Section: Radiodignosis

Original Research Article

EVALUATION OF ACUTE PANCREATITIS WITH 128 SLICE MDCT

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ABSTRACT

In present study 200 cases of acute pancreatitis were evaluated and following conclusions were made. MDCT is an excellent imaging modality in diagnosis of acute pancreatitis with depiction of pancreas, peri pancreatic changes and also associated complications. No significant correlation seen between pancreatic enzymes and severity of pancreatitis. Significant correlation with modified CT severity index and length of hospital stay, interventions, organ failure is noted. MCTSI is good indicator for outcome of patient especially with the organ failure and also length of stay. CECT with modified CT severity index shows good correlation with grading of severity of pancreatitis and extent of disease process. CT is the most sensitive and specific imaging modality for the evaluation of acute pancreatitis and its complications.

Keywords: MDCT, MCTSI, CECT, Pancreatitis.

INTRODUCTION

Acute pancreatitis is a process of acute inflammation of pancreas usually caused by biliary stone, alcohol ingestion, metabolic factors and drugs. Abdominal pain is the major symptom of acute pancreatitis. It is generally classified into mild & severe forms. Mild pancreatitis, also called as interstitial or edematous pancreatitis is associated with minimal organ failure and an uneventful recovery1,2. Severe pancreatitis also called as necrotizing pancreatitis occurs approximately in 20% of the patients and is associated with organ failure or local complications, including necrosis, infection or pseudo cyst formation3,4.

The most common causes of pancreatitis are choledocholithiasis and ethanol abuse. Other causes include trauma, metabolic disorders (hyperlipidemia, hypercalcemia), ERCP induced pancreatitis, medications (azathioprine, sulphonamides), tumors, and congenital anomalies such as pancreas divisum [5].

The diagnosis is usually established by leukocytosis, elevated serum amylase, serum lipase. A computed tomography (CT) scan confirms the clinical impression of acute pancreatitis.

The assessment of the severity of acute pancreatitis has a significant role in management. Mild pancreatitis responds well to the supportive therapy, whereas severe pancreatitis requires intensive monitoring and specific treatment. So, the aim of this study is to determine whether early CT is effective in assessing the severity of acute pancreatitis and in predicting the prognosis and clinical outcome in these patients.

Aims and Objectives of the Study

1) To study the prognostic value of MDCT in acute pancreatitis.
2) To correlate CT severity index with pancreatic enzymes and clinical outcome.
3) To evaluate the complications using modified computed tomography severity index.

MATERIAL AND METHODS

Study Design

Study area and period

This study will be performed from March 2022 to march 2023 in department of Radio diagnosis in Narayana Medical College, Nellore, Andhra Pradesh.

Study population

Patients referred to department of Radio-diagnosis in Narayana Medical College with the Clinically

suspected/Diagnosis/Lab findings / Ultrasonography suggestive of acute
pancreatitis of all the age groups

Sample size

Minimum of 200 patients.

Technique:

Non imaging data:

The non –imaging data will be collected as described in proforma.

Imaging data:

Ultrasound:

Patients will be examined either in supine or prone position or both as required. In individuals where the pancreas was scanned in detail, they were asked to drink 2 glasses of water (which will produce acoustic window suitable for visualization of pancreas) and additional examination was done in Real time ultrasound scanning was done with a 3.5, 9 and 11 MHz sector probe. Sitting position also.

Computed Tomography

CT equipment, Siemens 128 slice Multidetector CT.

Technique: In this study, patients will undergo plain scan or will be asked to drink around 1000 ml plain water before the scan and intravenous contrast of 70-80 ml of 350mg/ml nonionic iodinated contrast (IOHEXOL) injected using pressure injector at the rate of 3-4ml/sec. Threshold set at 150 Hounsfield units and delay of 3 seconds will be given after the attainment of threshold for arterial phase. Venous phase will be acquired after a delay 60 seconds from the time of contrast injection. Scanning will be done in cranio-caudal direction in arterial and venous phases from the level of diaphragm to aortic bifurcation in the arterial phase and from the level of diaphragm to the level of pubic symphysis in the venous phase. Images will be retro reconstructed with 1.25 mm slice thickness and reformatted in sagittal and coronal planes for analysis.

The severity of pancreatitis will be scored using modified CT severity index[1] and classified into two categories (mild and severe). The modified index is a 10 point scoring system derived by assessing the degree of pancreatic inflammation (0 to 4 points) pancreatic necrosis (0 to 4 points) and extra pancreatic complications (0 to 2 points)[7]. Clinical outcome parameters include the length of hospital stay, the need for surgical intervention and the occurrence of infection, organ failure and death[7].

