CT scan in the early assessment of patients with acute pancreatitis

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Abstract

Background

Guidelines recommend that contrast-enhanced computed tomography (CT) should be carried out 72 hours after onset of an attack of acute pancreatitis (AP). However, the exact time beyond 72 hours at which CT will produce the best diagnostic yield for local complications

Objective

To determine CT scan in the early assessment of patients with acute pancreatitis

Methods

A cross-sectional study was conducted at Jinnah Hospital Lahore Pakistan, which was performed between September 2020 to December 2023, The name of CT scan machine which was used in our study was Toshiba 64 slice and its slice thickness was 0.5 mm. Iodine-based contrast is used. The total number of patients in our study were 100. The number of Male patients were 45 and female were 55. For all patients, we did diagnostic tests CECT. BMI parameter of every

patient we took. We also took detailed history from the patients about the signs and symptoms. Data was tabulated and analyzed by SPSS version 26.

Result

In a current study total 100 patients were enrolled. The minimum age of patients were 42 years and the maximum age of the patients were 81 years. The mean age were 57.95±11.112 years. The minimum BMI of patients were 25 (Kg/m2) and the maximum BMI were 31 (Kg/m2). The mean BMI were 27.55±1.83 (Kg/m2). The minimum serum amylase were 300 (U/L) and the maximum serum amylase were 700 (U/L). The mean serum amylase were 376.55±87.42 (U/L). The minimum serum Lipase were 350 (U/L) and the maximum serum Lipase were 820 (U/L). The mean serum Lipase were 438.0±103.08 (U/L).
the frequency of Female patients were 55 and the percentage were 55. The cumulative percent were same 55.0. The frequency of male patients were 45 and the percentage were 45. Total number of patients were 100 (100 %) in our study.
he frequency of gallstones were absent in 54 patients and its percentage were 54% and the frequency of gallstone were present in 46 patients and its percentage were 46%.
P-value is <0.04 in our study.

Conclusion

We concluded that the most common etiology of acute pancreatitis is Gallstone. Early CT was a good indicator of the severity of acute pancreatitis in our selected population. Pancreatic necrosis is estimated on early, contrast-enhanced CT and seen only in patients having severe disease. CECT is a good modality for the early detection of AP. Females were more in our study as compared to males.

Keywords: *Low-dose CT (LDCT), Acute pancreatitis (AP)Computed Tomography (CT).*

Introduction

The global incidence is rising, although studies suggest rates are currently more stable in Asia [1]. The prevalent inflammatory exocrine pancreatitis condition known as acute pancreatitis has a fatality rate of 1-2% and is characterized by severe stomach pain and numerous organ dysfunction that can progress to pancreatic necrosis and permanent organ failure [2]. Abdominal tomography is the imaging modality most frequently used to diagnose acute pancreatitis [3]. Pancreatitis acuteis (AP) is a frequently occurring gastrointestinal emergency. Imaging will be necessary to establish the diagnosis if stomach discomfort clearly implies the presence of AP but the serum lipase and/or amylase activity is less than three times the upper limit of normal, as may be the case with delayed presentation [4]. For the purpose of precisely assessing abdomen adipose and skeletal muscle characteristics, computed tomography (CT) imaging is considered the gold standard for body composition assessment [5]. Nearly all AP patients had an abdominal CT scan. When determining the severity of AP, admission abdominal CT scans and clinical rating methods performed similarly [6]. Patients with mild edematous AP can be released in as little as a few days in roughly 80% of cases. However, a severe or complex course of pancreatitis occurs in around 20% of individuals; this kind of pancreatitis is characterized by early or delayed systemic and local consequences [7]. The two most significant local consequences of AP are pancreatic necrosis and peripancreatic fluid collections. Patients with pancreatic necrosis have a significantly higher morbidity and mortality rate than those with non-necrotizing interstitial pancreatitis[8]. Currently, the loss of vascular enhancement on cross-sectional imaging, such as computed tomography (CT) or magnetic resonance imaging, is the best way to identify pancreatic necrosis [9]. Additionally, pancreatic problems include splanchnic thrombosis, extrapancreatic necrosis, ascites, pleural effusion, fluid collection, and, eventually, walled-off necrosis/pseudocysts and pseudoaneurysms can be diagnosed with CT using intravenous contrast [10-11]. Therefore, the majority of guidelines advise doing a CT scan more than 72 hours after the onset of symptoms. [12] The precise moment beyond 72 hours after the onset of symptoms at which CT will show the best diagnostic yield for local complications is unclear, as the development of pancreatic necrosis and local complications in AP is a dynamic process. [13] On the other hand, new research has demonstrated that early CT offers valuable prognostic information rather than aggravating severe pancreatitis [14]. Because the impairment of pancreatic perfusion and signs of

