

PREOPERATIVE ASSESSMENT OF LOCALLY INVASIVE PANCREATIC TUMOR BY COMPUTED TOMOGRAPHY AND ENDOSCOPIC ULTRASOUND

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Pancreatic cancer is the 5th most common reason of cancer-related deaths in Asian countries and the 4th leading reason of cancer-related deaths in Western countries. Computed tomography (CT) show excellent spatial and temporal resolution with wide anatomic coverage for evaluation of pancreatic lesions. Endoscopic Ultrasound (EUS) is used for radiology evaluation in symptomatic or asymptomatic cases with pancreatic lesions.

Purpose. To assess the radiological findings and to find the accuracy between CT and EUS in preoperative assessment of locally invasion pancreatic tumors.

Materials and methods. A retrospective study of 22 patients proven with pancreatic adenocarcinoma were studied at a period from 26th July 2023 to 29th May 2024. Data collected include age of patient, sex, Location of pancreas mass. CT scan findings included: max tumor dimension, attenuation, dilatation, invasion, arterial contact and venous. EUS findings included: appearance, echogenisty and dilatation. EUS (fugifilm linear EUS, Japan), was done under GA. CT scan was performed used the Siemens system.

Results. In this study, mean age of patients was 40.68 ± 10.45 yrs (median =45.5 yrs). Females were predominant in 14 cases (63.6%). Head of pancreas represented the common site of mass location in 13 of cases (59.1%). The maximum tumor dimension measured by CT was most belonged between 2 to cm in 13 patients (59.1%). The Hypo-attenuated mass visualized in 19 cases (86.4%). In relation to dilatation, the pancreatic duct dilated in seven cases (31.8%) while CBD dilated in 15 cases (68.2%). Regarding to the invasion to adjacent organs, the duodenum was the common organ invaded in six patients. Arterial contact to celiac artery seen in four patients and also for mesenteric artery. Venous content visualized in nine patients at portal vein, two in IVC and the most of patients with mesenteric vein ($n=11$; 50%). Most of mass appearance by EUS was infiltrative in 14 cases (63.6%). 16 of 22 patients (72.7%) showed hypo-echoic mass. CT showed higher sensitivity and specificity, respectively with accuracy rate reached to 81% in diagnosis of max tumor dimension among other tests. Furthermore, EUS sensitivity, specificity and accuracy for echogenisty were greater among other parameter (75%; 66%; 60%, respectively).

Discussion. In this study, the maximum tumor dimension measured was most belonged between 2 to 4 cm in 13 patients (59.1%). Those with dimension more than 4 cm were 7 cases (31.8%). The Hypo-attenuated mass visualized in 19 cases (86.4%). The iso-attenuated mass detected in three cases. In relation to dilatation, the pancreatic duct dilated in seven cases (31.8%) while CBD dilated in 15 cases (68.2%). Regarding to the invasion to adjacent organs, the duodenum was the common organ invaded in six patients. Arterial contact to celiac artery seen in four patients and also for mesenteric artery. Venous content visualized in nine patients at portal vein, two in IVC and the most of patients with mesenteric vein ($n=11$; 50%). Disagree with the findings of Dickinson et al. found 22 cases (13%) had tumors that were not measurable (≤ 2 cm), 125 (74%) had tumor $> 2 - \leq 4$ cm, and 21 (12%) had tumors > 4 cm. Tumors were present in 116 cases (69%) within the head, in 19 cases (11%) – neck and body or tail in 33patients (20%). Tumor arterial contacting was presented in 47 cases and venous contacting was presented in 136 cases. They classified 25% of tumor as iso-attenuating. These data differ from our findings. The discordances are probably because of the differences in study designs including difference in patients selecting criteria, CT scan evaluation at different stages of management, vascular involvement assessment via intra-operative radiology and inclusion of subjects with different primer resect-ability classifications.

Conclusions. Head of pancreas represented the common site of pancreatic cancer. The large maximum tumor dimension measured, Hypo-attenuated mass, dilatation of the pancreatic and CBD, invasion to adjacent organs encasement of vessels are features of pancreatic carcinoma detect by CT scan. Infiltrative, hypo-echoic mass and dilatation of ducts are features of pancreatic carcinoma detect by CT scan. CT have higher sensitivity and specificity, respectively among EUS, with no signifi-

cant difference.

Keywords: pancreatic cancer, computed tomography, endoscopic ultrasound, portal vein, CT scan attenuation.

