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ORIGINAL RESEARCH

Role of multidetector computed tomography in imaging of fluid collections in acute pancreatitis and its correlation with clinical prognosis in accordance with revised atlanta classification

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ABSTRACT

Aim: The aim was to correlate radiological findings of acute pancreatitis with clinical and biochemical parameters for proper management of the disease and its prognostication. **Materials and Methods:** 50 individuals with clinically suspected acute pancreatitis were studied to evaluate the correlation between CT findingswith clinical outcome in terms of duration of hospital stay, ICU admissions, need for surgical intervention and overall mortality. **Observations and results:** A total of 50 patients were included in this study. Out of which 68% was males. Most common etiology was alcohol (36%)followed by gall stones (30%).Mean hospital stay was 15.1 days and was significantly longer with necrotizing pancreatitis (p=0.001) 60% patients had non-necrotizing pancreatitis and 40% patients had necrotizing pancreatitis. 90% patients were managed conservatively. The patients who had surgical management, all of them had necrotizing pancreatitis. The rate of complications was significantly higher in necrotic pancreatic collections like ICU admissions, development of MODS and development of sepsis. **Conclusion:** The Modified Atlanta Classification is useful in assessing acute pancreatitis complications and their relationship to clinical outcome. Positive correlation was found between radiological findings and duration of hospital stay, ICU admissions, development ofMODS and sepsis and need for surgical intervention.

Keywords: Acute pancreatitis, Computed Tomography, Modified Atlanta Classification, complications, clinical outcome.

INTRODUCTION

Acute pancreatitis is an inflammatory disease of the pancreas caused by pancreatic enzyme autodigestion, which results in failure of the gland and other organs systems.The most common etiology of acute pancreatitis is cholelithiasis, followed by alcohol, blunt /iatrogenic trauma (post-operative trauma, post-cholecystectomy, post-ERCP), hypertriglyceridemia, drug-induced infections, congenital anomalies (pancreas divisum, choledochocele), vascular abnormalities (atherosclerotic emboli, hypoperfusion, vasculitis), cystic fibrosis, Reye syndrome and idiopathic.Acute pancreatitis is further classified into two categories by the Modified Atlanta Classification: necrotizing pancreatitis and interstitial edematous pancreatitis[1]. In addition, it describes the types of pancreatic and peripancreatic collections, which might develop as a consequence. To help with the course of action of acute pancreatitis, a number of radiologic and clinical scoring systems have been employed. The

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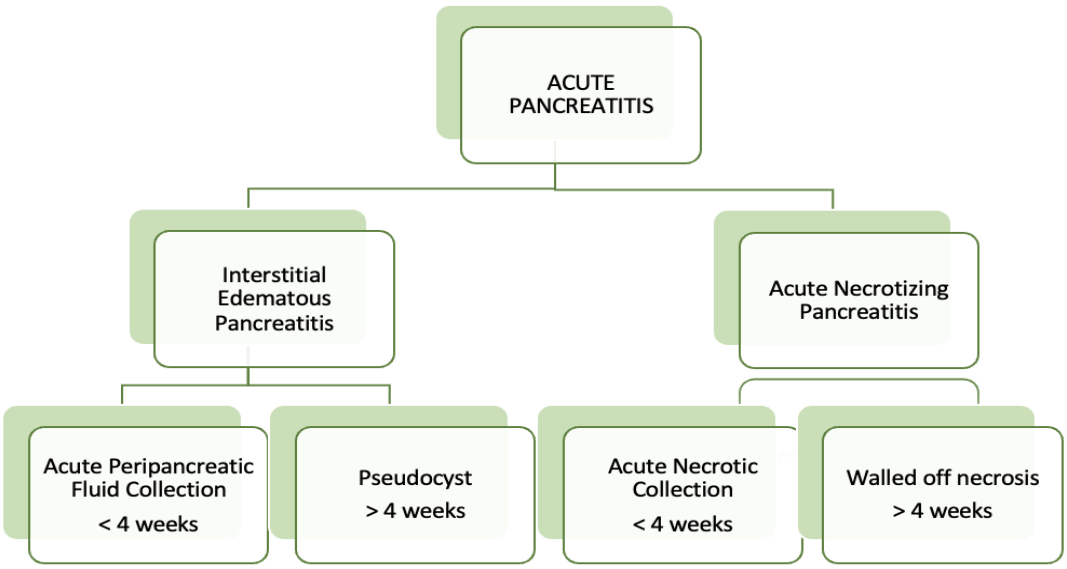
most commonly utilized radiological scoring system of these is the mCTSI score[2].