Inclusion Criteria

1. All the patients who are suspected/diagnosed of acute pancreatitis based on clinical and laboratory amylase & serum lipase.
2. Patients who are diagnosed acute pancreatitis on ultrasonography

Exclusion Criteria

1. Patients admitted with clinical suspicion of acute pancreatitis who did not undergo contrast enhanced MDCT.
2. Pancreatitis due to trauma.
3. Suspected acute pancreatitis patients with normal pancreas on CT scan and normal serum amylase level.

Data Analysis

Collected data will be analyzed by frequency percentage, Chi square test to assess the statistical significance.

RESULTS

Out of 200 patients, 146 were male corresponding to 73% and 54 were female corresponding to 27%. 28% of males showed mild pancreatitis, 29% of males showed moderate pancreatitis and 16% of males fall into severe category. 15% of females fall into mild category, 10% are moderate and 2% showed severe pancreatitis. [Table 1]

Out of 200 cases 40 cases required surgical intervention, of which 16 cases of severe pancreatitis cases required intervention, 20 cases of moderate pancreatitis cases required intervention and only 4 cases of mild pancreatitis required surgical intervention. There was significant correlation between need for surgical intervention and severity of pancreatitis. [Table 2]

There were 4 deaths, all of them seen in severe pancreatitis; this also shows significant correlation between severity index and mortality. [Table 3]

Mean age of males with pancreatitis was 45.34±2.08 and mean age of females was 41.04±3.54. Mean days of hospital stay was 7.91±0.98 in males and 6.18±0.944 in females. [Table 4]

Mean duration hospital stay is comparatively more in severe pancreatitis with p value of 0.00 suggestive of significant correlation with severity of pancreatitis. [Table 5]

Area under curve for severe cases was 0.86, for moderate pancreatitis was 0.65 and mild cases was 0.72 with PPV of 0.69 FOR severe pancreatitis suggestive of significant correlation. [Table 10]

Out of 200 cases 46 cases showed necrosis of which 26 cases showed >30% necrosis and 20 cases showed <30% necrosis. [Table 12]

Of 46 cases of necrosis 36 cases were seen in severe pancreatitis of which 10 cases had <30% and 26 cases had >30%. 10 cases of moderate pancreatitis showed necrosis all of which are <30%. [Table 13]

Out of 200 cases 2 cases showed normal pancreas, 88 cases showed intrinsic pancreatic changes, and 58 cases showed pancreatic or peri pancreatic fluid collections. [Table 16]

46 cases showed necrosis

Pleural effusion was the most commonest complication, in total 66 cases showed bilateral pleural effusion, 2 cases showed right sided pleural effusion,18 cases showed left pleural effusion and bilateral effusion noted in 46 cases. [Table 17]

Ascites was the second common complication with 27% of cases. Of vascular complications, 10 cases of splenic vein thrombosis noted, 4 cases of SMV thrombosis noted. 6 cases showed sub capsular collection. Of 200 cases six cases shows gastrointestinal involvement. [Table 18]

No definite correlation noted between serum pancreatic enzymes levels with severity index, severe pancreatitis showed as low as 50 units of lipase and mild pancreatitis showed as high as 20000. Similarly amylase levels were in varied distribution in three categories. [Table 20]

Table 1: Correlation between gender and MCTSI

Gender	Mild	Moderate	Severe	Total
Male	56	58	32	146
Female	30	20	04	54
Total	86	78	36	200

Table 2: Intervention versus MCTSI

	Intervention		
MCTSI	Yes	No	Total
Mild	4	82	86
Moderate	20	58	78
Severe	16	20	36
Total	40	160	200

Table 3: Mortality versus MCTSI

Mortality	Mild	Moderate	Severe	Total
Yes	00	0	4	04
No	86	78	32	196
Total	86	78	38	200
Chi-square	5.18			

Table 4: Descriptive statistics of age and duration of hospital stay

Gender	Variables	Mean±SD	Median	IQR
Male	Age-Mean	45.34±2.08	48.00	30.50-59.00
	Hospital stay mean	7.91±0.98	3.00	3.00-10.00
Female	Age-Mean	41.04±3.54	40.00	23.00-57.00
	Hospital stay mean	6.18±0.944	4.00	4.00-8.00

Table 5: Significance relation between hospital stay and MCTSI

mctsi	Mean duration-Hospital Stay Mean±SD	Correlation values	P-value
Mild	4.37±0.27	0.56	0.11
moderate	10.63±2.15	0.62	0.16
severe	14.55±1.56	0.82	0.00

Table 6: Gender distribution

Gender	No	%
Male	146	73.00
Female	54	27.00

Table 7: Intervention

Intervention	No	%
Yes	40	20
No	160	80

Table 8: Mortality status

Mortality	No	%
Yes	06	3.00
No	194	97.00

Out of 200 cases, 194 cases recovered and 6 cases died.