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ПРЕДОПЕРАЦИОННАЯ ОЦЕНКА МЕСТНО-РАСПРОСТРАНЕННЫХ ОПУХОЛЕЙ ПОДЖЕЛУДОЧНОЙ ЖЕЛЕЗЫ С ПОМОЩЬЮ КОМПЬЮТЕРНОЙ ТОМОГРАФИИ И ЭНДОСКОПИЧЕСКОГО УЛЬТРАЗВУКОВОГО ИССЛЕДОВАНИЯ

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Рак поджелудочной железы занимает 5-е место среди причин смертности от рака в азиатских странах и 4-е место среди причин смертности от рака в западных странах. Компьютерная томография (КТ) предоставляет пространственное и временное разрешение с широким анатомическим охватом для оценки поражений поджелудочной железы. Эндоскопическое ультразвуковое исследование (ЭндоУЗИ) используется для оценки симптоматических или бессимптомных случаев с поражением поджелудочной железы.

Цель исследования. Оценить результаты и сравнить точность КТ и ЭндоУЗИ в предоперационной оценке местно-распространенных опухолей поджелудочной железы.

Материалы и методы. В ретроспективном исследовании были проанализированы данные 22 пациентов с подтвержденным диагнозом: «аденокарцинома поджелудочной железы», в период с 26 июля 2023 года по 29 мая 2024 года. Собранные данные включали возраст пациента, пол и локализацию опухоли поджелудочной железы. Результаты компьютерной томографии (КТ) включали максимальные размеры опухоли, рентгенологические критерии, наличие дилатации, инвазии, а также контакт с артериями и венами. Результаты эндоскопического ультразвукового исследования (ЭндоУЗИ) включали описание внешнего вида, экзогенности и наличие дилатации. ЭндоУЗИ проводилось с использованием линейного эндоскопического ультразвукового аппарата Fugifilm (Япония) под общей анестезией. Компьютерная томография была выполнена с использованием системы Siemens.

Результаты. В данном исследовании средний возраст пациентов составил $40,68 \pm 10,45$ лет (медиана=45,5 лет). Женщины составляли преобладающее большинство – 14 случаев (63,6%). Наиболее распространенным местом локализации опухоли была головка поджелудочной железы – 13 случаев (59,1%). Максимальный размер опухоли, измеренный при помощи компьютерной томографии, в большинстве случаев находился в диапазоне от 2 до 5 см и наблюдался у 13 пациентов (59,1%). Гиподенное образование визуализировалось в 19 случаях (86,4%). Что касается дилатации, Вирсунгов проток был расширен в 7 случаях (31,8%), в то время как общий желчный проток был расширен в 15 случаях (68,2%). Касаемо инвазии в соседние органы – двенадцатиперстная кишка была наиболее часто затронута у 6 пациентов. Контакт с артериями, такими как чревный ствол, наблюдался у 4 пациентов, аналогично с мезентериальной артерией. Венозный контакт визуализировался у 9 пациентов в воротной вене, в нижней полой вене (НПВ) – у 2, и у большинства пациентов по отношению к мезентериальной вене (n=11, 50%). Большинство опухолей при проведении ЭндоУЗИ были инфильтративными – у 14 пациентов (63,6%). У 16 из 22 пациентов (72,7%) была отмечены гипоехогенные образования. Компьютер-

ная томография показала более высокую чувствительность и специфичность с точностью диагностики максимального размера опухоли, достигшей 81% по сравнению с другими методами. Кроме того, чувствительность, специфичность и точность ЭндоУЗИ для оценки экзогенности были более высокими по сравнению с другими параметрами: 75%, 66% и 60% соответственно.

Обсуждение. В данном исследовании максимальный размер опухоли, измеренный у 13 пациентов (59,1%), варьировался в пределах от 2 до 4 см. У 7 пациентов (31,8%) размеры опухоли превышали 4 см. Гиподенсное образование визуализировалось в 19 случаях (86,4%), в то время как изоденсное – было обнаружено лишь у трех пациентов. Что касается дилатации, вирусного протока был расширен в 7 случаях (31,8%), в то время как общий желчный проток был расширен в 15 случаях (68,2%). Двенадцатиперстная кишка оказалась наиболее часто затронутой в рамках местно-распространенной инвазии – у 6 пациентов. Контакт с артериальными сосудами, такими как чревный ствол и мезентериальная артерия, был выявлен у четырех пациентов. Венозный контакт наблюдался у 9 пациентов с воротной веной, с нижней полой веной – у 2, при этом у большинства пациентов $n=11$; 50%) отмечался контакт с мезентериальной веной. Эти результаты расходятся с данными исследования Dickinson et al., в котором 22 (13%) случая опухолей были малого размера (≤ 2 см), 125 (74%) опухолей имели размер более 2 и менее 4 см, а в 21 (12%) случае превышали размер в 4 см. У 116 пациентов (69%) опухоли находились в головке поджелудочной железы, у 19 – в шейке (11%), а у 33 пациентов (20%) – в теле или хвосте. Контакт с артериальными сосудами был зарегистрирован в 47 случаях, тогда как венозный контакт наблюдался в 136 случаях. В исследовании авторы классифицировали 25% опухолей как изоденсные. Эти данные отличаются от наших результатов. Различия в результатах, вероятно, обусловлены различиями в дизайне исследований, включая различные критерии отбора пациентов, оценку КТ на разных стадиях лечения, оценку сосудистого вовлечения с помощью интраоперационного контроля и включение субъектов с различной классификацией первичной резектабельности.

