ОРИГИНАЛЬНАЯ СТАТЬЯ

THE ROLE OF CT SCAN IN THE DIAGNOSIS OF PANCREATIC CYSTIC LESIONS

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Cystic lesions of pancreas are common and challenge more difficulty to detection. Computed tomography (CT) is the best radiology tool for the primer evaluation and follow-up of pancreatic cysts.

Purpose. To determine the role of CT scan in the diagnosis of pancreatic cystic lesions, and differentiate weather lesions are malignant or benign.

Materials and methods. A prospective study with total of 58 patients were enrolled in the study during the period from 12th June 2021 to 20th May 2022. The study sample consisted of 19 (32.8%) male and 39 (67.2%) female. CT scan features include: lesion sites, parenchymal atrophy, number of cystic lesion, diameter of largest cyst, calcification, ductal dilation, solid components, cyst contour, contrast enhancement, type of cyst, thickness of wall, lymphovascular invasion and communication were collected. CT scan was performed utilizing the Siemens system (SOMATOM Definition AS VA44A; Siemens, Somaris/7 syngo CT 67002-2012B, Germany) and 64-slice (multi-detector) CT system (Philips).

Results. The mean age was 41.59±11.9 years. The majority of cysts were situated in head of pancreas (21, 36.2%). About 33 (56.9%) of cases detected one cyst on CT scan. The CT scan detected 47 (81.1%) of non-calcified cysts. Only six-scan showed dilation of duct and 6 (10.3%) cases had cyst with solid component. The cyst contour presented as round in 50 (86.2%) of patients. The majority appear to be homogeneous in 45 (77.6%). About 39 (67.2%) cases detected unilocular cysts. Kappa statistic was revealed that cyst location (P=0.036), number of cyst (P=0.048), ductal dilation (P=0.022), solid component (P=0.003) and type of cyst (P=0.013) had significantly perfect agreement signals. Solid components of cyst showed statistically significant difference in malignant pancreatic cyst more than benign cyst (P=0.004). Furthermore, types of cyst in benign pancreatic tumor were detected significantly different from malignant lesion (P=0.016).

Conclusions. CT scan is the easy applicable non-invasive tool of choice for assessment of cystic lesions of pancreas. Round, homogeneous enhancement, oligo-unilocular, non-calcified, non-dilated duct, non-solid and thin wall head cyst are the prevalent features detected by CT scan. The most common diameter measured of pancreatic cyst is more than 30 mm. Lymphovascular invasion, solid component and communicated cyst-duct are mostly features of malignant lesions. Detection of cyst site, number, ductal dilation, solid component and type of cyst are significantly helpful to differentiated between malignant and benign pancreatic cysts.

Keywords: computed tomography, pancreatic cystic lesions, Kappa statistic.

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КОМПЬЮТЕРНАЯ ТОМОГРАФИЯ В ДИАГНОСТИКЕ КИСТОЗНЫХ ПОРАЖЕНИЙ ПОДЖЕЛУДОЧНОЙ ЖЕЛЕЗЫ

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Кистозные поражения поджелудочной железы встречаются часто и иногда с трудом диагностируются. Компьютерная томография (КТ) является лучшим методом визуализации для первичной оценки и наблюдения за кистами поджелудочной железы.

Цель. Определение роли КТ в диагностике кистозных поражений поджелудочной железы и дифференциации их на злокачественные и доброкачественные.

Материалы и методы. В период с 12 июня 2021 г. по 20 мая 2022 г. было проведено проспективное исследование с участием 58 пациентов. В исследование включены 19 (32,8%) мужчин и 39 (67,2%) женщин. КТ-критерии включали в себя: область поражения, атрофию паренхимы, количество кистозных поражений, диаметр наибольшей кисты, кальциноз, расширение протоков, солидные компоненты, контур кисты, контрастное усиление, тип кисты, толщину стенки, лимфоваскулярную инвазию, сообщение между кистой и протоком. КТ выполняли с использованием аппарата Siemens (SOMATOM Definition AS VA44A; Siemens, Somaris/7 syngo CT 67002-2012B, Германия) и 64-срезового (мультидетекторного) КТ (Philips).

