Original Research Article

Modified CT severity index for evaluation of acute pancreatitis and correlation with patient outcome

Bharath Kumar Shetty[1*], Prajwith K J Rai[2]

[1]Assistant Professor, [2]Post Graduate, Department of Radiology, AJ Institute of Medical Sciences, Mangalore., INDIA.
Email: sathishkumard11@gmail.com

Abstract

Background: 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 and severe forms. Mild pancreatitis, also called as interstitial or edematous pancreatitis is associated with minimal organ failure and an uneventful recovery. This study was conducted to assess the prognostic value of MDCT in patients with acute pancreatitis and to correlate the CT Severity Indexes with clinical outcome. **Materials and Methods:** Of 47 patients diagnosed with acute pancreatitis who underwent contrast-enhanced MDCT within 3 days of the onset of symptoms during the study period were included in the study. The severity of the pancreatitis was scored using both the modified CT severity indexes and CT severity indexes. Patient clinical outcome was scored using parameters such as: mean duration of hospital stay, the need for surgical intervention, occurrences of infection, end organ failure and death. For both the CT and modified CT severity indexes, correlation between the severity of the pancreatitis and patient outcome was estimated using the percentage, frequency charts and chi-square test. **Results:** When applying the modified index, the severity of pancreatitis and the following parameters significantly correlated than the CT severity index: the length of the hospital stay (2-23 days), the occurrence of infection (17/47 patients) (modified CT severity index [p = 0.001] vs CT severity index [p = 0.172]). Highly significant correlation between the severity of pancreatitis and the development of organ failure (21/47 patients) was seen only using the modified CT severity index (p = 0.002), not the CT severity index (p = 0.0513). There was no significant correlation between severity of pancreatitis based on the modified CT severity index and the need for the surgical intervention (modified index [p = 0.117] vs CT severity index [p = 0.017]. Mortality rate in our study was 2%. **Conclusion:** There was highly significant correlation between the MCTSI score and the prediction of end organ failure, systemic infection and duration of hospital stay than CTSI score. MCTSI is a very useful tool for the screening of patients with acute pancreatitis for the classification of severity accurately and to predict the clinical outcome when used before three days of symptom onset.

Key Words: Acute pancreatitis, MDCT, Abdominal pain, CT severity index.

[*]**Address for Correspondence:**
Dr Bharath Kumar Shetty, Assistant Professor, Department of Radiology, AJ Institute of Medical Sciences, Mangalore. India.
Email: sathishkumard11@gmail.com
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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 and severe forms. Mild pancreatitis, also called as interstitial or edematous pancreatitis is associated with minimal organ failure and an uneventful recovery.[1] 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 pseudocyst formation.[2] The diagnosis is usually established by leucocytosis, elevated serum

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amylase, serum lipase. A computed tomography (CT) scan confirms the clinical impression of acute pancreatitis.[3] The assessment of the severity of acute pancreatitis has a significant role in management.[4] Mild pancreatitis responds well to the supportive therapy, whereas severe pancreatitis requires intensive monitoring and specific treatment.[5] 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

- To study the prognostic value of MDCT in acute pancreatitis.
- To correlate CT severity indexes with clinical outcome.

MATERIALS AND METHODS

SOURCE OF DATA

This is a correlative study that is done in the department of Radio Diagnosis in Father Muller Medical College for a period of 22 months from August 2010 to June 2012. Study group consists of 47 patient's selected using purposive sampling method from patients admitted to Father Muller Medical College Hospital with clinical impression of acute pancreatitis during study period.

METHOD OF COLLECTION OF DATA

Patients admitted to Father Muller Medical College Hospital with clinical impression of acute pancreatitis who underwent contrast enhanced MDCT during study period within three days of admission were included in the study. All scans were done using GE Bright speed 16 - slice MDCT with 120 KVp and 300 mAs with 5 mm slice thickness. Bolus tracking method is used for post contrast scan with the tracker placed in the descending aorta at the level of dome of diaphragm. 70-80 ml of 350mg/ml non ionic iodinated contrast (IOHEXOL) was injected using pressure injector at the rate of 3-4ml/sec. Threshold set at 150 Hounsefield units and delay of 3 seconds was given after the attainment of threshold for arterial phase. Venous phase acquired after a delay 60 seconds from the time of contrast injection. Scanning was 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 were retro reconstructed with 1.25 mm slice thickness and reformatted in sagittal and coronal planes for analysis. The severity of pancreatitis was scored using modified CT severity index and classified into three categories (mild, moderate 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 or 2 points). Clinical outcome parameters included the length of hospital stay, the need for surgical intervention and the occurrence of infection, organ failure and death.

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

INCLUSION CRITERIA:

1. Patients admitted with clinical suspicion of acute pancreatitis who underwent contrast enhanced MDCT within three days of admission.

EXCLUSION CRITERIA:

1. Patients admitted with clinical suspicion of acute pancreatitis who did not undergo contrast enhanced MDCT.
2. Pancreatitis due to trauma.

RESULTS

This study was conducted in the Department of Radio diagnosis, Fr Muller Medical College Hospital, Mangalore from August 2010 to June 2012. The study comprised of a total of 47 patients.