peripancreatic necrosis develop over a period of seven days, an early CECT may underestimate the extent of pancreatic and peripancreatic necrosis. For this reason, a CT examination should not be performed before 72 hours after the onset of symptoms in order to grade the severity of the disease [15–16]. Acute necrotic collections, or ACNs for short, are ill-organized necrotic collections that appear during the first four weeks of necrotizing pancretitis [17–18]. In order to diagnose acute pancreatitis, two of the following three criteria must be met: (1) abdominal pain that is consistent with the illness; (2) serum lipase or amylase levels that are three times higher than normal; and (3) findings on cross-sectional abdominal imaging that are consistent with the illness [in adults, computed tomography (CT) [19-20].

MATERIALS AND METHODS

A cross-sectional study was conducted at Jinnah Hospital Lahore Pakistan, which was performed between September 2020 to December 2023, The name of CT scan machine which was used in our study was Toshiba 64 slice and its slice thickness was 0.5 mm. Iodine based contrast is used. The total number of patients in our study were 100. The number of Male patients were 45 and female were 55. For all patients, we did diagnostic tests CECT. BMI parameter of every patient we took. We also took detailed history from the patients about the signs and symptoms. Data was tabulated and analyzed by SPSS version 26.

Results

Table 1: Mean age, BMI, Serum Amylase and Serum lipase of all the enrolled patients (*n=100*)

Variables	Minimum	Maximum	Mean±SD
Age (Years)	42	81	57.95±11.112
BMI (Kg/m2)	25	31	27.55±1.83
Serum Amylase (U/L)	300	700	376.55±87.42
Serum Lipase (U/L)	350	820	438.0±103.08

In a current study total 100 patients were enrolled. The minimum age of patients were 42 years and the maximum age of the patients were 81 years. The mean age were 57.95±11.112 years. The minimum BMI of patients were 25 (Kg/m2) and the maximum BMI were 31 (Kg/m2). The mean BMI were 27.55±1.83 (Kg/m2). The minimum serum amylase were 300 (U/L) and the maximum serum amylase were 700 (U/L). The mean serum amylase were 376.55±87.42 (U/L).

The minimum serum Lipase were 350 (U/L) and the maximum serum Lipase were 820 (U/L). The mean serum Lipase were 438.0±103.08 (U/L).

Table 2: Frequency and Percentage of Gender (n=100)

Gender	Frequency	Percent	Valid Percent	Cumulative Percent
F	55	55.0	55.0	55.0
M	45	45.0	45.0	100.0

| Total | 100 | 100.0 | 100.0 |

In the above table 2, the frequency of Female patients were 55 and the percentage were 55. The cumulative percent were same 55.0. The frequency of male patients were 45 and the percentage were 45. Total number of patients were 100 (100 %) in our study.

Picture 1: Acute pancreatitis. Pancreatic abscess. Large, relatively well-circumscribed heterogeneous collection containing gas bubbles inferior to the pancreatic head.

Table 3: Characteristics of enrolled patients (n=100)

Variables			
Gallstone	**Frequency**	**Percentage**	P-Value
NO	54	54.0	0.04
YES	46	46.0	
Alcohol Consumption			
NO	97	97.0	

YES	3	3.0
Epigastric Pain		
NO	35	35.0
YES	65	65.0
Tenderness		
NO	65	65.0
YES	35	35.0
Enlargement of Pancreas Size		
NO	53	53.0
YES	47	47.0
CECT		
YES	100	100.0
Pancreas Parenchymal texture		
Heterogenous	35	35.0
Homogeneous	65	65.0
Pancreas shape		
Irregular pancreatic margin	40	40.0
Regular Pancreatic margin	60	60.0

Patient characteristics of enrolled patients in table 3 were (n=100). The frequency of gallstones were absent in 54 patients and its percentage were 54% and the frequency of gallstone were present in 46 patients and its percentage were 46%.
P-value is <0.04.
The frequency of alcohol consumption were absent in 97 patients and its percentage were 97% and the frequency of alcohol consumption were present in 3 patients and its percentage were 3%.
The frequency of epigastric pain were absent in 35 patients and its percentage were 35% and the frequency of epigastric pain were present in 65 patients and its percentage were 65%.
The frequency of tenderness were absent in 65 patients and its percentage were 65% and the frequency of tenderness were present in 35 patients and its percentage were 35%.
The frequency of enlargement of pancreas size were absent in 53 patients and its percentage were 53% and the frequency of enlargement of pancreas size were present in 47 patients and its percentage were 47%.
The frequency of Contrast CT (CECT) were done for all patients.