Результаты. Средний возраст составил 41,59±11,9 года. Большинство кист располагалось в головке поджелудочной железы (21, 36,2%). В 33 (56,9%) случаях выявили единичные кисты на компьютерных томограммах. При КТ было выявлено 47 (81,1%) кист без кальциноза. Только в 6 наблюдениях было выявлено расширение протока, а также в 6 (10,3%) случаях была обнаружена киста с солидным компонентом. Контур кисты был круглым у 50 (86,2%) больных. Большинство кист были однородными (n=45, 77,6%). Около 39 (67,2%) случаев составили однокамерные кисты. Каппа-статистика показала, что расположение кисты (P=0,036), количество кист (P=0,048), расширение протока (P=0,022), солидный компонент (P=0,003) и тип кисты (P=0,013) имели достоверно полное соответствие данных. Солидные компоненты кисты показали статистически значимую разницу между злокачественной кистой поджелудочной железы и доброкачественной кистой (P=0,004). Кроме того, выявлены типы кист при доброкачественной опухоли поджелудочной железы, достоверно отличающиеся от злокачественного поражения (P=0,016).

Выводы. КТ является легко применимым неинвазивным методом выбора для оценки кистозных поражений поджелудочной железы. Характерными признаками, определяющимися при КТ-сканировании, являются: округлые контуры, гомогенное усиление, олигоунилокулярные, некальцинированные, без расширения протока, несолидные и тонкостенные кисты головки. Наиболее часто измеряемый диаметр кисты поджелудочной железы составил более 30 мм. Лимфоваскулярная инвазия, солидный компонент и сообщение между кистой и протоком являются наиболее характерными признаками злокачественных новообразований. Обнаружение расположения кисты, количества, расширения протока, солидного компонента и типа кисты значительно помогает дифференцировать злокачественные и доброкачественные кисты поджелудочной железы.

Ключевые слова: компьютерная томография, кистозные поражения поджелудочной железы, каппа-статистика.

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Pancreas cyst are very common and raising challenge delima of difficulty to investigation [1]. The common detected cystic lesions are pseudocysts, serous cystadenomas (SCA), mucinous cystic neoplasms (MCN), intraductal papillary mucinous neoplasms (IPMN) and solid pseudopapillary tumors. Almost all cysts may be pseudocysts, and all cysts require to diagnosed to be prove weather be malignant or pre-malignant [2]. Recently, there is no gold standard radiological tools for differentiation [3]. CT scan, PET scan, MRI, MR-cholangiopancreatography, endoscopic ultrasound with fine needle aspiration (EUSFNA), endoscopic retrograde cholangiopancreatography (ERCP) and cyst fluid tumor markers have been used to diagnosed cysts which are demonstrated different degrees of sensitivity and specificity [2-8]. These cysts categorized into neoplastic and non-neoplastic. Neoplastic cystic lesions can transform to malignant. In addition, pseudocysts, lymphoepithelial cysts, and retention cysts are never transform to malignancy. The percent of diagnosed of cysts has been varied, ranging from 0.7-36.7% [9-12].

In recent studies, CT scan is the best radiology tool for the primer evaluation and follow-up of cysts [13-17]. Advantageous properties of available multi-slice CT scans are the high speed of acquisition with narrow collimation, large image resolution, multi-planar imaging and reformats using volume data [18]. Additionally CT is widely available, easily accessible, less cost, high sensitive, high accurate, reproducible, and easy to read [18]. CT scan protocols vary in practice worldwide, and the commonly using is delay 40-50 sec and portal venous phase (delay of 60-70 sec) [14-16, 19, 20]. A monophasic CT protocol after intravenous contrast administration is usually sufficient for the diagnosis, severity assessment, and monitoring the progression of AP [18].

Aims of the study are to determine the roles of CT scan in the diagnosis of pancreatic cystic lesions, to differentiate weather lesions are malignant or non-malignant and to find-out the imaging features for detection of the benign and malignant cysts.

Methods.

Study design and setting.

A prospective study with total of 58 patients with central abdominal pain radiated to back were enrolled in the study during the period from 12thJune 2021 to 20thMay 2022.The study sample consisted of 19 (32.8%) male and 39 (67.2%) female, their median age was 42 years (mean=41.59±11.9 years).

Data collection.