STUDY GROUP CHARACTERISTICS:

1. **Age distribution:**

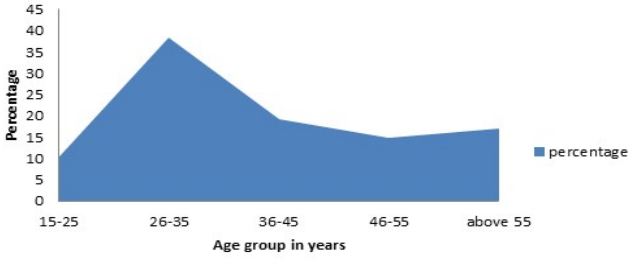


Figure 1: Age distribution of the study group

Table 1: Age distribution of the study group

Age group (in years)	Number of patients	Percentage
15-25	5	11
26-35	18	38
36-45	9	19
46-55	7	15
Above 55	8	17

Study included patients between the age group ranging from 15 years to 79 years with a mean age of 40 yrs. Maximum number of patients was seen in the age group of 26-35 years of age group which consisted of 18 (38.3%) patients. (Fig-1 and Table-1)

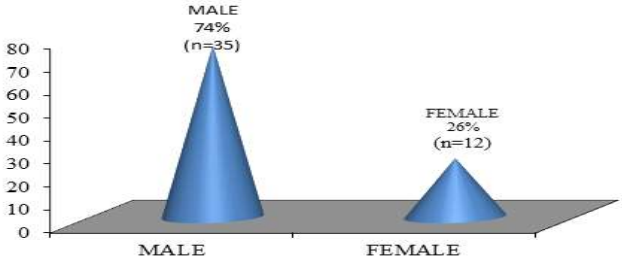


Figure 3: Sex distribution of the patients

Sex distribution

In our study, out of 47 cases, 35 (74.5%) were male and 12 (25.5%) were females with a male to female ratio of 2.9: 1. (Fig-3)

DISEASE CHARACTERISTICS

Etiology

In our study, 27 of 47 patients were alcoholic comprising of 53%, 16 (35%) patients had gall stones and remaining patients were grouped as others which consisted of 4 patients, diagnosed as leptospirosis (n=2), pancreatic carcinoma (n=1) and idiopathic (n=1). (Fig-4)

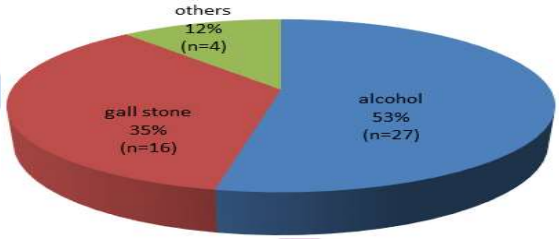


Figure 4: Etiology of pancreatitis

DIAGNOSIS OF PANCREATITIS

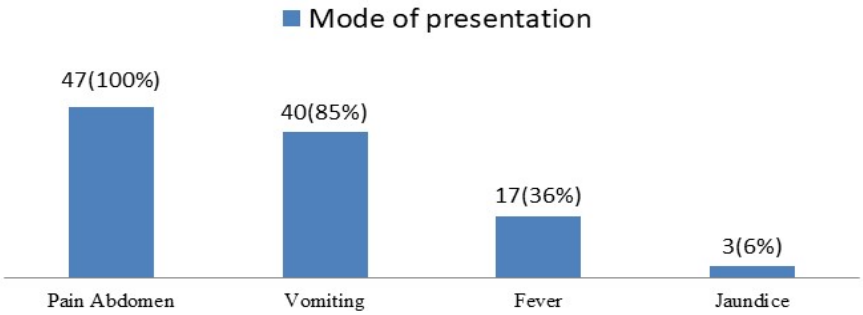


Figure 5: Mode of clinical presentation of acute pancreatitis

All 47 patients (100 %) presented with pain abdomen. 40 patients (85%) had vomiting, 17(36%) patients had fever and 3(6%) of patients had jaundice at the time of admission.(Fig-5)

LABORATORY DIAGNOSIS

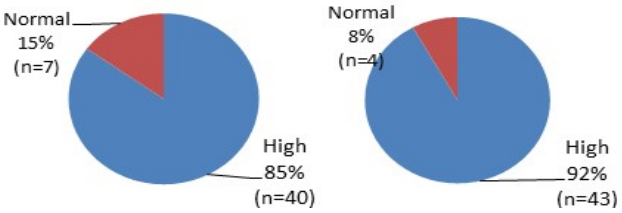


Figure 6: Patients with elevated amylase and lipase levels

Amylase was elevated in 40 (85%) patients at presentation. Lipase was elevated in 43(92%) patients at presentation. (Fig-6)

ULTRASONOGRAPHY

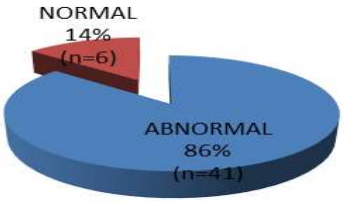


Figure 7: patients with abnormal findings on ultrasonography

In 6 (14%) patients ultrasound was normal. 41 (86%) patients had abnormal ultrasound findings such as bulky pancreas with altered echogenecity, peripancreatic fat stranding, fluid collection, ascites or pleural effusion.(Fig-13)

COMPUTED TOMOGRAPHIC EVALUATION

After diagnosing Acute Pancreatitis based on the clinical presentation, biochemical parameters and ultrasonography, patients were subjected to CT scan of the abdomen according to the standard protocol. The severity of the pancreatitis was assessed by assigning point system by using Modified CT Severity Index and CT Severity Index.

MODIFIED CT SEVERITY INDEX.

The modified index is a 10 point scoring system derived by assigning points to the degree of pancreatic inflammation (0 to 4 points) pancreatic necrosis (0 to 4 points) and extra pancreatic complications (0 or 2 points). All patients were graded into mild (score 0-3), moderate (score 4-6) or severe (score 7-10).

