreatic duct or common bile duct, parenchymal atrophy, and contour abnormalities. Secondary signs of PDAC include dilatation of the PD or CBD, parenchymal atrophy, and contour abnormalities. Dilation of both the PD and the CBD is known as the "double duct sign" and is not diagnostic for cancer in the head of pancreas [7]. MDCT with contrast is the best modality for staging of PDAC and identification of vascular invasion [8].
EUS is considered the best method to detect early tumors in the pancreas. PDAC on EUS appears as a hypoechoic mass with dilation of the proximal PD and irregular border. This is the most accurate method for local T and N staging, and for identification of vascular invasion. But when it comes to assessing distant metastases, EUS is inferior to MDCT. Furthermore, EUS has a limited specificity when it comes to ruling out vascular involvement in small tumors, especially when inflammatory alterations are evident [9]. EUS is mainly used to get fine needle aspiration or biopsy material in patients with PDAC [10].

2.Patients and Methods:

A prospective study of 30 patients with pancreatic masses were subjected to MDCT pancreatic protocol and EUS to assess the nature of the mass.
Results obtained from both EUS and MDCT were compared to the true intraoperative findings.

Inclusion criteria:

Patients with resectable and borderline pancreatic tumors and fit for surgery.
Age: > 18 years old.

Exclusion criteria:

Patients with unresectable pancreatic lesions (e.g.: vascular invasion, distal metastasis, ascites).
Patients with diagnosed pancreatic tumors but unfit for surgery (coagulopathy, cardiomyopathy, respiratory distress).

Statistical analysis

Data were entered and analyzed using IBM-SPSS software (Version 26.0. Armonk, NY: IBM Corp). Initially, quantitative data were tested for normality using Shapiro-Wilk's test, being normally distributed if $p>0.050$. The presence of significant outliers was tested for by inspecting boxplots. Quantitative data from each group were presented as mean ± standard deviation (SD) as data were normally distributed. "Independent-samples t-test" was used to compare normally distributed quantitative data between two groups, while the "One-Way ANOVA test" was used to compare normally distributed quantitative data between more than two groups. Statistically significant results were followed by post-hoc Tukey HSD and Games-Howell tests to detect where that significant difference existed. Post-hoc Games-Howell test was used when the homogeneity of variances was violated (p value for Levene's test < 0.05). The quantitative data that were not

normally distributed were expressed as median and interquartile range (IQR). Spearman's, Pearson's, and Point biserial correlation tests were used to determine associations between variables. For any used test, the results were considered as statistically significant if the p value is ≤ 0.05.

3.Results:

Table 1: Demographics of the study population

Table 1: Demographics of the study population N=30		**%**	
Age/years		60.0 (18-73)	
Sex	**Female**	19	63.3
	Male	11	36.7
Hypertension	1	3.3	
DM	7	23.3	
Data are expressed as mean ± SD or n (%).			

Table 2: nature of lesions

	Solid	**Cystic**
CT	17(56.7%)	9(30%)
EUS	22(73.3%)	8(26.7%)
Intraoperative	21(70%)	9(30%)

Table 3: site of lesions detected by CT, EUS and intraoperative:

	Head	Body	Tail	Head & Body	Body & Tail	Ampullary	Not Detected
CT	13 (43.3%)	1 (3.3%)	5 (16.75%)	2 (6.75%)	1 (3.3%)	4 (13.3%)	4 (13.3%)
EUS	19 (63.3%)	0	4(13.3%)	1 (3.3%)	1 (3.3%)	5 (16.7%)	0
intraoperative	17 (56.7%)	1 (3.3%)	3 (10%)	3 (10%)	1 (3.3%)	5 (16.7%)	0

4.Discussion:

Pancreatic cancer is a highly fatal disease with a 5-year survival rate of approximately 10% in the USA, and it is becoming an increasingly common cause of cancer mortality [11]. EUS is the most suitable modality for detection of pancreatic lesions due to its spatial resolution. A typical EUS image of a normal pancreas has a homogeneous "salt and pepper" appearance. EUS images of an inflammatory mass have a heterogeneous echo pattern, showing calcification, peripancreatic echo-rich stranding, and cysts [12].

In our study we found that out of 30 patients, there were 11 males (36.7%) and 19 females (63.3%) with mean age 60 years.

Rawla et al. stated that pancreatic cancer is disease of elderly and rarely diagnosed before age of 55 years [13]. In addition, Gaddam et al., 2021 found that pancreatic cancer incidence increased among both sexes between 2000 and 2018. However, a greater relative increase was observed among women younger than 55 years[14]., also Sumampouw et al., 2019 found that there is increase in pancreatic 5

cancer incidence and this increase is more significant in females [15]. EUS in assessing nature almost matched the true intraoperative findings. While CT diagnosed 17 cases (out of 21 as solid) and diagnosed 9 cystic cases perfectly, it failed to detect the lesion in 4 cases.
This agrees with Costache et al., 2017 who stated that EUS is able to detect focal lesions as small as 2-5 mm and has a very good accuracy (91%) compared to CT (69%) and MRI (82%), in the diagnosis of pancreatic tumors less than 2 cm [16]. Also, agrees with Salom and Prat, 2022 found that EUS offers a greater sensitivity for the detection of solid pancreatic tumors, primarily for lesions under 2 cm in diameter. Therefore, in high-risk groups, EUS is the recommended imaging modality for pancreatic cancer screening [17].
Hence, EUS is superior to CT in assessment and detection of pancreatic lesions.

5.Conflict of interest

The authors declare that they have no conflict of interest.

6.Ethical approval

The study protocol was approved by the Research Ethics Committee of the Faculty of Medicine "Institutional Research Board", Mansoura University, Egypt.

7.Informed consent

Signed informed consent was obtained from all participants in this study.

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