Image 1- Modified Atlanta Classification



Necrotizing pancreatitis is defined as presence of non-enhancing necrotic areas within the pancreatic parenchyma which is often complicated by collections namely acute necrotic collection(<4weeks) and walled off necrosis (>4weeks). Similarly acute peripancreatic collections (<4weeks) and pseudocyst (>4weeks) develop as a consequence of acute interstitial pancreatitis. Complicationslike infected necrosis, bowel necrosis/perforation, pancreatic fistula, sepsis, multiorgan failure,ascites,pleural effusion can also develop.Vascular complications are also not uncommon like pseudoaneurysm, rupture, and thrombosis. Individualized multidisciplinary care is necessary for patients with necrotizing pancreatitis, to lower mortality and avoid treatment related complications. The "step-up" approach, which attempts to use the least invasive technique first and progressive escalation for therapy failure, is the currently accepted care strategy[3].

MATERIALS AND METHODS

A prospective correlative study was conducted in the Department of Radiodiagnosis and Imaging, Government Medical College, Amritsar for a period of 2 years. Sample size 50. Patients with clinically suspected acute pancreatitis were included in this study. The cases were subjected to CECT. Contrast enhanced CT was performed using 5mm thick slices in soft tissue window settings before and after contrast injection. Findings were recorded for the type of pancreatitis, presence of collections and their characterisation. Vascular and non vascular complications were recorded. All the cases were followed up for length of hospital stay, ICU admissions, Multi-organ failure, requirement of drainage procedures and mortality. The imaging findings and clinical findings subjected to quantitative statistical analysisusing Statistical Package for the IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp., Chicago and valid conclusions were drawn.

RESULTS

A total of 50 patients were included in this study. Out of which 68% was males. Maximum patients belonged to the 41-50yr age group. Most common etiology was alcohol (36%) followed by gall stones (30%). Other causes were idiopathic (13%), traumatic (4%), choledochal cyst (2%), autoimmune pancreatitis (2%). Mean hospital stay was 15.1 days and was significantly longer with necrotizing pancreatitis (p=0.001). 60% patients had non-necrotizing pancreatitis and 40% patients had necrotizing pancreatitis. Acute peripancreatic collection was seen in 44% patients, Acute Necrotic collection (28%), Pseudocyst(8%) and Walled off necrosis(6%). Rate of complications like ascites was 42%, pleural effusion (31%), sepsis (16%) and multi-organ failure in 20% cases.

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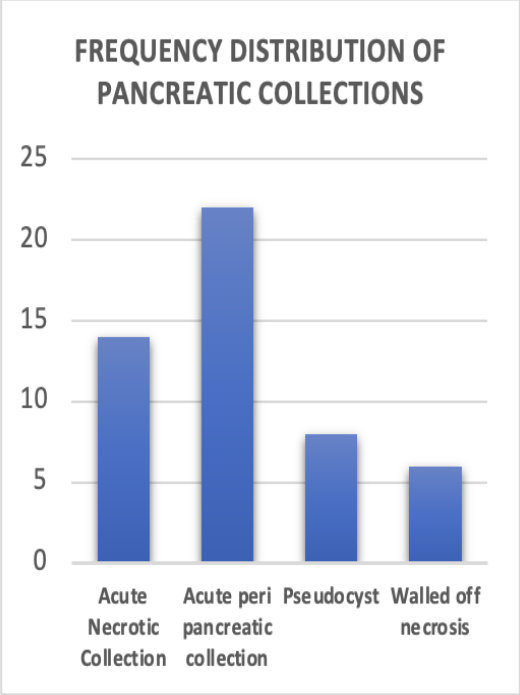

Table-1

Frequency distribution of Extra-pancreatic complications			
	Absent	Present	Total no. of pts.
Ascites	8 (16%)	42(84%)	50 (100%)
Pleural effusion	19(38%)	31(62%)	50 (100%)
Sepsis	8(84%)	42(16%)	50 (100%)
MODS	10(80%)	40(20%)	50 (100%)
ICU Admission	9(18%)	41(82%)	50 (100%)

Table 2

The proportion of patients having complications was significantly higher in necrotic pancreatic collections. Among ICU admissions 44% subjects had ANC, 44% had walled of necrosis, 0% had pseudocyst and 11% patients had APC. 60% patients with walled of necrosis, 30% patients with ANC, 10 % patients with APC and none of the patients with pseudocyst had multiorgan failure.