1. **PANCREATIC INFLAMMATION.**

In our study, pancreas was normal in 2 (4.3%) patients. 24 (51.1%) patients had intrinsic pancreatic abnormalities with or without inflammatory changes in peripancreatic fat, to whom 2 points were assigned. Remaining 21 (44.7%) patients had pancreatic or peripancreatic fluid collection or peripancreatic fat necrosis, to whom 4 points were assigned. (Fig-8)

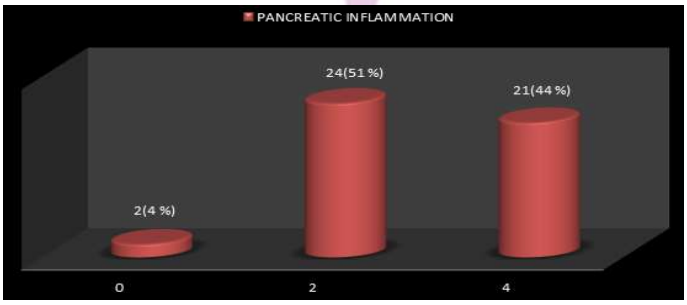


Figure 8: Number and percentage of patients with scoring based on pancreatic changes in CT

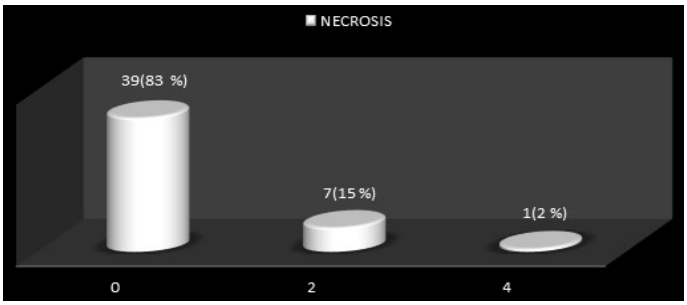


Figure 9: Number and percentage of patients with scoring based on the pancreatic necrosis

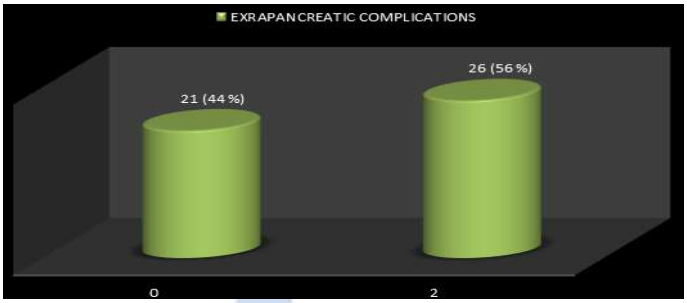


Figure 10: Number and percentage of patients with scoring based on the extra pancreatic complications

2. PANCREATIC NECROSIS.

A total of 39 (83%) patients had no evidence of pancreatic necrosis on CT scan. 7(15%) patients had less than 30% necrosis to whom 2 points were assigned. only 1 patient had more than 30% necrosis, to whom 4 points were assigned.(Fig-9)

3. EXTRAPANCREATIC COMPLICATIONS.

Out of 47 patients, 21 (45%) patients had no evidence of extra pancreatic complications. 26 (56%) patients had one or more extra pancreatic complications such as pleural effusion, ascites, vascular complications, parenchymal complications, or gastrointestinal tract involvement.

In our study, 22 patients (85%) had both ascites and pleural effusion. 4 patients (20%) had only isolated ascites. None of the patients had isolated pleural effusion. One patient is found to have splenic vein aneurysm and another found to have portal vein thrombosis. (Fig-10)

Modified CT Severity index

Modified CT Severity index was calculated by adding points assigned to each parameter. The severity of pancreatitis is classified into three categories: mild (0-3 points), moderate (4-6 points) and severe (7-10 points). According to the Modified CT Severity Index, the patients were graded into mild (n=19), moderate (n=20) and severe (n=8) i.e. 40% patients had mild, 43% patients had moderate and 17% had severe pancreatitis. (Fig-11)

CT SEVERITY INDEX

The severity of pancreatitis is scored using CT severity index and classified into three categories (mild, moderate and severe). The CTSI is a 10 point scoring system derived by assigning points to the degree of pancreatic inflammation (0 to 4 points) and pancreatic necrosis (0 to 6 points).

According to the CT Severity Index, the patients were graded into mild (n=34), moderate (n=12) and severe (n=1). 72% patients had mild, 25% patients had moderate and only 2% patients had severe pancreatitis as per CTSI score. (Fig-11)

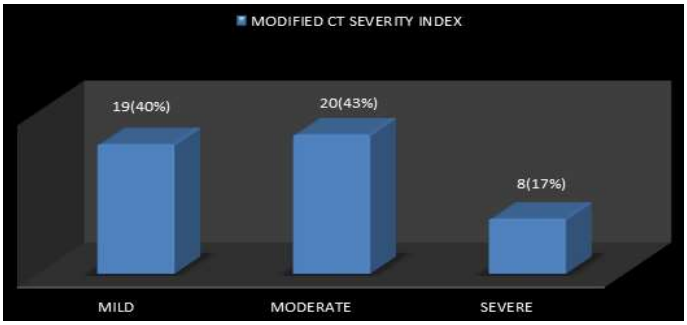


Figure 11: Number and percentage of patients with severity assessment based on MCTSI

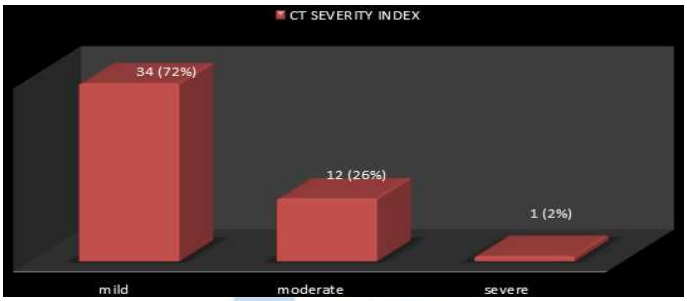


Figure 12: Number and percentage of patients with severity assessment based on CTSI