Participants data, including age, gender, and symptoms, besides, and CT scan features include: lesion sites (head, neck, body, tail or multi sites), parenchymal atrophy (present or not), number of cystic lesion (1, 2 or 3 and more), diameter of largest cyst (<10mm, 10-30 mm and >30 mm), calcification (parietal, central and peripheral), ductal dilation (present or not), solid components (present or not), cyst contour (round, lobulated, and pseudopod), contrast enhancement (homogeneous and heterogeneous), cyst types (Uni-locular, Micro-multi-locular, Macro-multi-locular and Solid), thickness of wall (thin and thick), lymphovascular invasion (present or not) and communication (cyst-duct) (present or not). All the studied patients went for CT scan examination, which was done before any intervention.

Exclusion Criteria.

1. Any contraindication for CT scan examination (pregnancy, and allergy to contrast).
2. Patients unwilling to do the CT scan.
3. Patients with renal insufficiency.

CT scan protocols.

CT scan was performed utilizing the Siemens system (SOMATOM Definition AS VA44A; Siemens, Somaris/7 syngo CT 67002-2012B, Germany) and 64-slice multi-detector) CT system (Philips).The image quality checked according to following:

• Checked with the LINE tool that the diameter of large Acrylic pin is 50±1 mm.

• All resolution holes (7 rows) in the Acrylic pin should be visible.

• Five to six low contrast pins in the Aculon body be detectable.

The measurement scan parameter of 64 SLICE are:

• Collimation .....16 x 2.5
• Thickness.....5
• Increment.....0
• Rot time.....0.75
• Voltage.....120
• mAs/slico.....250
• Resolution.....Std
• Scan Angle.....360º

Technique of MDCT scan

• CT scan was performed using (64-slice multi-detector) CT system (Philips) of (kV 120) and (MAS 100).

• Scan done prior and after IV contrast taken. Water used as oral contrast given five min before each CT scan. Non-contrast CT images taken with five mm collimation. Omnipaque is used as IV contrast medium, then injected at rate of five ml/sec.

• The CT scans are taken after initiation of contrast at 30 sec, 50 sec, 65 sec, to assess the arterial, pancreatic and venous images, re-

Table №1. Patients demographic distribution of this study.

Characteristics		No.	%
Age (years) Mean±SD (Median)= 41.59±11.9 (42)	12-20	2	3.4
	21-30	11	18.9
	31-40	14	24.2
	41-50	19	32.8
	51-60	10	17.2
	>60	2	3.4
Gender	M	19	32.8
	F	39	67.2
Symptoms	Pancreatic	19	32.8
	Lab	27	46.6
	Other	12	20.6

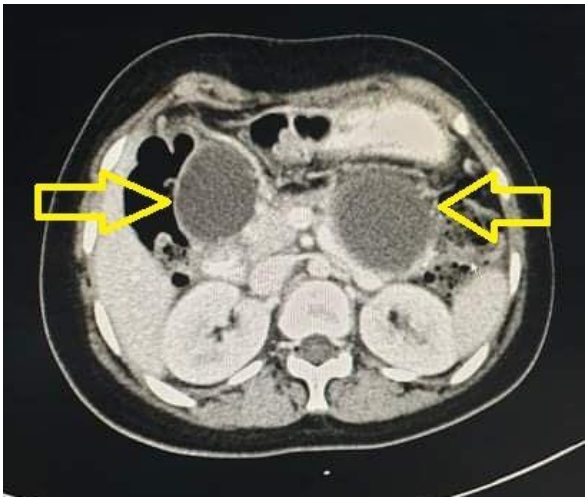

Fig. 1 (Рис. 1)

Fig. 1. CT, abdomen, axial view, soft tissue window.

Patient, 12-years-old female with abdominal pain and vomiting.

CT scan after contrast showed multiple cystic lesion (head and tail), largest cyst (> 30 mm), peripheral enhancement homogenous round in shape with thick wall, and there are no calcification, ductal dilation, solid component, LVI or communication.

Рис. 1. КТ брюшной полости, аксиальная плоскость, мягкотканный режим.

Пациентка, 12 лет, с болью в животе и рвотой.

При КТ после контрастирования визуализируются множественные кистозные образования (головка и хвост), большая киста размером > 30 мм, периферическое усиление, гомогенной округлой формы с толстой стенкой; кальциноз, расширение протоков, солидный компонент, лимфоваскулярная инвазия, сообщение между кистой и протоком отсутствуют.

spectively.

