Correlation between modified CT severity index and complications of acute pancreatitis in the evaluation of patient outcome

Satish Prasad B S[1*], Likhitha S[2]

[1]Professor and HOD, [2]Junior Resident, Department of Radiodiagnosis, Adichunchangiri Institute of Medical Sciences, Bangalore, Karnataka, INDIA.
Email: satishprasad.bs@gmail.com

Abstract

Aims and Objectives: 1) 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. 2) To study the prognostic value of MDCT in acute pancreatitis. 3) To correlate CT severity indexes with clinical outcome. **Method:** Study period: 18 months; from October 2013 to April 2015. A total of 50 patients are included. **Place of study:** Aims, B.G.Nagara. **Equipment:** Ge 16 slice CT. All patients were scored using both CT severity and Modified CT severity index and patient outcome taken into consideration on basis of duration of hospital stay, need of surgical intervention, occurrence of infections, end organ failure and death. Correlation was estimated by using the percentage, frequency charts and chi sqaure test. **Result:** The study was conducted in the department of Radiodiagnosis in Adichunchangiri Institute Of Medical Sciences. When applied modified CT severity index, severity of pancreatitis significantly correlated than CT severity index, the length of hospital stay (2-23 days), occurrence of end organ failure (21/50pts) (Modified CT severity index [P=0.002] v/s CT severity index [P=0.012]). Highly significant correlation between grading of acute pancreatitis and prediction of systemic infections (17/50) was seen using the modified CT severity index [P=0.001], not CT severity index[P=0.172]. There was no significant correlation between grading of severity of pancreatitis based on the Modified CT severity index and need for surgical intervention (Modified index [P=0.117]) v/s CT severity index [P=0.117]. Mortality rate in our study was 2%. **Conclusion:** Highly significant correlation between MCTSI score and prediction of end organ failure, systemic infection and duration of hospital stay. Significant correlation of grades of severity of acute pancreatitis based on MCTSI with patient outcome parameters than grades of severity of acute pancreatitis 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. Extrapancreatic complications, when included in the CT scoring system (MCTSI) were significantly correlated with organ failure and adverse clinical outcome. Hence MCTSI may be more usefull scoring system than CTSI. MCSTI is very useful tool for screening of patients.
Keywords: Modified Ct Severity Index (MCTSI), Acute Pancreatitis, Patient Outcomes.

Access this article online	
Quick Response Code:	Website: www.statperson.com
	DOI: 16 June 2015

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. 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. 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. 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

MATERIALS AND METHODS

Study Design
This is a correlative study that is done in the department of Radio Diagnosis in Adichunchanagiri Medical College for a period of 18 months from October 2013 to April 2015.Study group consists of 50 patients selected using purposive sampling method from patients admitted to Adichunchanagiri Hospital with clinical impression of acute pancreatitis during study period.

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

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

Equipment: Ge 16 slice CT.

Examination Method
All patients were scored using both CT severity and Modified CT severity index and patient outcome taken into consideration on basis of duration of hospital stay, need of surgical intervention, occurrence of infections, end organ failure and death. Correlation was estimated by using the percentage, frequency charts and chi sqaure test.

Statistical Analysis

Table 1: Age distribution

Age group (in years)	Number of patients	Percentage
15-25	5	11
26-35	21	40
36-45	9	19
46-55	7	15
Above55	8	17
Total	**50**	**100**

Sex Distribution
In our study, out of 50 cases, 38 (76.5%) were male and 12 (23.5%) were females with a male to female ratio of 2.9: 1

DISEASE CHARACTERISTICS

Etiology: In our study, 30 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, pancreatic carcinoma (n=1) and idiopathic (n=3).

Mode of presentation: All 50 patients (100 %) presented with pain abdomen. 43 patients (85%) had vomiting, 17(36%) patients had at presentation (Fig-12).fever and 3(6%) of patients had jaundice at the time of admission.

Laboratory diagnosis: Amylase was elevated in 40 (85%) patients at presentation. Lipase was elevated in 43(92%) patients.

Ultrasonography: In 9 (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.

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).

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 24 (44.7%) patients had pancreatic or peripancreatic fluid collection or peripancreatic fat necrosis, to whom 4 points were assigned.

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 which 2 points were assigned. Only 4 patient had more than 30% necrosis, to which 4 points were assigned.

Extrapancreatic complications: Out of 50 patients, 21 (45%) patients had no evidence of extra pancreatic complications. 29 (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. 7 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.

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=11) i.e. 40% patients had mild, 43% patients had moderate and 17% had severe pancreatitis.

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=4). 72% patients had mild, 25% patients had moderate and only 2% patients had severe pancreatitis as per CTSI score. In CTSI scoring system, 34 patients (72%) belonged to mild category, 12 (25%) patients had moderate and only 4 patients 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 11 (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. 21 of 50 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) 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)

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). 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). 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).

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.

