ORIGINAL RESEARCH

Prognostication of acute pancreatitis using Computed Tomography Severity Indices. Can Modified CT Severity Index replace CT Severity Index - A Prospective study

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ABSTRACT

Introduction: Acute pancreatitis is a diffuse inflammatory process, which initially confined to pancreas may spread to regional tissues, adjacent and distant organs depending upon the clinical severity, thus running a highly unpredictable clinical course with variable outcome. Stratification of cases based on severity at admission is essential to permit triage, determine prognosis, decide upon treatment, and allocate resources judiciously.

Materials and Methods: In our study, 50 patients diagnosed with acute pancreatitis on Contrast enhanced Computed Tomography were evaluated and severity of pancreatitis and clinical outcome were scored using both Modified CTSeverity Index and CTSeverity Index and correlated with parameters such as mean duration of hospital stay, the need for surgical intervention, occurrences of infection and end organ failure. Statistical correlation was assessed using chi-square test.

Results: The clinical parameters correlated well with Modified CT Severity Index than CT Severity Index with significant'P'value except the need for surgical intervention which correlated well with CTSeverity Index. Hence Modified CT Severity Index may be more useful scoring system than CT-Severity Index.

Conclusion: Modified CT Severity Index is a veryuseful and reliable tool for prognostication of patients with acute pancreatitis for it accurately predicts the clinical outcome, permitting appropriate treatment to be initiated and therebyreducing the mortality and morbidity.

Keywords: Acute pancreatitis, Modified CT Severity Index, CT severity Index, Prognosis, Clinical outcome

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INTRODUCTION

It is extremely essential to identify the severity of attack of pancreatitis, so as to timely start appropriate management, thus playing an important role in reducing the morbidity and mortality. Overall mortality for pancreatitis is 5%.[1,2] The mortality of severe pancreatitis is 14%-25%[3] and the presence of multiorgan failure increases this to 47%.[1,2,3] About half of the deaths occur within 2 weeks as a result of multiorgan dysfunction and the remainder occur later from complications of infection.[4]

In Indian scenario, acute pancreatitis is related to alcohol or biliary tract stone disease in 80% of cases with 10% due to metabolic factors, drugs or other causes and remaining 10% being idiopathic.[4,5]

Contrast enhanced computed tomography is the gold standard non invasive cross sectional imaging technique for its accurate depiction of the pathology, severity and complications. Recently, Modified Computed Tomography Severity Index (MCTSI) has been introduced which differs from the Computed Tomography Severity Index (CTSI) by better categorisation of pancreatic necrosis, grading the peripancreatic fluid collection and also taking into consideration of the presence of extra pancreatic complications.

The aim of our study was to study the prognostic value of Modified Computed Tomography Severity Index and Computed Tomography Severity Index in admitted cases of acute pancreatitis and to correlate the indices with clinical outcomes.

MATERIALS AND METHODS

This prospective study was conducted in department of

Radiodiagnosis King George Hospital, Andhra Pradesh from November 2012 to August 2014. 50 clinically diagnosed cases of acute pancreatitis who were referred for contrast enhanced Computed Tomography, within three days of admission were included in the study. All scans were performed after obtaining informed consent from the patient using GE Bright Speed16 slice CT scanner (France). Detailed written and oral consent were obtained from the subjects after reading the protocol in verbatim and explaining it in subject's own language.

Plain and contrast images of abdomen and pelvis from xiphisternum to pubic symphysis were obtained after a four hour fast.80 ml of intravenous non-ionic dimer contrast agent was administered in all cases. Arterial and portovenous phases were obtained after a post threshold delay of 8 and 45 minutes. 5mm axial sections were obtained, which were further reconstructed into 1.5 mm slices and post procedural axial, coronal and sagittal multiplanar reformations were performed and analysed.All images were viewed in a range of soft tissue window settings.

The severity of pancreatitis was scored initially 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). Subsequently the severity of pancreatitis was re-scored in all cases using modified CT severity index into three categories (mild, moderate and severe). The modified index is a10 point scoring system derived by assessing the degree of pancreatic inflammation (0 to 4 points), pancreatic necrosis (0 to 4 points) and extrapancreatic complications (0 or 2 points). All patients were graded into mild (score 0-2), moderate (score 4-6) or severe (score 8-10).

Clinical outcome parameters included were the length of hospital stay,need for surgical intervention, occurrence of infection and organ failure. Collected data was analyzed by Pearson Chi square test to assess the statistical significance.

RESULTS

The study comprised of 50 cases of acute pancreatitis with age distribution as indicated in Table 1.
Our study included patients between the age group ranging from 15 years to 79 years with a mean age of 40 yrs. Out of 50 cases, 38(76%) were male and 12 (24%) were females with a male to female ratio of 3:1. The major etiologies encountered in our study were 29

Age group (years)	Number of patients	%
15-25	6	12
26-35	20	40
36-45	9	18
46-55	7	14
Above 55	8	16
Total	50	100

Table-1: Age distribution of the study group

Modified CTSeverity Index	Mild	Moderate	Severe
Total number of patients	22	20	8
Mean duration of hospitalization (in days)	6	9	14
Surgical intervention	0(0%)	2(10%)	2(25%)
Infection	2(9%)	8(40%)	7(88%)
Endorgan failure	6(27%)	7(35%)	8(100%)

Table-2: Patient outcomes and duration of hospitalisation in severity based on Modified CTSeverity Index

CTSI	Mild	Moderate	Severe
Total number of patients	37	12	1
Mean duration of hospitalization (in days)	7	14	3
Surgical intervention	1(3%)	2(17%)	1(100%)
Infection	10(27%)	6(50%)	1(100%)
Endorgan failure	11(30%)	9(75%)	1(100%)