Table 9: MCTSI status

CTS	No	%
Mild	86	43.00
Moderate	78	39.00
Severe	36	18.00
Total	200.0	

Table 10: Area under curve of MCTIS status with hospital duration (ROC Analysis)

CTS	No	auc	Specificity	sensitivity	PPV	NPV
Mild	86	0.72	0.89	0.11	0.24	0.76
Moderate	78	0.65	0.72	0.28	0.68	0.25

Severe	36	0.86	0.26	0.74	0.69	0.34

Table 11: Area under curve of MCTSI status with COMPLICATION

CTS	No	auc	Specificity	sensitivity	PPV	NPV
Mild	86	0.42	0.66	0.35	0.45	0.32
Moderate	78	0.54	0.53	0.47	0.28	0.26
Severe	36	0.79	0.12	0.88	0.86	0.14

Table 12: Status of necrosis

Necrosis	No	%
<30%	20	10
>30.0%	26	13
No	154	77
Total	200	100

Table 13: Relation between necrosis and MCTSI

Necrosis	Mild	Moderate	severe	Total
<30	0	10	10	20
>30	0	0	26	24
No	86	70	0	156
Total	86	78	36	200

Table 14: This study also indicated significant correlation with severity index

MCTSI	No	r-value	p-value
Mild	86	0.52	0.22
Moderate	78	0.66	0.28
Severe	36	0.72	0.00
Total	200.0		

Table 15: Correlation between necrosis versus MCTSI

MCTSI	No	r-value	p-value
Mild	86	0.36	0.11
Moderate	78	0.22	0.20
Severe	36	0.69	0.00
Total	200.0		

Table 15: Partial Correlation between mortality versus MCTSI

MCTSI	No	r-value	p-value
Mild	86	0.17	0.70
Moderate	78	0.12	0.67
Severe	36	0.57	0.00
Total	200.0		

Table 16: Pancreatic inflammatory changes comparison

Ct findings	No of findings	percentage
Normal Pancreas	2	1%
Inflammation of pancreas of peripancreatic fat	88	44%
Pancreatic or peripancreatic fluid collections	58	29%
Necrosis	46	23%

Table 17: Extrapancreatic complications comparison

Ct findings	No of cases	Percentage
PLEURAL EFFUSION	66	33%
RIGHT	2	1%
LEFT	18	9%
BILATERAL	46	23%

Table 18: Extrapancreatic complications comparison

Ct findings	No of cases	Percentage
Ascites	54	27%
Splenic vein thrombosis	10	5%
Smy thrombosis	4	2%
Splenic infarction	8	4%
Sub capsular collection	6	3%
Mods	26	13%
Infection	18	9%
Gastrointestinal involvement	6	3%

Table 19: Comparison of late complications

Ct findings	No of cases	Percentage
Psuedocysts	16	8%
Walled off necrosis	6	3%

Table 20: Relation between ranges of enzymes with severity

	Mild pancreatitis	Moderate pancreatitis	Severe pancreatitis
Range of lipase levels	27-25000	45-7200	45-7200
Range of amylase levels	45-9000	135-3200	85-3000

DISCUSSION

In a study of 12 months conducted in Narayana Hospital, Nellore we have analyzed correlation with clinical outcome, complications, length of stay, requirement of intervention and clinical severity of Pancreatitis by modified severity index.

The Modified CT Severity Index is a simpler scoring tool and more accurate than the CT Severity Index, it includes pancreatic changes, peripancreatic inflammatory changes and also gives points to extra pancreatic complications which was main difference between two indexes.6

The modified severity index differentiates between presence or absence of fluid collections,

however it Doesn't take into consideration number of fluid collections. In addition to it necrosis is classified into minimal or substantial.

73% of cases were male and 27% of cases were female correlating with prior done studies.