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 hospitalisation 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. The above values shows that mean duration of hospitalisation 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 hospitalisation. Mortality rate in our study was 2%.
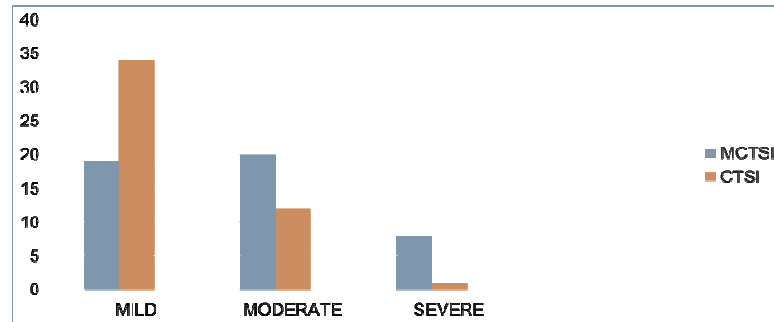
Figure 1: Correlation of severity between modified CT severity index and CT severity index
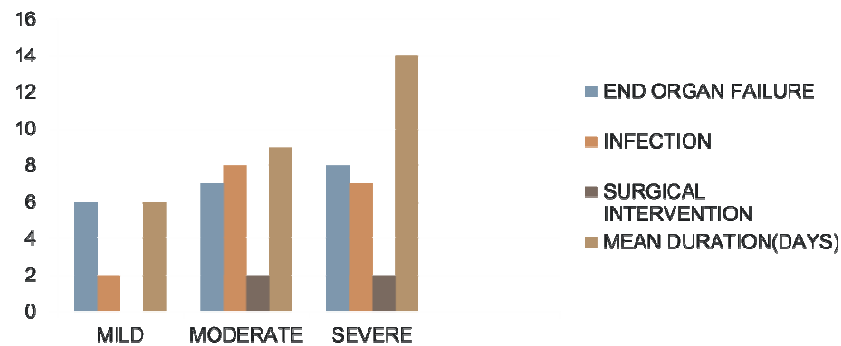

Figure 2: Comparsion of patients with adverse clinical outcome and duration of hospital stay with modified CT severity index
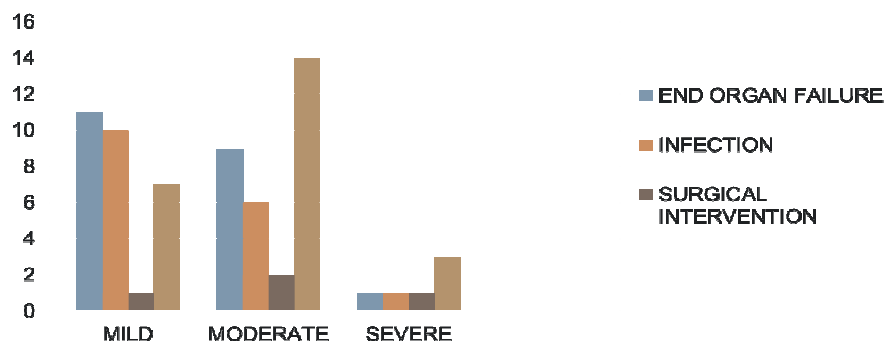

Figure 3: Comparsion of patients with adverse clinical outcome and duration of hospital stay with CT severity index

DISCUSSION

Maximum number of patients with acute pancreatitis was seen in the age group of 26-35 years of age (38%) with mean age of presentation being 40 years. Male to female ratio was 2.9: 1 with male preponderance. Chronic alcohol abuse was the most common cause of pancreatitis (53%), second was gallstones (35%) other rare causes were pancreatic carcinoma and idiopathic. All patients presented with pain abdomen. 85% had vomiting, 36% patients had fever and 6% of patients had jaundice at the time of presentation. Duration of hospital stay ranged from 2 to 23 days with mean duration of 9 days. Mortality rate was 2%. Amylase was elevated in 85% patients. Lipase was elevated in 92% patients. 86% patients had features of pancreatitis on ultrasound and in 14%

ultrasound was normal. In 2% of patients pancreas was normal in CT scan. Pancreatic inflammation was seen in 98% of patients. 83% patients had no evidence of pancreatic necrosis on CT scan. 15% of patients had less than 30% necrosis and only 2% had more than 30% necrosis. 45% patients had no evidence of extra pancreatic complications. 56% patients had one or more extra pancreatic complications. According to Modified CT Severity Index, 40% patients had mild, 43% patients had moderate and 17% had severe pancreatitis. 45% patients are considered to have end organ failure. Hepatic failure is the most common system failure seen in 38% patients. 36% patients had evidence of systemic infection. 8% patients required surgical interventions.