Заключение. Головка поджелудочной железы является наиболее распространенным местом локализации рака поджелудочной железы. Большой максимальный размер опухоли, гиподенсное образование, дилатация поджелудочного протока и общего желчного протока (СВД), инвазия в соседние органы и сосуды являются характеристиками аденокарциномы поджелудочной железы, определяемыми при помощи компьютерной томографии (КТ). Инфильтративное гиподенсное образование и дилатация протоков также являются признаками аденокарциномы, выявляемыми при КТ. Компьютерная томография обладает более высокой чувствительностью и специфичностью по сравнению с эндоскопическим ультразвуковым исследованием (ЭндоУЗИ), без значительных различий.

Ключевые слова: рак поджелудочной железы, компьютерная томография, эндоскопическое ультразвуковое исследование, воротная вена, аттенуация при компьютерной томографии.

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Pancreatic cancer is 5th most common reason of cancer-related mortality in Asian countries and 4th leading reason of cancer-related mortality in Western countries [1]. The most pancreatic cancer cases are detected as locally advanced or metastatic phase. About, 15-20% of them are candidate for surgical resections [2]. The roles of radiology have been development of pancreatic cancer treatment, and it play crucial roles in the screening, diagnosis, preoperative staging, post-operative surveillance, and treatment responses evaluation of pancreatic cancer [3].

Pancreatic lesions are mostly rare and an originating challenge dilemma of these cysts to be more difficulty to investigation, because the quality of radiological imaging technology improve the discovery of asymptomatic pancreatic cysts is obviously to increase [1].

These cysts classified into non-neoplastic and neoplastic. Neoplastic cystic lesions can undergoing malignant transformation, while cystic pancreatic neuro-endocrine tumors potentially metastatic. Besides, lymphoepithelial cysts, pseudocysts, and retention cysts are indolent lesions and not progress into malignant status. The percent of detection of pancreatic cysts is varied as 0.7% to 36.7% [4].

Recently, computed tomography (CT) is the best imaging technique to the initial assessment and follow-up of pancreatic cysts [5]. Beneficial properties of available multislice CT-scanners are the great acquisition speed with narrowing collimation, high images resolution, possibility of multiplanar imaging and reformats using volume data [6]. Commonly, ultrasonography is used for prior radiologic assessment in symptomatic and asymptomatic pancreatic cysts. It is non-invasive, easily accessible and inexpensive. Pancreatic cancer appears as an infiltrative hypo-echoic focal lesion with main pancreatic ducts or bile ducts dilatation [7].

Because of the pancreatic cancers can showed rapid progressing and spreading [8]. Pancreatic cancers are notice as a mass lesion that exhibit hypo-enhancement compared to the nearby parenchyma in the pancreatic phases. It may cause dilatation of ducts, adjacent vascular structures encasement, directly invasion of neighboring organs, and regional LAP. In meta-analyses and systematic review, CT scans have showed sensitivity of 89% to 91% and specificity of 85% to 90% for the pancreatic cancer diagnosis [9].

EUS is utilized for radiology evaluation in symptomatic or asymptomatic cases. Pancreatic cancers often appear as an infiltrative or distinct hypo-echoic focal pancreatic lesions, commonly accompanied by main pancreatic

ducts or bile ducts dilatation [7]. The detection of pancreatic cancers in EUS is highly dependent on the operator's techniques, patient's body habitus, and the location and size of the tumors. The EUS sensitivity and specificity are ranging 68% to 95% and 50% to 100%, respectively [10]. The limitations are diagnostic performances, therefore, EUS is rarely used for detection, resect-ability evaluations and responses evaluation of pancreatic cancers [7]. The limitation of abilities of CT scans have been compared with EUS in prediction of vascular invasion, and EUS have proven to be more accurate [11].