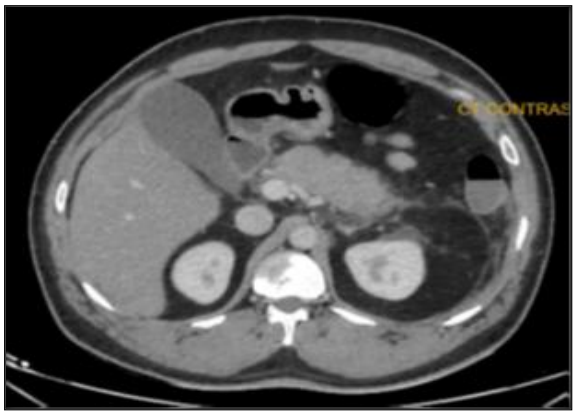

Figure 1: Bulky pancreas with mild fat stranding

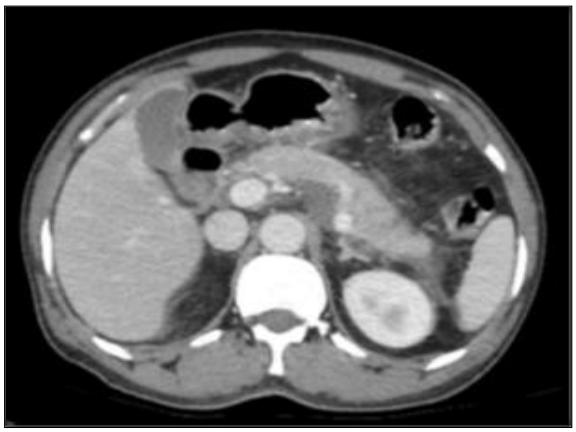

Figure 2: Peri pancreatic fluid collection in acute edematous pancreatitis

Figure 3: Non enhancing areas within pancreas (<30%)- Acute Necrotising pancreatitis

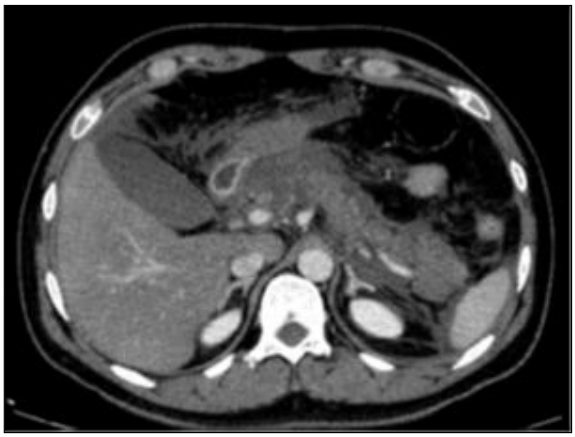

Figure 4: Non enhancing areas within pancreas (>30%)- Acute Necrotising pancreatitis

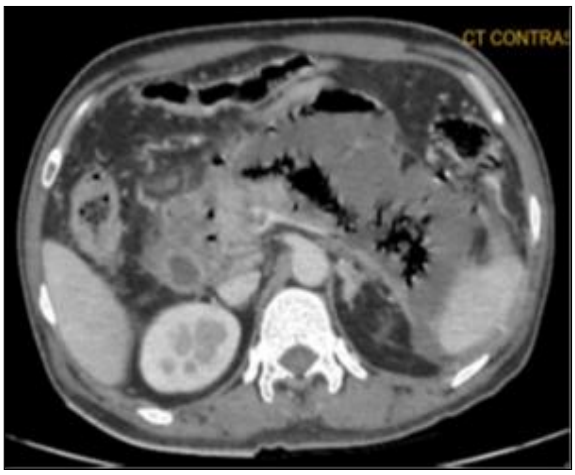

Figure 5: Necrotising peri pancreatic collection/ Walled off necrosis with portal vein thrombosis in acute necrotising pancreatitis