• Slice thickness is 2mm slice, reconstruction of pancreatic images are at 1mm.

Ethical considerations.

Written informed consent was obtained from the patients for participating in this research. The study was approved by the Medical Ethical Committee of College of Medicine, Babylon University (ID: 2022305).

Statistical analysis.

Statistical package for social science (SPSS version 24.0, Chicago: SPSS, Inc.) was used. Results were described in the form of frequencies and percentage for qualitative data and (mean, and SD) calculation for quantitative data. Pearson's correlation test was used to detect the relationship between continuous variables. Inter-observer kappa agreement was assessed. A one-sided P value of 0.05 or less was considered statistically significant.

Results

The most commonly recorded age group was that between (41-50) years in 19 (32.8%). Symptomatically speaking, 19 (32.8%) patients presented with pancreatic symptoms, 27 (46.6%) patients laboratory detected, and 12 (20.6%) patients diagnosed by other symptom as abdominal pain, nausea and vomiting (table №1).

Regarding the sites of pancreatic cyst, the majority of cysts were situated in head of pancreas (21, 36.2%). Twelve (20.6%) cases were located in neck, 12(20.6%) cases were located in multi-site, 8(13.8%) cases situated in body, and 5(8.6%) cases located in tail of pancreas. Ten (17.2%) of lesions detected with parenchymal atrophy, whereas 48 (82.8%) of cysts weren't atrophied. Regarding number of cyst, 33 (56.9%) of cases detected one cyst on CT scan, 11(19%) cases diagnosed with two-cysts, and 14 (24.1%) cases diagnosed with more

than three-cysts (fig. 1).

In term of largest cyst, the cases categorized as group with diameter of cyst less than 10 mm, group of 10-30 mm, and group of more than 30 mm diameter. Four (6.9%) cases with group 1, 26 (44.8%) cases with group 2, and 28 (48.3%) cases with group 3. The CT scan detected calcified cyst in 11 cases as 2 (3.4%) parietal calcification, 3 (5.2%) central calcification and 6 (10.3%) peripheral calcification. However, 47 (81.1%) of cyst was not calcified. In relation to ductal dilation, only six-scan showed dilation of duct, while 52 (89.7%) scan was not showed any dilation. In relation to solid component of cyst, 6 (10.3%) of cases had cyst with solid component, whereas 52 (89.7%) cases detected without solid component. The cyst contour presented as round (oval) in 50 (86.2%) of patients, lobulated contour in 5 (8.6%) cases, and pseudopod in 3 (5.2%).All cysts were enhancement with contrast. The majority appear to be homogeneous in 45 (77.6%), while the rest 13 (23.4%) were heterogeneous in content. In relation to the type of cyst, 39 (67.2%) cases detected with unilocular cyst, 6 (10.3%) with micro-multilocular, 3 (5.2%) with macro-multilocular, and 6 (10.3%) with solid type. In addition, four cases were missed. According to wall thickness of cyst, the results revealed 43 (74.1%) cases with thin wall, while 15 (25.9%) cases with thick wall. In relation to lymphovascular invasion, only four (6.9%) patients showed LVI, while 54 (93.1%) cases recorded without LVI. Regarding communication (cyst-duct), this feature found in 6 (10.3%) cases, and not visualized in 52 (89.7%) cases (Table 2).

Inter-observer agreement Kappa statistic of CT finding was revealed that detection of cyst location (k=6.8; P=0.036), number of cyst (k=2.1; P=0.048), ductal dilation (k=4.8; P=0.022), solid component (k=13.7; P=0.003) and type of cyst (k=12.2; P=0.013) had significantly perfect agreement signals. The rest signs were interpreted with fair agreement as followed; parenchymal atrophy (k=-0.021), diameter of largest cyst (k=-0.28), calcification (k=0.33), diameter of ductal dilation (k=0.06), contour of cyst (k=-0.135), content of cyst (k=0.245), enhancement (k=0), wall thickness (k=-0.034), LVI (k=-0.016), and communication (k=0.042) (Table 3).