Purpose.

1. To determine the radiological findings of CT and EUS in preoperative assessment of locally invasion pancreatic tumors.

2. To find the accuracy between CT and EUS in preoperative assessment of locally invasion pancreatic tumors.

Materials and Methods.

Study design and setting.

A retrospective study of 22 patients proven with pancreatic adenocarcinoma were studied at a period from 26th July 2023 to 29th May 2024. Sample consist of 8 males (36.4%) and 14 females (63.6%), they attended to the Department of Radiology in Al-Hilla General hospital.

Data collection.

Data collected include age of patient, sex, Location of pancreas mass (head, body and tail). CT scan findings included: Max tumor dimension (<2 cm, 2-4 cm, >4 cm), Attenuation (hypo-, iso- hyper-), Dilatation, Invasion (duodenum, stomach, spleen, bowel, colon, adrenal), Arterial contact (celiac, hepatic, mesenteric) and Venous (portal, mesenteric, IVC). EUS findings included: Appearance (distinct and infiltrative), Echogenisty hypoechoic, iso- and no), and Dilatation (pancreatic duct and bile duct).

Inclusion criteria:

1. Patients with pancreatic cancer.
2. Patients aged >18 years.

Exclusion criteria:

1. Patients unwilling to CT scan.
2. Pregnancy.
3. Allergy to contrast.
4. Renal insufficiency.

Endoscopic (EUS).

EUS (fugifilm linear EUS, Japan), (7.5 MHz) was done under GA. Upon needle availability, FNAB was getting from the pancreatic lesions performing by echo tip-needles of 22 gauge. Vascular evaluation was done within a tumor-vessel correlation to 3 categories:

- Type I (clear invasion)
- Type II (abutment)
- Type III (non-invasion) [12].

CT scan.



Fig. 1 a (Рис. 1 а)

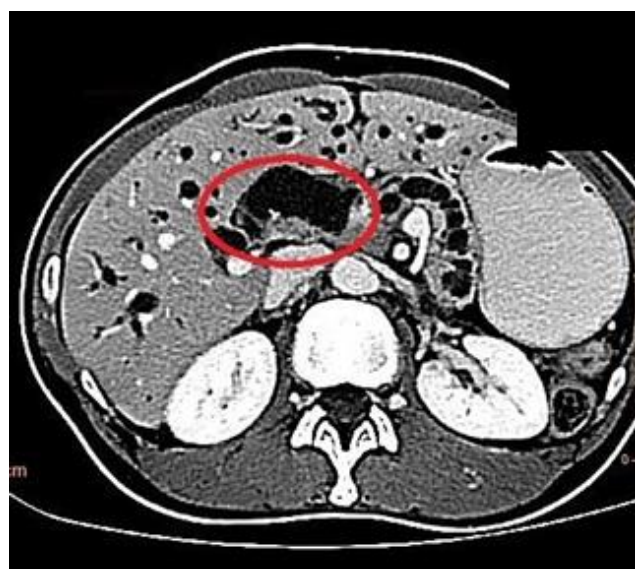


Fig. 1 b (Рис. 1 б)

Fig. 1. CT, abdomen, axial views. A – Portal venous phase with contrast enhancement. B – Arterial phase with contrast enhancement.

Patient, a 52-years-old woman with Pancreatic head cancer: CT scan of the abdomen showed soft tissue mass measuring 19x22x34mm at the pancreatic head, obstruction of CBD and dilatation of pancreatic duct (7 mm), no extra extension, no encasement of vessels with heterogeneous density and post-contrast enhancement, no cystic appearance (red cycle).

Рис. 1. КТ, брюшная полость, аксиальная плоскость. А – Внутривенное контрастирование, портальная венозная фаза. В – Внутривенное контрастирование, артериальная фаза.

Пациент, 52 года, женщина, рак головки поджелудочной железы. Определяется мягкотканое образование, размером 19x22x34 мм в области головки поджелудочной железы, обструкция общего желчного протока и дилатация Вирсунгова протока (7 мм), без экстенсивного распространения, без вовлечения сосудистых структур, неоднородной плотностью и с постконтрастным усилением, без кистозного компонента (красная окружность).

CT scans were done by the Siemens system (SOMATOM Definition AS; Siemens, Germany). The parameters of scan were (64 SLICES): Thickness (5 mm), Collimation (16 x 2.5), mAs/slice (250), Rot time (0.75 ms), Scan Angle (360°) and Resolution (Std). Slice thickness (2mm), reconstruction (1mm).