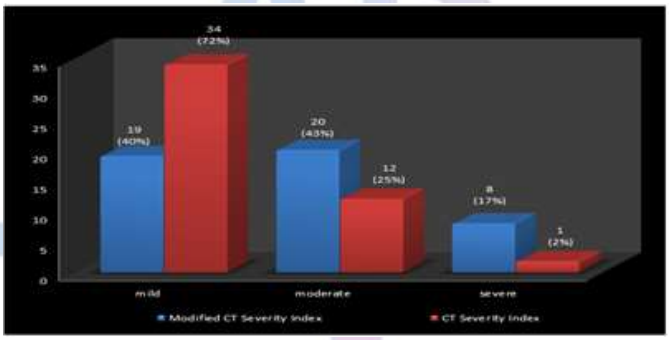


Figure 13: Comparison of total number of patients belonged to each severity indixes based on MCTSI and CTSI

The Figure-13 clearly depicts the distribution of patients in each category. In CTSI scoring system, 34 patients (72%) belonged to mild category, 12 (25%) patients had moderate and only patient belonged to severe pancreatitis. But in MCTSI scoring system 19 (40%) patients found to have mild pancreatitis and 20 (43%) patients found to have moderate and 8 (17%) patients severe pancreatitis. The discrepancy is attributed to the inclusion of extra pancreatic complications in MCTSI scoring system. Hence, two extra points were added to the severity index in addition to the pancreatic inflammation and necrosis findings.

PATIENT OUTCOME PARAMETERS:

Clinical outcome of patients in our study was assessed by following parameters: end organ failure, evidence of systemic infection, surgical intervention and duration of hospital stay.

END ORGAN FAILURE:

Patients are followed up for the presence or absence of dysfunction in six separate organ systems as defined. End organ failure is defined as the presence or absence of dysfunction in any of the six separate organ systems as defined.

- Respiratory failure: PaO2 of less than 60 mm Hg or by the need for ventilatory support.
- Cardiovascular system: Systolic blood pressure of less than 90 mm Hg in the absence of hypovolemia with signs of peripheral hypoperfusion or by the need for continuous infusion of vasopressor or inotropic agents to maintain a systolic blood pressure of more than 90 mm Hg.

- Central nervous system failure: Glasgow Coma Scale score lesser than 6.
- Renal failure: Either a serum creatinine level that exceeded 300 µmol/L(3mg/dL) or urine output of less than 500 mL/24 hr or less than 180 mL/8 hr, or by the need for hemo- or peritoneal dialysis.
- Hepatic failure: Serum bilirubin levels greater than 100 µmol/L (3mg/dL)
- Hematologic system failure: Hematocrit level of more than 50%, WBC of less than 2,000 /mm3, or platelet count of less than 40,000/mm3.

21 of 47 patients (45%) are found to have end organ failure. Hepatic failure was seen in 18 (38%) patients is the most common system failure in patients with acute pancreatitis in our study. Cardiac failure seen in 6 (13%), Renal failure in 5 (10%) patients. Respiratory failure and CNS failure failure each seen in 1 (2%) patient. One patient developed raise in hematocrit value. Of these 21 patients who developed end organ failure, 6 patients had mild, 7 patients had moderate and 8 patients had severe pancreatitis according to the MCTSI. 32% of patients who had mild pancreatitis had end organ failure, whereas end organ failure is seen in 35% and 100% of patients who had moderate and severe pancreatitis respectively(p=0.002). (Fig-20) According to CTSI, of these 21 patients, 11 patients had mild, 9 patients had moderate and 1 patient had severe pancreatitis. 32% of patients who had mild pancreatitis had end organ failure, whereas end organ failure is seen in 75% and 100% of patients who had moderate and severe pancreatitis respectively (p=0.012).The above statistics shows that, highly significant correlation exists between the prediction of end organ failure with the classification according to the MCTSI (p=0.002) than CTSI (p=0.012). (Fig-21)

SYSTEMIC INFECTION

A total of 17 (36%) patients who had fever and leukocytosis were considered to have systemic infection. Of these 17 patients, 2 patients had mild, 8 patients had moderate and 7 patients had severe pancreatitis according to the MCTSI. 10% of patients who had mild pancreatitis had systemic infection, whereas systemic infection is seen in 40% and 88% of patients who had moderate and severe pancreatitis respectively (p=0.001). (Fig-14)

According to CTSI, of these 17 patients, 10 patients had mild, 6 patients had moderate and 1 patient had severe pancreatitis. 29% of patients who had mild pancreatitis had systemic infection, whereas systemic infection was seen in 50% and 100% of patients who had moderate and severe pancreatitis respectively (p=0.172). (Fig-15) With above statistical values, it can be concluded that, there is a highly significant correlation between the prediction of systemic infection with the classification according to the MCTSI (P=0.001), compared to the classification according to CTSI which is not statistically significant (p=0.172).