Characteristic of CT scan findings in non-malignant and malignant lesions are listed in Table 4. Pancreatic cysts locations, parenchymal atrophy of cyst, number of cyst, diameter of largest cyst, calcification, ductal dilation and diameter, contour, contents, enhancement, wall thickness, LVI and cyst-duct communication were differ insignificantly (P=0.752), (P=1), (P=0.621), (P=0.882), (P= 1), (P=0.231), (P=1), (P=0.452), (P=0.082), (P=NA), (P=1), (P=0.5), and (P=0.576), respectively, between benign and malignant tumors. Additionally, solid components of cyst showed statistically significant difference in malignant pancreatic cyst more than benign cyst (P=0.004). Furthermore, types of cyst in benign pancreatic tumor were detected significantly different from malignant tumor (P=0.016).

Discussion.

In this study, the majority of pancreatic cysts were situated in head (21, 36.2%). Whereas, twelve (20.6%) cases were located in neck, 12 (20.6%) cases were located as a multi-site, 8 (13.8%) cases situated in body, and 5 (8.6%) cases located in tail of pancreas. An agreement with Tantawy et al. (head (n=11), body (n=2), tail (n=4) and diffuse (n=1)) and a disagreement with Pongpornsup et al. study (head (n=9), body (n=6), tail (n=10) and neck (n=2)) were recorded [21, 22].

According to other CT scan findings in this study, ten (17.2%) cases with pancreatic lesions have parenchymal atrophy, 33 (56.9%) of cases have one cyst, 11 (19%) cases diagnosed with two-cysts, and 14 (24.1%) cases diagnosed with more than three-cysts. Pongpornsup et al., study showed that polycystic lesions were common [22]. Multi-cystic pattern (multiple microcyst<2 cm) are common presented in up to 70% of cases which is a morphologic patterns of SCNs, besides, honeycomb and oligo-cystic [23].

Also, the cases with diameter of cyst less than 10 mm, were 4 (6.9%) cases, 26 (44.8%) cases with (10-30 mm), and 28 (48.3%) cases with more than 30 mm. Pongpornsup et al. study revealed range of diameter from 7.2 mm to 14.7 mm [22].

The calcified cyst presented in 11 (18.9%) of cases, however, 47 (81.1%) of cyst was not calcified, whereas Pongpornsup et al., study reported 9 cases with calcification and 24 cases without [22]. Calcified cyst was seen on CT scan in 30% of cases which is specific and pathgnomonic for SCNs [24].

Kim et al. described the correlation stigma in chronic pancreatitis, as calcifications, duct dilatation, stones, and parenchyma atrophic change present in pancreatic pseudocyst [25].

Atypical manifestations of SCNs include giant tumors with ductal dilatation, intratumoral hemorrhages, uni-locularlesions, solid variants, and a spreading form [26]. SCNs are generally considered as benign, however, about three percent have high malignant potential

Table№2. Patients distribution according to CT scan findings.			
Findings		**No.**	**%**
Site	Head	21	36.2
	Neck	12	20.6
	Body	8	13.8
	Tail	5	8.6
	Multi sites	12	20.6
Parenchymal atrophy	Atrophied cyst	10	17.2
	Not	48	82.8
Number of cyst	1	33	56.9
	2	11	19
	≥3	14	24.1
Diameter of largest cyst	<10 mm	4	6.9
	10-30 mm	26	44.8
	>30 mm	28	48.3
Calcification	Peripheral	6	10.3
	Central	3	5.2
	Parietal	2	3.4
	Not	47	81.1
Ductal dilation	Yes	6	10.3
	No	52	89.7
Solid component	Yes	6	10.3
	No	52	89.7
Cyst contour	Round (oval)	50	86.2
	Lobulated	5	8.6
	Pseudopod	3	5.2
Enhancement	Homogeneous	45	77.6
	Heterogeneous	13	23.4
Type of cyst	Unilocular	39	67.2
	Micro multilocular	6	10.3
	Macromultilocular	3	5.2
	Solid	6	10.3
	Missed	4	6.9
Wall thickness	Thin	43	74.1
	Thick	15	25.9
Lymphovascular invasion	Present	4	6.9
	Absent	54	93.1
Communication (cyst-duct)	Present	6	10.3
	Absent	52	89.7

Table №3. Kappa value in each CT finding.