90% patients were managed conservatively. Surgery was required in 66% patients with WON, 11% patients with pseudocyst, 11% patients with ANC and 11% patients with APC. Conservative management was done in 17% patients with pseudocyst, 31.7% patients with ANC and 51.2 % patients with APC.SimilarlymCTSI also showed positive correlation with need for surgical management. 90% patients with mild-moderate disease were managed conservatively. 35% patients with severe disease required surgical intervention. Rate of ICU admission were also higher in severe disease (35%)as compared to mild-moderate disease (9%). Out of 50 patients, mortality was 4% patients (n=2).

DISCUSSION

Acute severe pancreatitis is a life threatening condition, especially when it is accompanied by necrosis or infection.Out of a total of 50 patients, males were affected more than females (M:F = 2.1:1), which is comparable with the studies by **Negi et al.**[4](M:F = 2.6:1) and **A C de Beaux**[5](M:F = 1.6:1). The higher prevalence of alcoholism in men explains the higher incidence of acute pancreatitis in men. Alcohol induced pancreatitis was higher (36%) than gallstone induced pancreatitis (30%), explained by the greater incidence of liquor abuse in India. **Marshal J.B** [6] in a study found that cholelithiasis and alcohol account for 60-80% of cases of AP.

In our study age range was 24-70 years with mean age 45.2 years. Most of the patients were present in the age group 41-50 years (38%). In the similar study by **Raghu M G *et al.*** [7] the mean age of 42.9 (age range 18-80 years) was reported and **Baig *et al.***[8] reported a mean age of 30 years indicating that acute pancreatitis can occur in any age group but 30-50 age were more frequently affected. In our study mean amylase level was 480 U/L and mean lipase was 465U/L. The values were higher in severe pancreatitis as compared to mild pancreatitis. However, the difference was not statistical significant.

Local complications of acute pancreatitis include acute peri-pancreatic fluid collection, acute necrotic collection, pancreatic pseudocysts, infected pancreatic necrosis, and walled-off necrosis. In our study, 16% of patients had pseudocysts, while 28% had acute peripancreatic collection. Necrotic collections, such as WON, were observed in 12% of patients, while acute necrotic collections were seen in 44%. This is comparable to the studies done by **Ramu et al.**[9] and **Akhter et al.**[10] where acute fluid collections were the most common pancreatic complications (29.1% and 41% respectively).Extra-pancreatic complications like pleural effusion was seen in 62% cases, ascites (84%), necrosis (40%), sepsis (16%), and multi-organ dysfunction (20%)**.**In three cases, hepatic and splenic pseudocysts were seen.

In our study, the mean hospital stay was 15.1 days. In mild-moderate acute pancreatitis, the mean hospital stay was 10.9, and in severe acute pancreatitis, it was

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21.64. It is comparable to the study done by **Gurleyik*et al*.** [11]**and Banday *et al*.** [12]

Higher mCTSI score predicted the occurrence of organ failure, ICU admissions as well as longer duration of hospital stay. The results were in concordance with the study by **Balthazar *et al.*** [13]