Scan done prior and post IV contrast administration. Water used as oral contrast given 5 min prior each study. Non-contrast images taken with 5 mm collimation. Omni-paque is used as IV contrast medium, administered at rate of 5 ml/sec. The CT scan images were taken post initiation of injection at 30 sec, 50 sec, 65 sec, to assess the arterial, pancreatic and venous phases, respectively.

Ethical considerations.

The study was approved by the Medical Ethical Board of College of Medicine, Babylon University (5053 in 26-07-2023).

Statistical analysis.

Statistical package for social science (SPSS version 26.0, NY, IBM Inc.) was used. Data were described as number and percent for

qualitative data, and mean with SD for quantitative data. The area under the receiver operating characteristic (ROC) curve (AUC) for the diagnostic test was used. The accuracy, sensitivity, and specificity were calculated. A P-value <0.05 considered statistically significant.

Results.

Patients baseline characters.

In this study, 22 patients preoperatively assessed for pancreatic mass were enrolled. The mean age of patients was 40.68±10.45 yrs (median=45.5 yrs). Most of patients included in age group (41-60 yrs) as 11 (50%). In regard to gender, females were predominant in 14 cases (63.6%) while 8 cases (36.4%) were males. Head of pancreas represented the common site of mass location in 13 cases (59.1%) of cases (Fig. 1). Body of pancreas recorded in 6 patients and tail in three patients (Table 1).

Results according CT scan.

Table №2 listed CT scan of pancreas. The maximum tumor dimension measured was most belonged between 2 to cm in 13 patients (59.1%). Those with dimension more than 4 cm



Fig. 2 a (Рис. 2 а)

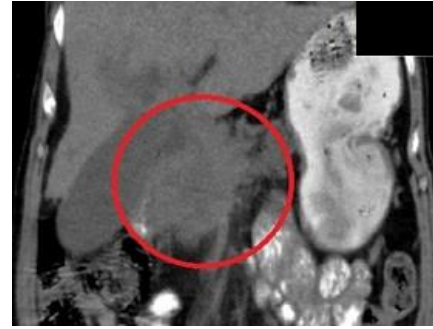


Fig. 2 b (Рис. 2 б)

Fig. 2. CT, abdomen. A – axial slice, portal venous phase with contrast enhancement. B – coronal slice, portal venous phase with contrast enhancement.

Patient, a 51-years-old woman with pancreatic head cancer showed soft tissue mass measure 72x62x60 mm at the pancreatic head, solid lobulated, obstruction of CBD and dilatation (14 mm), extra extension, encasement of portal duct and hepatic biliary tree. Multiple malignant regional LN (10x16 mm for largest one), and the mass infiltrated of ampulla of Vater and 2nd part of the duodenum (red circle).

Рис. 2. КТ, брюшная полость. А – аксиальная плоскость, внутривенное контрастирование, портально-венозная фаза. В – корональный срез, внутривенное контрастирование портально-венозная фаза.

Пациентка, 51 год, рак головки поджелудочной железы: определяется мягкотканное образование, размером 72x62x60 мм в области головки поджелудочной железы, солидная, дольчатого строения, с обструкцией и дилатацией общего желчного протока (14 мм), с экстенсивным распространением, с вовлечением портальной вены и желчных протоков. Отмечаются множественные регионарные метастатические лимфоузлы (максимальный размер 10x16 мм). Образование инфильтрирует фатерову ампулу и 2-ю часть двенадцатиперстной кишки (красная окружность).

Table №1. Patients baseline characters distribution (n=22).

Variables		No. of patient	%
Age (years)	20-40	6	27.3
	41-60	11	50
	>60	5	22.7
Gender	Male	8	36.4
	Female	14	63.6
Location of pancreas	Head	13	59.1
	Body	6	27.3
	Tail	3	13.6

Table №2. CT scan findings distribution (n=22).

Variables		No. of patient	%
Max tumor dimension (cm)	<2	2	9.1
	2-4	13	59.1
	>4	7	31.8
Attenuation	Hypo	19	86.4
	Iso	3	13.6
Dilatation	PD	7	31.8
	CBD	15	68.2
Invasion	Duodenum	6	27.3
	Stomach	2	9.1
	No	14	63.6
Arterial contact	Celiac	4	18.2
	Hepatic	1	4.5
	Mesenteric	4	18.2
Venous	No	13	59.1
	Portal	9	40.9
	Mesenteric	11	50.0
	IVC	2	9.1

(n=7; 31.8%). The Hypo-attenuated mass visualized in 19 cases (86.4%). The Iso-attenuated mass detected in three cases. In relation to dilatation, the pancreatic duct dilated in seven cases (31.8%) while CBD dilated in 15 cases (68.2%). Regarding to the invasion to adjacent organs, the duodenum was the common organ invaded in six patients. Stomach was invaded in two cases. Arterial contact to celiac artery seen in four patients and also for mesenteric artery. Hepatic artery contact seen in one patient. Venous content visualized in nine patients at portal vein, two in IVC and the most of patients with mesenteric vein (n=11; 50%) (Fig. 2).