Sign	Kappa value	95%CI	P-value
Cyst location	6.8#	0.295-0.318	0.036
Parenchymal atrophy	-0.021-	-	1
Number of cyst	2.1#	0.474-0.5	0.048
Diameter of largest cyst	-0.28-	0.843-0.862	0.085
Calcification	0.33	-	1
Ductal dilation	4.8#	0.213-0.234	0.022
Diameter of ductal dilation	0.06	0.792-0.812	0.082
Solid component	13.7#	0.002-0.005	0.003
Contour of cyst	-0.135-	0.321-0.345	0.333
Type of cyst	12.2#	0.01-0.016	0.013
Content of cyst	0.245	0.08-0.096	0.088
Enhancement	0	-	1
Wall thickness	-0.034-	-	1
LVI	-0.016-	-	1
Communication	0.042	0.57-0.596	0.058

Inter-observer agreement Kappa statistic

fair agreement, 0.21-0.40

moderate agreement, 0.41-0.60

substantial agreement, 0.61-0.80

#perfect agreement, 0.81-1.0

with regional invasion and distant spreading [27, 28]. Heneidy et al. (2017) stated that cystic lesions has been estimated to range from 2.4% to 24% in CT scan imaging, Galanis et al. stated that serous cystadenoma accounts for only 1-2% of all pancreatic neoplasm [29, 30].

Only six-scan showed dilation of duct, while 52 (89.7%) scan were not showed any dilation, while Pongpornsup et al. study reported dilation of cyst in 11 cases [22].

Approximately 6 (10.3%) of cases had cyst with solid component. Round (oval) cyst contour detected in 50 (86.2%), lobulated contour in 5 (8.6%), and pseudopod in 3 (5.2%). Pongpornsup et al., study revealed (21) cysts were round, (9) lobulated and (3) pseudopod [22].

All pancreatic cysts in this study are enhancement with contrast. Authors said the enhancement of ductal nodule and large main duct dilatation are more common in the malignancy, whereas other not described such relation [22, 31, 32].

The majority appear to be homogeneous in 45 (77.6%), while the rest 13 (23.4%) were heterogeneous in content. Also, in Pong pornsup et al. study, the majority of cysts were homogeneous (n=26), and the rest were heterogeneous (n=7) [22].

About 39 (67.2%) cases detected with unilocular cyst, 6 (10.3%) with micro-multilocular, 3 (5.2%) with macro-multilocular, and 6 (10.3%) with solid type. In Pongpornsup et al. study found 14 cases unilocular cyst, 16 cases multilocular, and 3 case were solid components [22]. The results of this study similar to that described by Kim et al. [25]. According to the present findings, cyst types (uni-locular, multi-locular micro-cystic, multi-locularmacrocystic and solid component) can be used for distinguishing between benign and malignant lesions of pancreas. However, the overlapping of is usually observed [22].

The results revealed 43 (74.1%) cases with thin wall, while 15 (25.9%) cases with thick wall. Pongpornsup et al. study [22] revealed 14 cases with thin wall and 17 cases with thick wall.

Only 4 (6.9%) lesions showed LVI, while 54 (93.1%) cases recorded without LVI, whereas Pongpornsup et al. study [22] mentioned that only nine cases detected with vascular in

Table №4. CT scan findings in benign and malignant lesions.

Findings of CT scan		Benign	Malignant	P – value*
Cyst location	Head	16	5	0.752
	Neck	11	1	
	Body	7	1	
	Tail	4	1	
	Multi-sites	11	1	
Parenchymal atrophy	Yes	8	2	1
	No	41	7	
Number of cyst	1	27	6	0.621
	2	9	2	
	≥3	13	1	
Diameter of largest cyst	< 10 mm	3	1	0.882
	10-30 mm	23	3	
	>30 mm	23	5	
Calcification	Parietal	2	0	1
	Central	5	1	
	Peripheral	12	1	
Ductal dilation	Yes	4	2	0.231
	No	45	7	
Diameter of ductal (mean± SD)		10.75 ±2.22	9.5±2.12	1
Solid compo-nent	Yes	2	4	0.004
	No	47	5	
Contour	Round (oval)	41	9	0.452
	Lobulated	5	0	
	Pseudopod	3	0	
Type of cyst	Unilocular	35	4	0.016
	Micro multilocular	5	1	
	Macro multilocular	3	0	
	Solid	2	4	
Content of cyst	Homogeneous	40	5	0.082
	Heterogeneous	9	4	
Enhancement		49	9	NA
Wall thickness	Thin	36	7	1
	Thick	13	2	
LVI	Yes	3	1	0.5
	No	46	8	
Communication	Yes	6	0	0.576
	No	43	9	