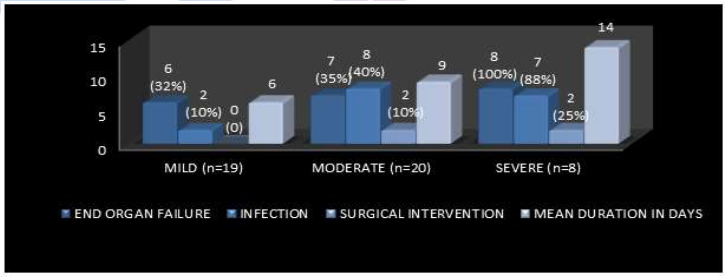


Figure 14: Comparison of patients with adverse clinical outcomes and days of hospitalization with severity grading according to MCTSI

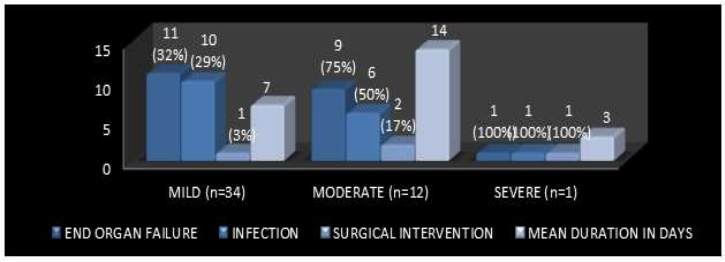


Figure 15: Comparison of patients with adverse clinical outcomes and days of hospitalization with severity grading according to CTSI

Table 2: Patient outcomes and duration of hospitalization in severity based on Modified CT Severity Index

MCTSI	MILD	MODERATE	SEVERE
Total number of patients	19	20	8
Mean duration of hospitalization (in days)	6	9	14
Surg int	0 (0%)	2 (10%)	2 (25%)
Infection	2 (10%)	8 (40%)	7 (88%)
End organ failure	6 (32%)	7 (35%)	8 (100%)

Table 3: Patient outcomes and duration of hospitalization in severity based on CT Severity Index

CTSI	MILD	MODERATE	SEVERE
Total number of patients	34	12	1
Mean duration of hospitalization (in days)	7	14	3
Surgical intervention	1 (3%)	2 (17%)	1 (100%)
Infection	10 (29%)	6 (50%)	1 (100v)
End organ failure	11 (32%)	9 (75%)	1 (100%)

SURGICAL INTERVENTION

Surgical intervention was required in 4 (8%) patients. Three patients who underwent laprotomy or USG guided aspiration had infected pseudocyst. One patient underwent surgical necrosectomy and subsequently that patient expired.

In our study, none of the patients who had mild pancreatitis according to MCTSI scoring underwent surgical intervention. Two patients (4%) had infected pseudocyst belonged to group of moderate pancreatitis, underwent surgical intervention. Two patients who had severe pancreatitis underwent surgical intervention, of them one had infected pseudocyst and another had necrosectomy. The statistical p value 0.117 is not significant. (Fig-20) One patient, who had mild pancreatitis according to CTSI scoring, had infected pseudocyst and underwent surgical intervention. Two patients (4%) had infected pseudocyst belonged to group of moderate pancreatitis, underwent surgical intervention. One patient who had severe pancreatitis underwent surgical intervention, necrosectomy. The statistical p value 0.017 is significant.(Fig-21) Above statistical analysis shows significant correlation between CTSI scoring system (p=0.017) and surgical intervention as compared to the MCTSI scoring system (0.117).

DURATION OF HOSPITAL STAY

Duration of hospital stay in our study was ranging from 2 to 23 days with mean duration of 9 days. The mean duration of hospitalization in mild, moderate and severe classes of Acute Pancreatitis according to Modified CT Severity Index was 6, 9 and 14 days respectively. Whereas it was 7, 14 and 3 days respectively as per the CT Severity Index. (Fig 20 and 21)

The above values shows that mean duration of hospitalization correlates well with the severity classification based on the MCTSI than CTSI.

MORTALITY RATE

One patient who had severe pancreatitis (score 10) based on both classification died due to multiple organ failure. The same patient underwent surgical necrosectomy and died on 3rd day of hospitalization. Mortality rate in our study was 2%.

ROLE OF PANCREATIC NECROSIS IN MCTSI SCORING SYSTEM.

8 patients in our study were found to have necrosis in CT evaluation. None of these patients belonged to the mild or moderate category of severity. 7 of 8 patients had less than 30 % of pancreatic surface area necrosis and 1 had more than 30% of necrosis (Fig-22). All patients who had pancreatic necrosis were classified into either moderate or severe category according to MCTSI scoring system and found to have more incidence of systemic organ failure, infection and longer duration of hospitalization.

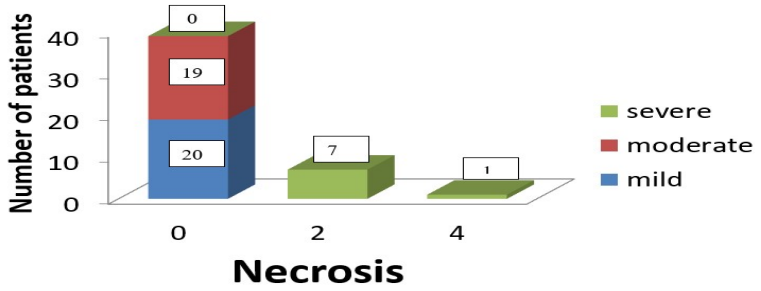


Figure 16: Relation between pancreatic necrosis and MCTSI scoring system

The present study showed no correlation between the presence of necrosis and prediction of end organ failure (EOF). Pancreatic necrois was present in 38% patients without any evidence of EOF, and there was no evidence of necrosis on CT scan in 61% patients with EOF. All patients who have evidence of necrosis had EOF. Hence the presence of necrosis and the occurrence of EOF favor association but not cause in acute pancreatitis.