Results according EUS.

Table №3 showed EUS findings of pancreas. Most of mass appearance was infiltrative in 14 cases (63.6%) whereas distinct mass seen in 8 patients only. In 16 of 22 patients (72.7%) hypo-echoic mass while six cases showed iso-echoic mass were showed. The dilatation seen in three cases in bile duct and four in pancreatic duct as shown in Figures 3, 4.

Accuracy rates results.

CT showed higher sensitivity and specificity (93.8% and 90%), respectively with accuracy rate reached to 81% in diagnosis of max tumor dimension among other tests with no statistical significant (p=0.854). Furthermore, EUS sensitivity, specificity and accuracy for echogenisty were greater among other parameter (75%; 66%; 60%), respectively, with no significant (p=0.768) (Table №4, Fig. 5, 6).

Discussion.

In the present study, the mean age of patients was 40.68±10.45 yrs (median =45.5 yrs). Females were predominant in 14 cases (63.6%) while 8 cases (36.4%) were males. Head of pancreas represented the common site of mass location in 13 of cases (59.1%). Body of pancreas recorded in 6 patients and tail in three patients. Dislike with Dickinson et al., and Pacella et al. findings [13, 14]. They studied more than 280 patients with pancreatic cancer. Dickinson et al., included 168 cases, 91 women and 77 man [13]. Joo et al., enrolled 110 patients (60 males and 50 females) mean age of 61±11 (28-89 yrs) [15]. Location of cancer as 68 head, 24 body and 18 tail.

Pongpornsup and co-authors, are dislike with our data, they studied cases have age range (7-85 yrs) as age of patients with malignant lesions (54-80 yrs) was lower than age of benign lesions (71-78 yrs) [16]. Also, Tantawy et al., mentioned that the age group mostly affected of (50-59) yrs, which are slight within the results of the present study [17]. A disagreement with Khattab et al., in their study on 39 patients, they found that males were affected more than females, and mean age of 58.3 yrs [18]. This is could be explained by different localities, different life expectancy, early diagnosis of lesions and early awareness of patients complained of symptomatic manifestations.

Parida and Biswal studied 62 cases, found that 76% were males and 24% were females

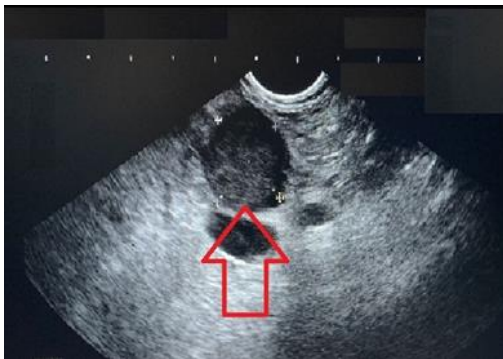


Fig. 3 (Рис. 3)



Fig. 4 (Рис. 4)

Fig. 3. Endoscopic ultrasound.

Pancreatic head hypoechoic infiltrative mass 2x3.5 cm (red arrow). Patient, a 52-years-old woman with pancreatic head cancer.

Рис. 3. Эндоскопическое ультразвуковое исследование.

Отмечается гипоехогенное образование головки поджелудочной железы размером 2х3,5 см (красная стрелка), с признаками инфильтрации. Пациентка, 52 года, рак головки поджелудочной железы.

Fig. 4. Endoscopic ultrasound.

Pancreatic head hypo-echoic infiltrative mass 6x8 cm with CBD dilatation (red circle). Patient, a 51-years-old woman with pancreatic head cancer.

Рис. 4. Эндоскопическое ультразвуковое исследование

Отмечается гипоехогенное образование головки поджелудочной железы размером 6х8 см с дилатацией общего желчного протока (красный кружок), с признаками инфильтрации. Пациентка, 51 год, рак головки поджелудочной железы.