*Pearson Chi-Square

volvement, which contrast to the prior CT scan study that reported up to 65% lesions with LVI [33]. MCNs can be differentiated from intraductal papillary mucinous tumor by its lack of cyst-duct communication. It can be divided as adenoma, borderline, non-invasive, and invasive tumors. The papillary projection and intramural nodules are presenting in the malignant category [22, 34].

In their study, Egorov et al. found vascular involvement of patients with pancreatic carcinoma ranges between (21-64%), most often with involvement of SMA, due to its location [35].

Regarding communication (cyst-duct), this feature found in 6 (10.3%) cases, and not visualized in 52 (89.7%) cases. Pongpornsup et al. study [22] showed only 6 cases with cyst-duct communication.

Solid cystic appearance with heterogeneous enhance is recorded as malignancy, which could be distinguished from solid pseudopapillary neoplasm, mucinous cyst-adenocarcinoma and cystic change in neuroendocrine malignancy [22]. Degenerative cystic changes are common in solid pseudopapillary epithelial neoplasms due to less blood supply. As a result pathological findings of malignancy are solid, hyper-vascular regions without gland formation, cellular, and degenerative pseudopapillae [28].

Cohen-Scaliand colleagues reported that head site, lobulated cyst, and absence of wall enhancement are specific for uni-locular macro-cystic serous cystadenoma [36].

Statistically speaking the inter-observer agreement Kappa statistic of CT scan finding was revealed that detection of cyst location (k= 6.8; P=0.036), number of cyst (k= 2.1; P=0.048), ductal dilation (k= 4.8; P=0.022), solid component (k= 13.7; P=0.003) and type of cyst (k= 12.2; P=0.013) had significantly perfect agreement signals to differentiated between malignant and benign pancreatic lesions. The rest signs were interpreted with fair agreement. Moreover, the favorable agreement (k= 0.705), is agree with a study of Pongpornsup et al. (k= 0.716) [22].

In correlation between benign and malignant in this study, the results showed that pancreatic cysts locations, parenchymal atrophy of cyst, number of cyst, diameter of largest cyst, calcification, ductal dilation and diameter, contour, contents, enhancement, wall thickness, LVI and cyst-duct communication were differ insignificantly (P> 0.05). Additionally, solid components of cyst showed statistically significant difference in malignant pancreatic cyst more than benign cyst (P=0.004). Furthermore, types of cyst in benign pancreatic tumor were detected significantly different from malignant tumor (P=0.016).

Crippa et al. recorded that MCNs documented 25% of all cystic malignancies and IPMNs were 50% [37].

Another series of 851 cases from 1978 to 2011 shown that IPMNs assumed for 38% of cysts, MCNs for 23%, SCNs for 16%, and solid pseudo-papillary tumors for 3% [38]. This misguidance can be diminished with a multidisciplinary team approach to study these cysts with incorporation of the clinical, radiologic, and pathologic findings before reaching a definite diagnosis.

Conclusions.

CT scan is the easy applicable non-invasive tool of choice for assessment of cystic lesions of pancreas. Round, homogeneous enhancement, oligo-unilocular, non-calcified, non-dilated duct, non-solid and thin wall head cyst are the prevalent features detected by MDCT scan. The most common diameter measured of pancreatic cyst is more than 30 mm. Lymphovascular invasion, solid component and communicated cyst-duct are mostly features of malignant lesions. Detection of cyst site, number, ductal dilation, solid component and type of cyst are significantly helpful to differentiated between malignant and benign pancreatic cysts. Pancreatic cysts sites, parenchymal atrophy, number, diameter of largest cyst, calcification, ductal dilation and diameter, contour, contents, enhancement, wall thickness, LVI and cyst-duct communication could be negatively impacted the CT scan results. Solid components of cyst and types of cyst could be positively implicated CT scan results.

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