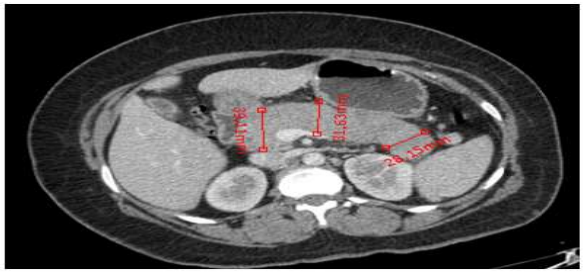


Figure 17: (Patient 1) Bulky pancreas with minimal peripancreatic fat stranding. MCTSI -2

Figure 18: a,b. (patient 3)Acute pancreatits with retroperitoneal acute fluid collections. MCTSI-4

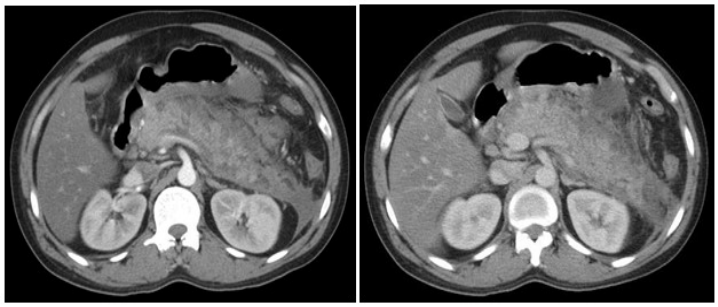
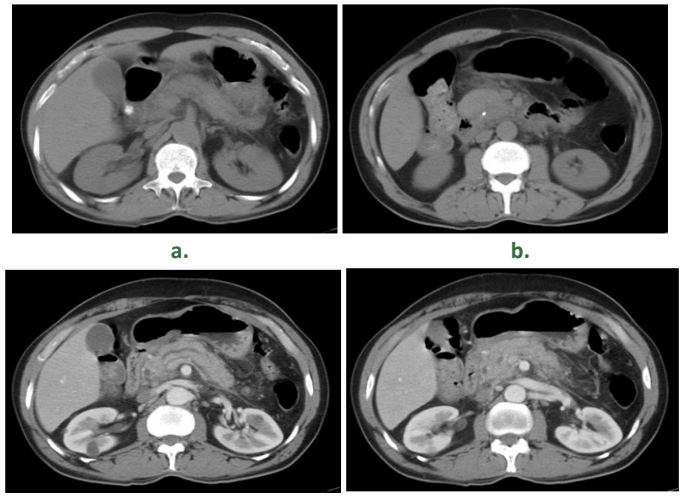


Figure 19: a,b. (patient no-6) Acute pancreatitis in an alcoholic patient with MCTSI 8. Peripancreatic fluid collection and intrapancreatic necrosis (less than 30%)

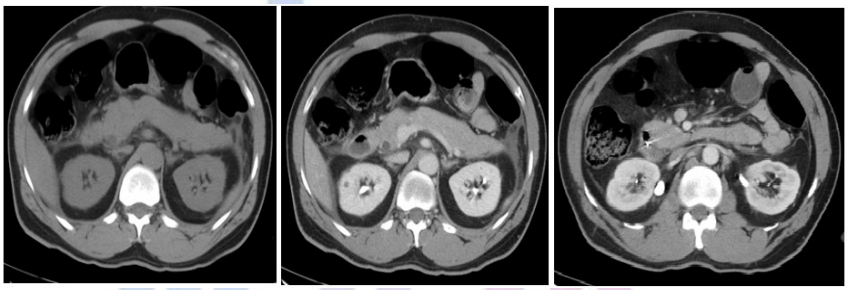
a. **b.** **c.**

Figure 20: a,b,c. (patient no-18). Acute necrotising pancreatitis with partially thrombose pseudoaneurysm of splenic artery and splenic infarct. MCTSI 10



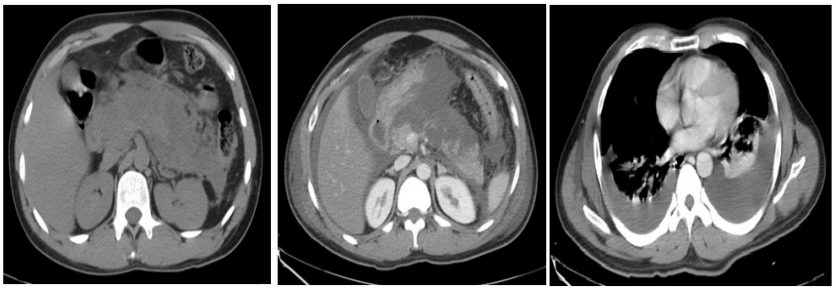
a. b. c. d.

Figure 21: a,b,c,d. (patient no-19). Gall stone pancreatitis.(MCTSI-2). Fig a shows gall stone in the region of the neck of gall bladder. Gall stone is seen impacted in the distal CBD(b) with dilated CBD and pancreatic duct (c). Mild peripancreatic fat stranding noted(d)



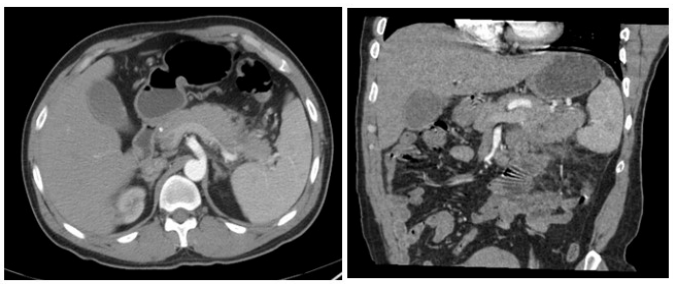
a. b. c.