Figure 1: a,b,c. Acute necrotising pancreatitis with partially thrombosed pseudoaneurysm of splenic artery and splenic infarct. MCTSI 10
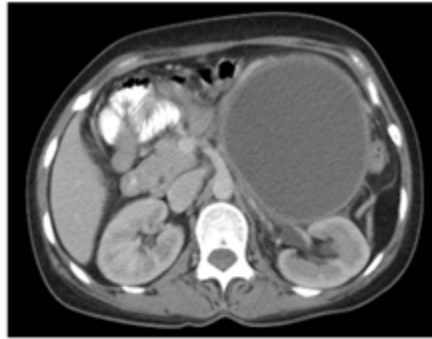

Figure 2: Thick walled pseudocyst in relation to the tail of pancreas, displacing the descending colon and aorta with features of acute pancreatitis in the form of peripancreatic fat stranding (MCTSI-2)
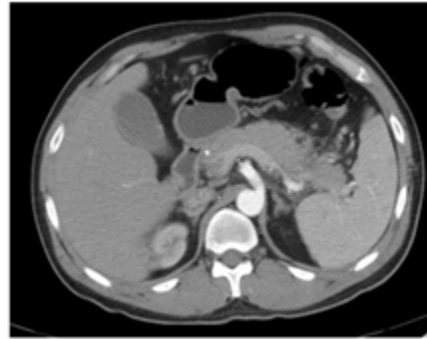
Figure 3: Pancreatitis involving the tail of pancreas (MCTSI-4). Head and body of the pancreas appear normal
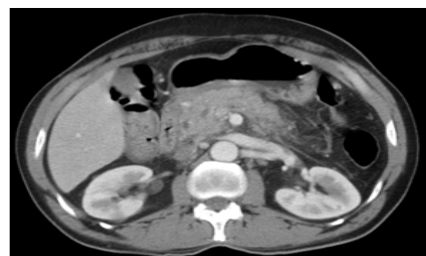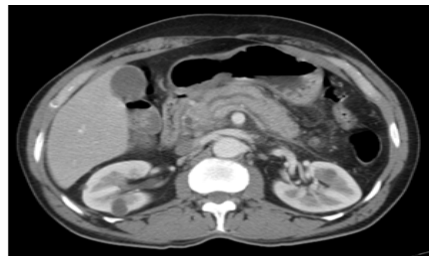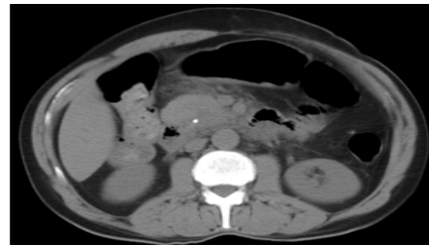

Figure 4: Gall stone pancreatitis. (MCTSI-2). Fig (a) shows gall stone in the region of the neck of gall bladder. Gall stone is seen impacted in the distal CBD (b) with dilated CBD and pancreatic duct (c). Mild peripancreatic fat stranding noted (d).

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 symptoms

REFERENCES

1. Clarke ES: History of gastroenterology.Gastroenterological Medicine, Philadelphia: Lea and Fibiger; 1969.
2. Tracy-Ann Moo, Rasa Zarnegar and Laurent Brunaud. Pancreas: Embryology, Anatomy, and Physiology. Endocrine Surgery- Springer Specialist Surgery Series, 2009, 4, 459-469.
3. Clemente CD. Gray's Anatomy of the Human Body, 30th ed. Philadelphia: Lea andFebiger; 1985.
4. Basmajian JV: Grant's Method of Anatomy. 10th ed. Baltimore, Williams and Wilkins, 1980
5. B. Hadorn, G. Zoppi, D.H. Shmerling, A. Prader, I. McIntyre, C.M. Anderson. Quantitative assessment of exocrine pancreatic function in infants and children. The Journal of Paediatrics.Volume 73, Issue 1 , Pages 39-50, July 1968
6. William H. Nealon , Surgical Diseases of the Pancreas (3rd Edition). Ann Surg. 2001 April; 33(4): 595–596.
7. DeFrances CJ, Hall MJ, Podgornik MN. National Hospital Discharge Survey: Advance data from vital and health statistics, National Center for Health Statistics, 2005.
8. Neoptolemos JP, Raraty M, Finch M: Acute pancreatitis: The substantial human and financial costs. Gut 98; 42:886-91.
9. Steinberg WM, Tenner S: Acute pancreatitis. N Engl J Med 1994; 330:1198-1210.
10. Moreau JA, Zinsmeister AR, Melton LJ. Gall stone pancreatitis and the effect of cholecystectomy. Mayo ClinProc, 1988; 63:466.
11. Ko CW, Sekijima JH, Lee SP: Biliary sludge. Ann Intern Med 1999; 130:301.
12. Choudari CP, Fogel EL, Sherman S. Idiopathic pancreatitis: yield of ERCP correlated with patients' age. Am J Gastroenterol 1998; 93:1654A.
13. Goldberg PB, Long WB, Oleaga JA. Choledococele as a cause of recurrent pancreatitis. Gastro 1980; 78:1041.et.