Pancreas parenchymal texture were heterogenous in 35 patients and its percentage were 35.0%. Pancreas parenchymal texture were homogenous in 65 patients and its percentage were 65.0%.
The frequency of pancreas shape irregular pancreatic margin were in 40 patients and its percentage were 40%.The frequency of pancreas shape regular pancreatic margin were in 60 patients and its percentage were 60%.

Picture 2: Acute pancreatitis, Pancreatic necrosis. Approximately 50% of the pancreatic gland does not display enhancement after contrast administration.

Figure 1: Pie chart of Necrosis in acute pancreatitis patients.
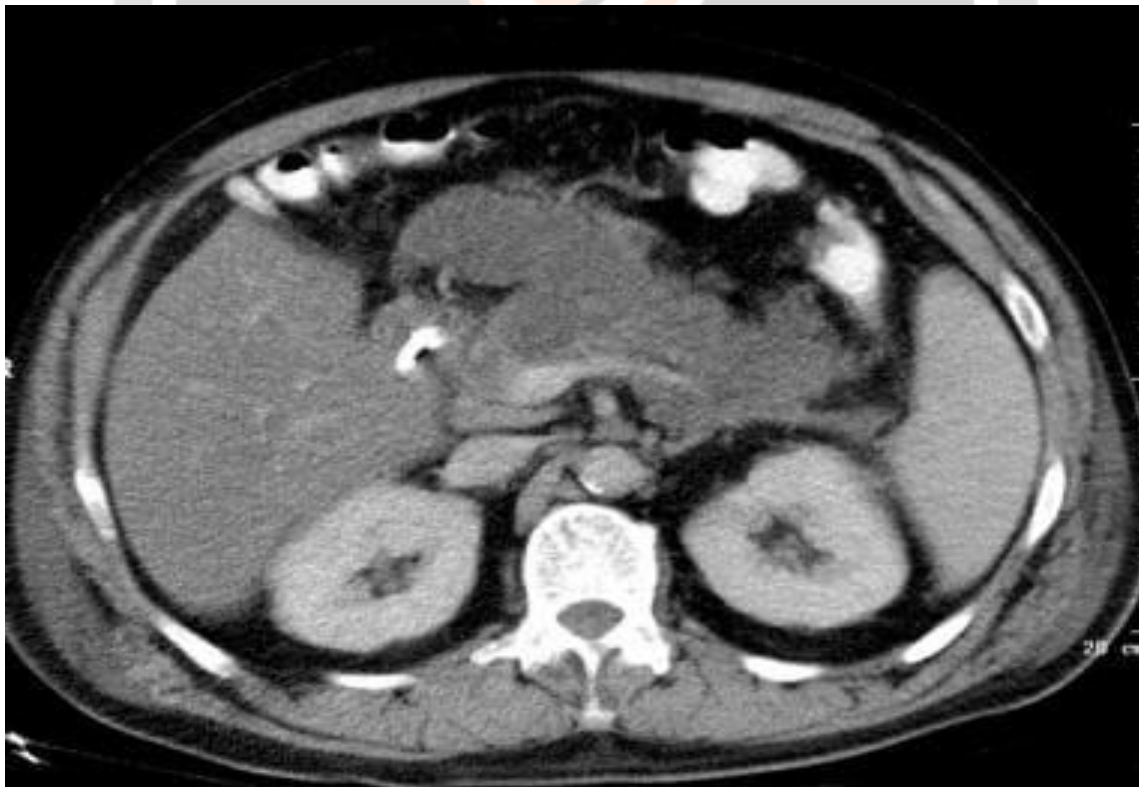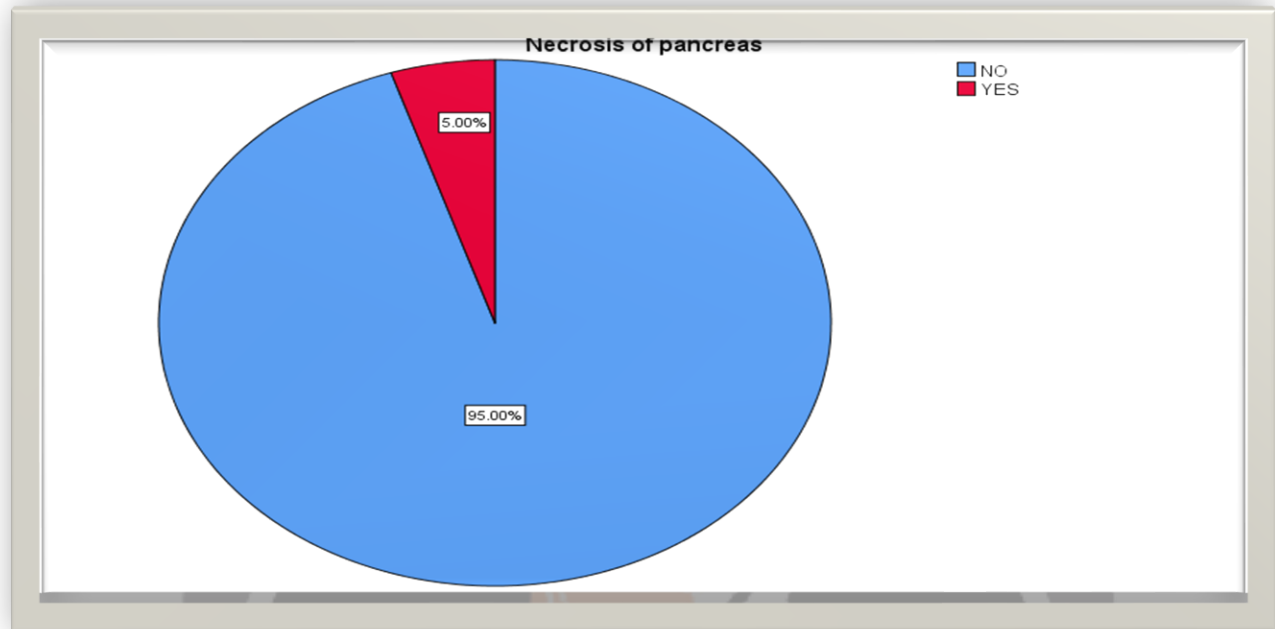
Picture 3: Acute pancreatitis. Pancreatic necrosis. Note the non-enhancing pancreatic body anterior to the splenic vein. Also present is peripancreatic fluid extending anteriorly from the pancreatic head.