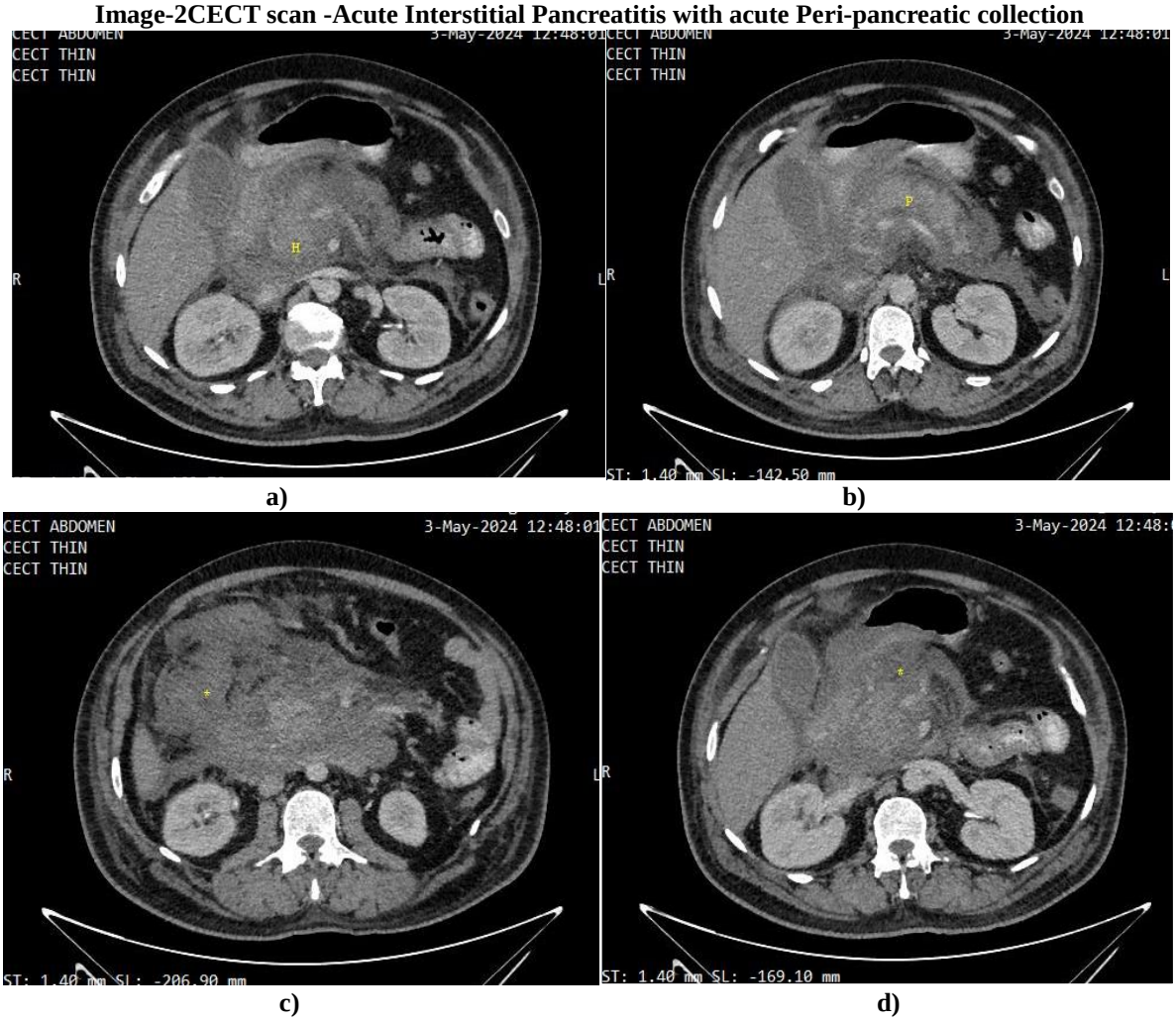
Surgery was required in 66% patients with WON, 11% patients with pseudocyst, 11% patients with ANC and 11% patients with APC. Conservative management was done in 17% patients with pseudocyst, 31.7% patients with ANC and 51.2 % patients with APC.These findings matches the studies done by **ML Freeman**[14] and **DW da Costa**[3]who also suggested that necrotic walled off collections generally requires intervention sooner or later in the disease progression.

2 patients out of total 50 patients expired (i.e 4% mortality). In a similar research by **Mann *et al*.** [15] and **Banerjee *et al***[16], they separately noted that in acute pancreatitis the average mortality rate approaches 2-10% while **Steinberg *et al*.** [17] noted a mortality of 2-9% in his study.

CONCLUSION

The Modified Atlanta Classification is useful in assessing acute pancreatitis complications and their relationship to clinical outcome. It demonstrated an excellent statistical correlation with the clinical outcome in our study, in terms of duration of hospital stay, infection development, occurrence of organ failure, and overall mortality. It might also foretell the requirement for interventional procedures.

Image-2CECT scan -Acute Interstitial Pancreatitis with acute Peri-pancreatic collection



a) **b)**

c) **d)**

Contrast enhanced CT in axial section shows a) Bulky Head and body of pancreas with peri-pancreatic fat stranding. (H-Head of pancreas, P-Body of pancreas) b) Normally enhancing pancreas seen. c) Ill-defined hypodense collection (*) is seen in peri-pancreatic space, subhepatic, peri-gastric space and left anterior para-renal space. D) GB shows hyperdense areas suggesting calculi. Findings are consistent with Acute Interstitial Pancreatitis with acute Peri-pancreatic collection.