Variables		No. of patient	%
Appearance	Distinct	8	36.4
	Infiltrative	14	63.6
Echogenisty	Hypo	16	72.7
	Iso	6	27.3
Dilatation	Pancreatic	4	18.2
	Bile	3	13.6
	No	15	68.2

Parameters		Sensitivity	Specificity	PPV	NPV	Accuracy	AUC	P- value
		%						
CT	Max tumor dimension	93.8	83.3	90	45.5	81	0.526	0.854
	Attenuation	67.1	59.6	75	29.4	66	0.479	0.883
	Dilatation	62.3	65	52.5	60	38.3	0.396	0.461
	Invasion	63	56	50	44.2	50	0.5	0.1
	Venous	68.8	33.3	52.1	52	65.5	0.698	0.161
EUS	Appearance	68.8	50	50	61.2	66.3	0.594	0.507
	Echogenisty	75	66	63.3	45.5	60	0.458	0.768
	Dilatation	63	33.3	59.1	38	62.5	0.448	0.712

CT, computed tomography; EUS, endoscopic ultrasonography; PPV, positive predictive value ; NPV, negative predictive value; AUC, are under curve

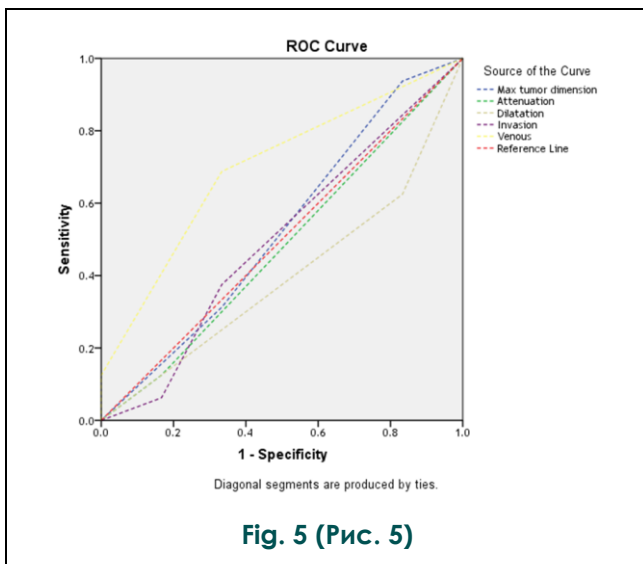


Fig. 5 (Рис. 5)

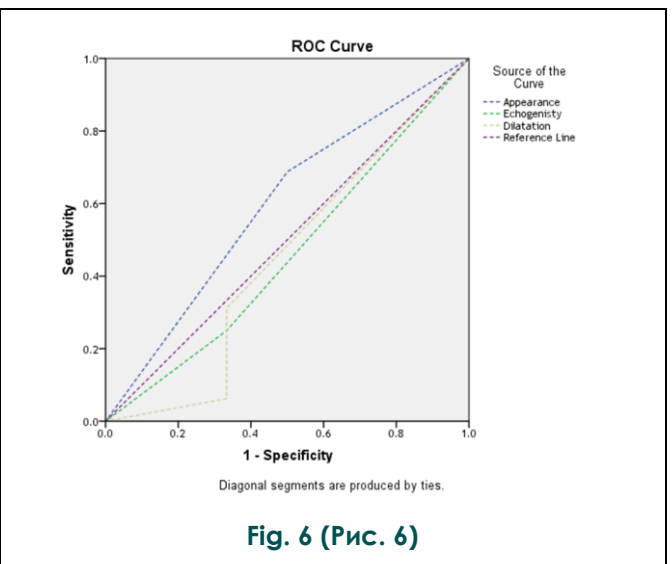


Fig. 6 (Рис. 6)

Fig. 5. ROC-curve of CT findings.
Рис. 5. ROC-кривая результатов КТ.

Fig. 6. ROC-curve of US findings.
Рис. 6. ROC-кривая результатов УЗИ.

with a male: female ratio of 3.1, and Hossain et al. reported 63% were men, and 37% were women [19, 20].