Figure 6: Acute pancreatitis with pancreatic pseudocyst

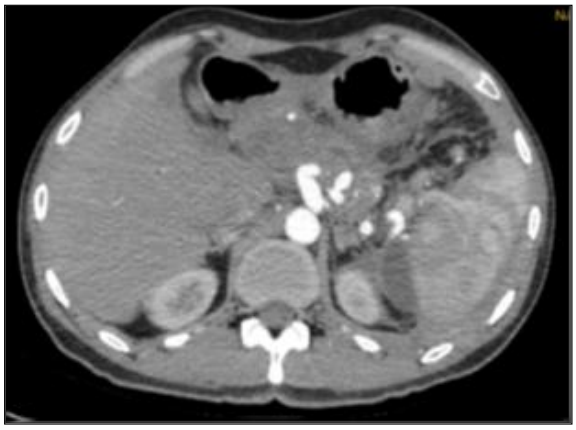

Figure 7: Splenic artery pseudo aneurysm in a case of acute pancreatitis

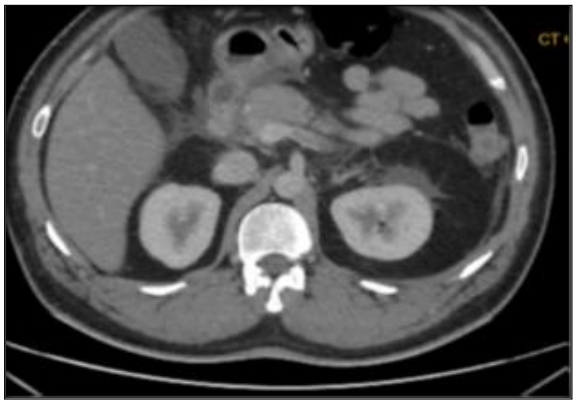

Figure 8: splenic vein thrombus

Using the modified severity index, 43 % of cases are mild,39% of cases are moderate and 18% of cases are severe. Severe acute pancreatitis correlates well with Mortele et al,[7] and Bollen et al,[1] where it was 15.1% and 18% whereas in our study it is 18%.

Relationship between MCTSI and necrosis showed significant correlation in our study in that total 23% of cases showed necrosis. Out of that 18% of cases were in severe category in which 26 cases showed >30% necrosis and 10 cases showed <30% necrosis. In moderate pancreatitis there were ten cases of necrosis which were all <30%.

Most common Ct findings in our study was pancreatic, peri pancreatic inflammatory cases which are 44% of cases, 29% of cases showed pancreatic or peripancreatic fluid collections.

One case demonstrated normal appearance of pancreas. This correlates well with prior studies done by Bollen et al,[1] which suggests MDCT is excellent to identify pancreatic and extra pancreatic changes.

In our study totally 40 cases required surgical intervention, out of them mostly was in severe. Pancreatitis category. 44% of severe pancreatitis cases required surgical intervention and only 26% and 4% in moderate and mild pancreatitis. Out of these cases 17 cases went on to recover however 3 cases were deceased. These findings indicate significant correlation of modified severity index with people requiring surgical intervention.

Out of 200 patients 194 patients recovered and 6 patients died which are all cases of severe pancreatitis, these findings are also similar to prior done studies indicating Modified severity index how well it correlates well with prognosis and mortality.

Hospital stay ranged from 0-60 days, mean hospital stay of severe pancreatitis was approximately 14 days which is significantly higher than mild and moderate pancreatitis (4 and 9 days), this mean duration of severe pancreatitis is slightly higher if compared to study done by mortele et al.[7] Statistical significance of length of hospital stay and severity of pancreatitis is well correlated in our study. Area under curve for severe pancreatitis in our study was 0.86 with sensitivity of 0.74 which was 66% in study done by mortele et al,[7] which shows good correlation on comparison.

Similarly area under curve for complications in severe pancreatitis is 0.79 with sensitivity and positive predictive value of 0.88 and 0.86 respectively which indicates good correlation with prior studies.

Out of 200 patients, Organ failure and infection were seen in 13% and 9% respectively which are mostly seen in severe pancreatitis cases. These clinical parameters correlation with modified severity index shows significant correlation with P value being significant.

Coming to complications, most common complication was pleural effusion which was seen in 33% of patients as corroborated by other Studies.

Ascites was the second most common complication. Vascular complications, gastrointestinal complications were also noted, but were mostly seen in cases of severe pancreatitis which correlates well with studies done earlier by Significant correlation was seen between modified CT severity index and patient clinical mortele et al,[7] outcome parameters. This correlated with study done by mortele et al,[7] and it is not correlating with study done by bollen et al.[1]

If we take consideration of pancreatic enzymes like amylase and lipase correlation is poor, no significant

correlation is noted between enzymes and severity of pancreatitis.

As previously some studies showed by taking into consideration > 3times of enzyme levels and correlated with severity index, we did without cutoff values however no correlation was identified as concluded by Kim, Yeon Soo et al8.

Finally, when compared with earlier studies our study showed significant correlation between Modified severity index and clinical outcome parameters and also correlates well with length of hospital stay and organ failure.

Limitations

Few of the cases don't have serum lipase and amylase levels.

Follow up of some of cases couldn't be done correctly as some of the cases are not admitted

CONCLUSION

CECT with modified CT severity index shows good correlation with grading of severity of pancreatitis and extent of disease process. CT is the most sensitive and specific imaging modality for the evaluation of acute pancreatitis and its complications.

Conflict of Interest: None

Funding Support: Nil

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