Table 4: Frequency and Percentage of Pancreatitis grades (n=100)

Frequency	Percent	Valid Percent	Cumulative Percent
Mild	60	60.0	60.0
Moderate	35	35.0	35.0
Severe	5	5.0	5.0
Total	100	100.0	100.0

In the above table 4, we did Acute pancreatitis grades, the frequency of mild acute pancreatitis were 60 and its percentage were 60%. The cumulative percentage were same 60.0. The frequency of moderate acute pancreatitis were 35 and its percentage were 35%. The cumulative percentage were same 35.0.

The frequency of severe acute pancreatitis were 5 and its percentage were 5%. The cumulative percentage were same 5.0.

Total number of patients were 100 (100 %) in our study.

Discussion

The majority of guidelines advise against performing a contrast-enhanced CT scan of the abdomen less than 72 hours following the beginning of symptoms since doing so could result in an underestimate of the amount of pancreatic necrosis [21]. Clinical treatment guidelines greatly depend on the timely diagnosis of patients with SAP. This work established a radiomics model using a machine learning technique based on portal venous phase enhanced-CT images. Features were extracted by identifying the ROI in the pancreas and peripancreatic regions [22]. Although qualitative or semi-quantitative methodologies are employed in CT-based evaluation systems for the assessment and prognostication of AP [23]. A relatively new technique that is simple to get from computed tomography (CT) images is body composition parameter analysis. In the diagnosis, management, and follow-up of patients with AP, CT has grown in significance [24]. As a result, CT done three days later would be able to precisely identify pancreatic necrosis; nonetheless, our findings indicate that CT done five days following the start of an AP attack is the most effective way to identify local consequences. Studies have recommended a wide range of time intervals, from 72 hours to 10 days, between the start of an acute episode and the CT scan [26]. Therefore, it is unclear when to undergo an abdominal CT scan in AP to get the best findings for determining the severity of acute pancreatitis [27].

CONCLUSION

We concluded that the most common etiology of acute pancreatitis is Gallstone. Early CT was a good indicator of the severity of acute pancreatitis in our selected population. Pancreatic necrosis is estimated on early, contrast-enhanced CT and seen only in patients having severe disease. CECT is a good modality for the early detection of AP. Females were more in our study as compared to males.

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