Figure 22: a,b,c. (patient no-22). Moderate pancreatitis (MCTSI-4) due to gall stone in distal CBD. CBD is dilated. Peripancreatic fat stranding and minimal ascites seen



a. b. c.

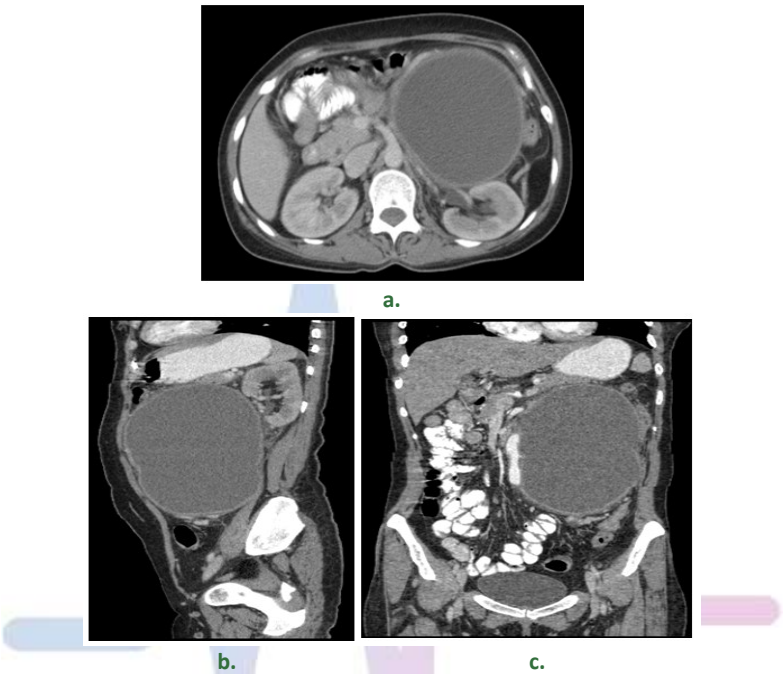
Figure 23: a,b,c. (patient no-24) Acute necrotosing pancreatitis. Pancreatic necrosis noted involving with more than 30% of pancreas with ascites and bilateral pleural effusion (MCTSI -10)



a. b.

Figure 24: a,b (patient no-27). Pancreatitis involving the tail of pancreas. (MCTSI-4). Head and body of the pancreas appears normal

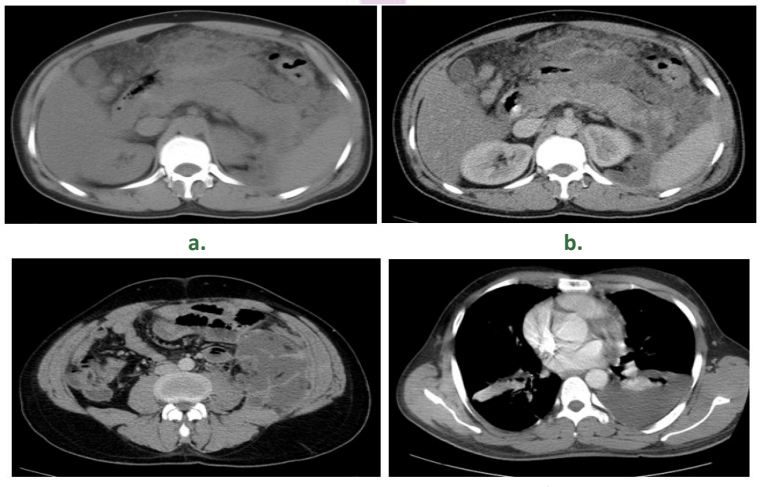
Figure 25: (patient no-37) Acute pancreatitis with intrapancreatic necrosis forming inflammatory mass. MCTSI-8



a.

b. c.

Figure 26: a, b, c. (patient no-30). Thick walled pseudocyst in relation to the tail of pancreas, displacing the descending colon and aorta with features of acute pancreatitis in the form of peripancreatic fat stranding (MCTSI-2)



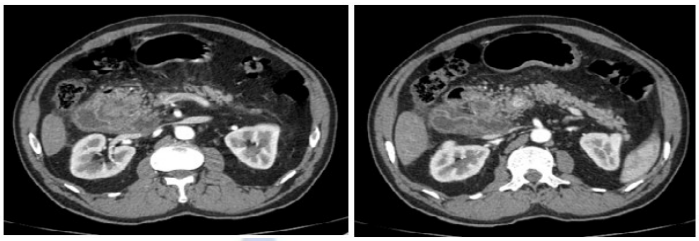
a. b.

c. d.

Figure 27: a,b,c,d.(patient no-36) Non contrast image shows extensive peripancreatic fat stranding(a). post contrast venous phase image shows intraparenchymal nonenhancing areas suggestive of pancreatic necrosis seen involving less than 30% of pancreas (b). Multiple foci of fluid collection noted in the left retroperitoneal compartment with mild ascites and left moderate pleural effusion. MCTSI-8

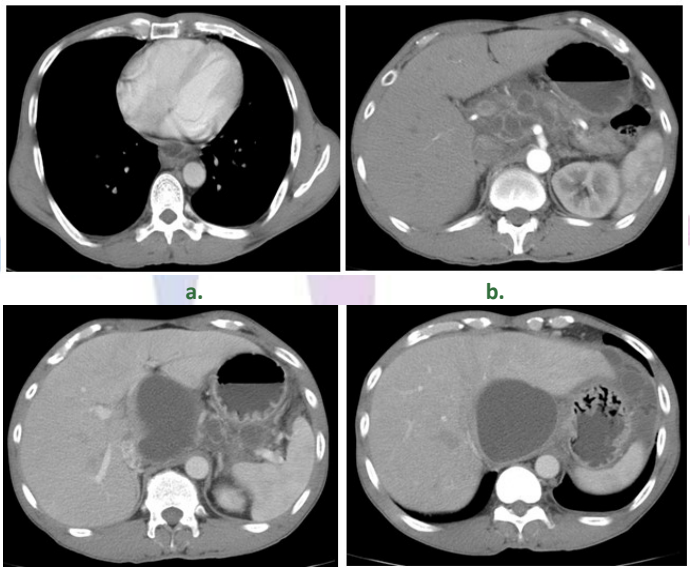
a. b. c.