In this study, the maximum tumor dimension measured was most belonged between 2 to 4 cm in 13 patients (59.1%). Those with dimension more than 4 cm were 7 (31.8%). The Hypo-attenuated mass visualized in 19 cases (86.4%). The iso-attenuated mass detected in three cases. In relation to dilatation, the pancreatic duct dilated in seven cases (31.8%) while CBD dilated in 15 cases (68.2%). Regarding to the invasion to adjacent organs, the duodenum was the common organ invaded in six patients. Arterial contact to celiac artery seen in four patients and also for mesenteric artery. Venous content visualized in nine patients at portal vein, two in IVC and the most of patients with mesenteric as 11 (50%). Disagree with the findings of Dickinson et al. found 22(13%) cases had tumors that were not measurable (≤ 2 cm), 125 (74%) had tumor $> 2 - \leq 4$ cm, and 21 (12%) had tumors > 4 cm [13]. Tumors were present in 116 (69%) within the head, 19 (11%) within the neck and body or tail in 33 patients (20%). Tumor arterial contacting was presented in 47 cases and venous contacting was presented in 136 cases. They classified 25% of tumor as iso-attenuating. These data differ from our findings. The discordances are probably because of the differences in study designs including difference in patients selecting criteria, CT scan evaluation at different stages of management, vascular involvement assessment via intra-operative radiology, and inclusion of subjects with different primer resect-ability classifications [14, 21].

In this study, the EUS findings of pancreas as followed: Most of mass appearance was infiltrative in 14 cases (63.6%) whereas distinct mass seen in 8 patients only. In 16 of 22 patients (72.7%) showed hypo-echoic mass while six cases showed iso-echoic mass. The dilatation seen in three cases in bile duct and four in pancreatic duct. El-Nady et al. sampled 50 patients (14 females and 36 males), aged 62.32 ± 7.82 yrs [22]. The most frequent pancreatic cancer sites were head in 48%, followed by the neck in 26%, uncinata at 18%, and body at 8%. The size measured by EUS (36.26 mm) and CT scan (35.52 mm) without significant differences. All cases were malignant (48 ductal adenocarcinoma and 2 adenosquamous carcinoma), however, our findings showed only 16 cases were malignant.

In the current study, CT showed higher sensitivity and specificity (93.8% and 90%), respectively with accuracy rate reached to 81% in diagnosis of max tumor dimension among other tests with no statistical significant ($p=0.854$). Furthermore, EUS sensitivity, specificity and

accuracy for Echogenisty were greater among other parameter, (75%; 66%; 60%), respectively, with no significant ($p=0.768$). This is possibly due to fewer stringent classification requirement that tumor only be iso-attenuating in the portal venous phase, whereas Kim et al. required both arterial and portal venous iso-attenuation [21]. The different classification rates are possibly due to no association between tumor attenuation and other findings in the whole cohort or in either treatment group was discordant [13, 21].

Nady et al. showed no statistical significant between CT scan and EUS data for the vessels assessment, which included superior mesenteric vein, superior mesenteric artery, portal veins, splenic vein, hepatic artery, celiac artery, splenic artery [22]. Although, accuracy of EUS was greater than we calculated regarding vascular invasion. They reported 100% sensitivity, 95.93% specificity and 96% accuracy compared to CT. In addition, The EUS diagnostic data for arterial invasion assessment yielded 95.65% sensitivity, 100% specificity and 99.5% accuracy of compared to CT. This information highlighted that EUS as a reliable alternative to CT scan in detected of pancreatic cancer (particularly the ability to providing tissues samples and circumventing contrast agent).

Nady et al., and Gohar et al., revealed that the commonest sites of tumor of pancreas was head that to be easily investigated [22, 23]. However, Fujii et al. recorded a distinct distribution of 54.4% head and 31.5% the body [24].

Nady et al. concluded that the EUS potential to accurately evaluating the stags and vascular invasions of pancreatic cancers [22]. Its sensitivity, specificity, and accuracy suggesting that EUS could be superior to CT as the initial evaluation method.

Tantawy et al. identified 18 cases with pancreatic cancer by MDCT [27]. Furthermore, they assessed vascular invasion of tumors, which are the important parameter for deciding resect-ability of pancreatic cancers [25].

Egorov and colleagues, reported vascular involvement of pancreatic carcinoma ranges between (21-64%), most often with involvement of Superior mesenteric artery due to its position [26].

The sensitivity and specificity of CT in the study Tantawy et al. were greater than our findings [27]. The same findings were reported by Morgan et al. and Aziz et al. [27, 28]. These discrepancies may be due to small sample size, low value of retrospective study, short time of our study, un-generalization of our data.

Conclusions.

Head of pancreas represented the common site of pancreatic cancer. The large maximum tumor dimension measured, Hypo-

attenuated mass, dilatation of the pancreatic and CBD, invasion to adjacent organs encasement of vessels are features of pancreatic carcinoma detect by CT scan. Infiltrative, hypoechoic mass and dilatation of ducts are fea-

tures of pancreatic carcinoma detect by CT scan. CT have higher sensitivity and specificity, respectively among EUS, with no significant difference.

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