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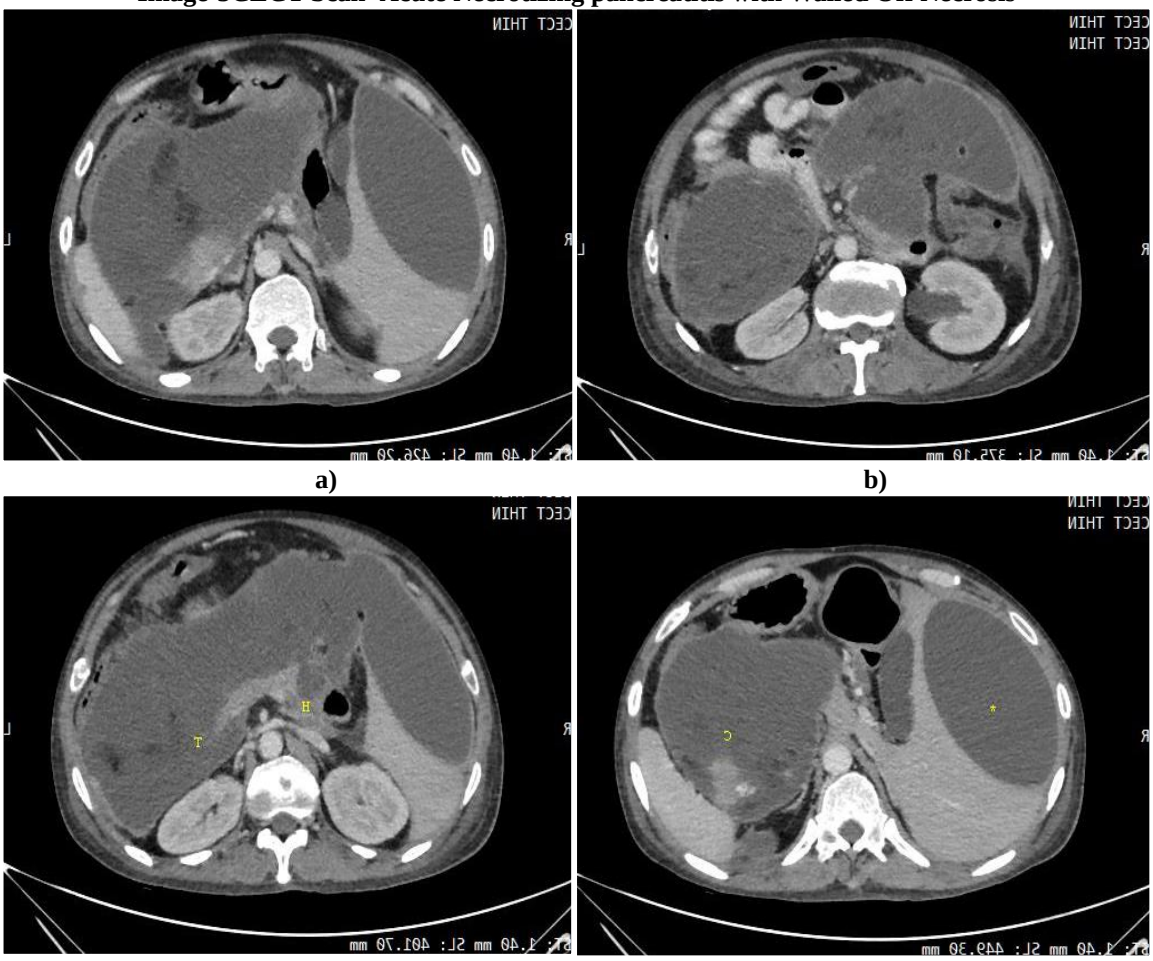
Image-3CECT Scan- Acute Necrotizing pancreatitis with Walled Off Necrosis



a) **b)**

c) **d)**

CECT shows a) Non-enhancing areas are seen involving head and body of pancreas (H-Head of pancreas) b) & c) A well defined collection (C) with internal debris and fat is seen in lesser sac, peri-pancreatic region and subhepatic regions d) A well defined subcapsular collection (*) is seen indenting the right lobe of liver likely Hepatic Pseudocyst. Findings are consistent with Acute Necrotizing pancreatitis with Walled Off Necrosis.

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