Figure 28: a,b,c.(patient no-39). Chronic pancreatitis. Pancreas is atrophic with multiple intraparenchymal calcifications. Mild fat stranding noted in the region of head of pancreas suggestive of acute attack of pancreatitis MCTSI-2



a. b.

Figure 29: a,b.(patient no-40) Groove pancreatitis. Peripancreatic fat stranding noted involving the head and uncinate process of the pancreas. Inflammatory mucosal edema of the adjacent C loop of the second and third part of the duodenum. MCTSI-2



a. b.

c. d.

Figure 30: a,b,c,d. (patient no-41) Multiple pseudocysts along the pancreas, in the porta hapatis, lesser sac, and along the lower end of esophagus. MCTSI-6

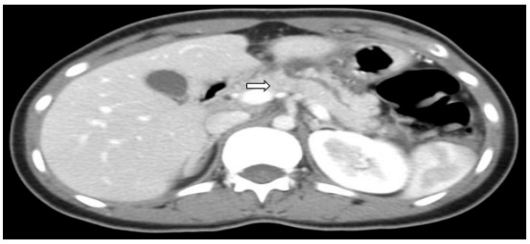
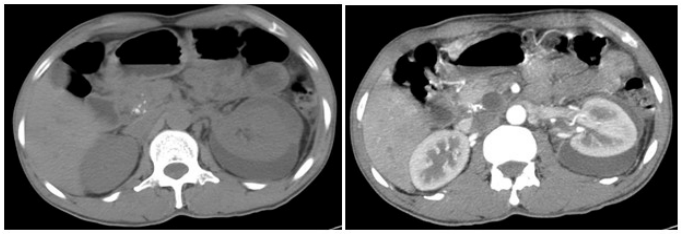


Figure 31: (patient no-42) Acute mild pancreatitis with focal disruption of the pancreatic duct and an adjacent focal fluid collection(arrow). MCTSI-2



a. b.

Figure 32: a,b. (patient no-43) Chronic pancreatitis with renal subcapsular pseudocyst.MCTSI-2

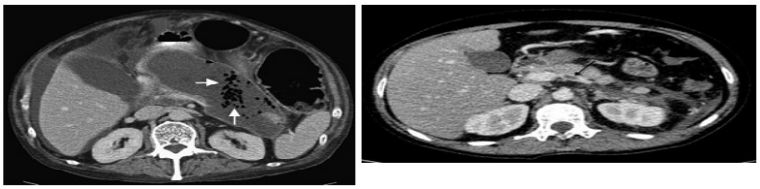


Figure 33: (patient no-44) Peripheraaly enhancing, thin walled cystic lesion in the stomach bed with air pockets suggestive of infected pseudocyst of pancreas. MCTSI-6; **Figure 34:** (patient no-35). Acute pancreatitis with portal vein thrombosis. MCTSI-4

DISCUSSION

Initial clinical assessment of the progression of acute pancreatitis alone has been inadequate in identifying patients who develop a severe disease. Identifying severe cases are important and can play a significant role in management decision and in reducing the morbidity and mortality associated with severe acute pancreatitis.[6] Ranson score, Glasgow score, APACHE II, Marshall and SOFA (Sepsis-related organ failure assessment) scoring system are different severity scoring system studied in the past and proven to be indicators of the clinical severity. But, none of the above scoring system are proven to be the precise indicators of the adverse clinical outcome.[7] Mean age of presentation is 40 years in our study population. It is concurrent with study done by Thomas *et al.*, Jauregui *et al.*, and others. The prevalence of chronic alcohol abuse and biliary stones are common in fourth and fifth decades explain the high incidence of the acute pancreatitis in this age group.[8] M: F ratio in our study is about 3:1.. Similar results are seen by Freeny *et al.*. But studies done by others showed slightly lesser ratio than our study. As alcohol is the most common etiological factor in our study which is common in males, a high M: F ratio is observed.[9] In our study 2% of mortality rate was observed, Lescence *et al.* observed 6% mortality in their study. The mean annual mortality rate for acute pancreatitis in the population was 1.3 per 100,000. Study done by Chamisa, T *et al.* showed difference in mortality rate in gallstone pancreatitis and alcohol induced pancreatitis which was 6.5% and 3.1% respectively. [10]

CONCLUSION

Our study showed highly significant correlation between the MCTSI score and the prediction of end organ failure, systemic infection and duration of hospital stay. However no significant correlation found with the need for surgical intervention. There was significant correlation of grades of severity of acute pancreatitis based on MCTSI with patient outcome parameters than grades of severity of acute pancreatitis based on CTSI. There was no statistical significance in the presence of necrosis and prediction of end organ failure. But presence of necrosis was always associated with end organ failure. Extra pancreatic complications, when included in the CT scoring system (MCTSI) were significantly correlated with end organ failure and adverse clinical outcome. Hence MCTSI may be more useful scoring system than CTSI. MCTSI is a very useful tool for the screening of patients with acute pancreatitis for the classification of severity accurately and to predict the clinical outcome when used within three days of symptom onset.

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