Table-3: Patient outcomes and duration of hospitalisation in severity based on CTSeverityI ndex.
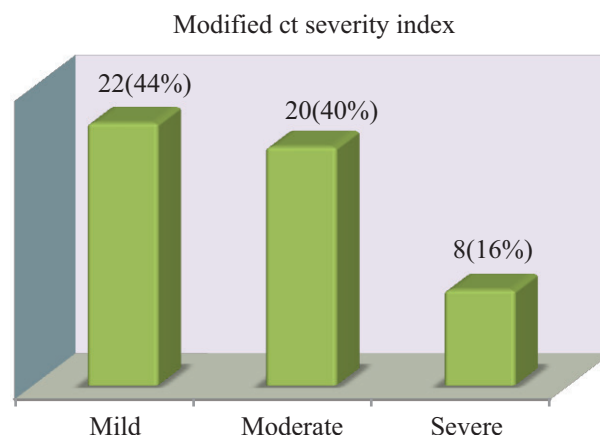
Modified ct severity index

Figure-1: Number and percentage of patients with grades of severity assessment based on Modified CTSeverity Index

(58%) alcoholic, 17(34%) had gall stones and remaining patients were grouped as others which consisted of 4 patients, in which the cause was idiopathic.
The discrepancy is attributed to the inclusion of extrapancreatic complications in Modified CTSeverity Index scoring system. Hence, two extra points were
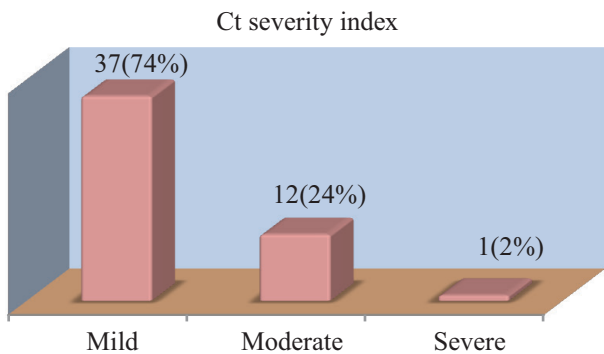
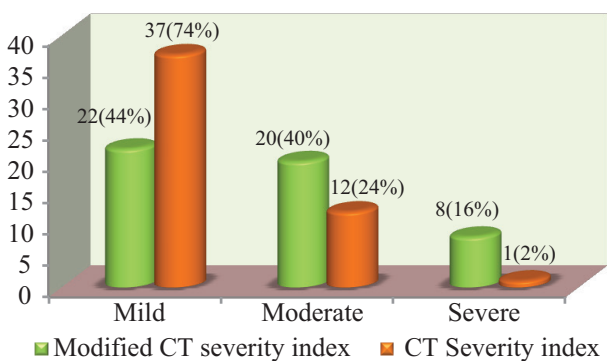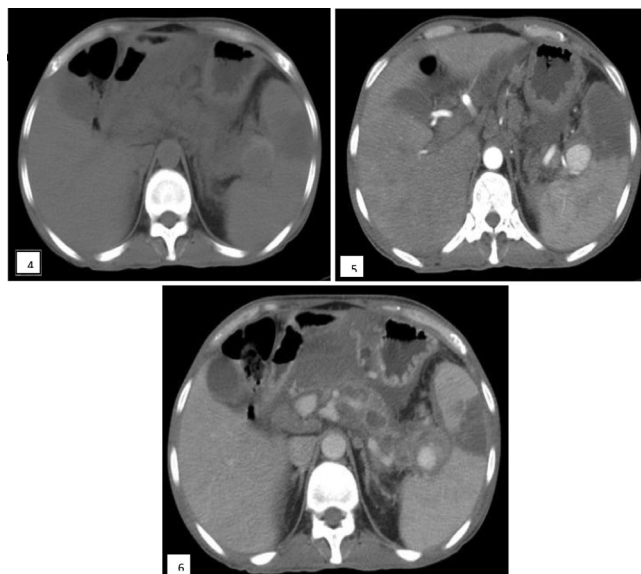**Figure-2:** Number and percentage of patients with grades of severity assessment based on CTSeverity Index
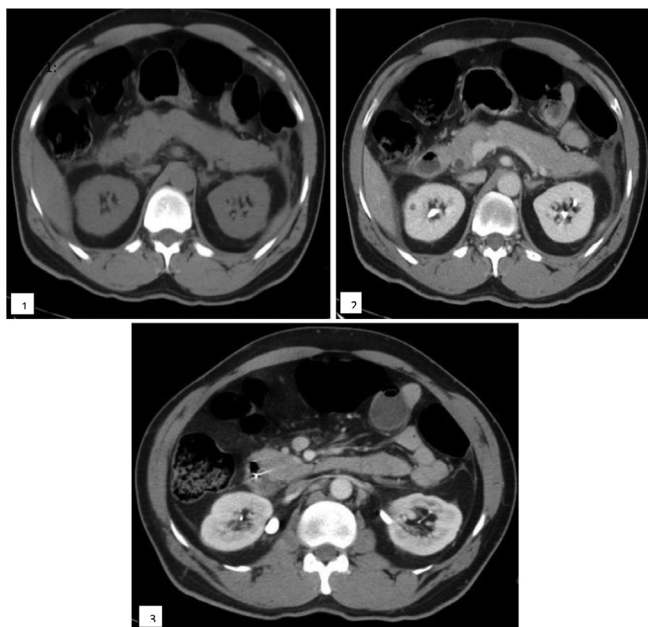

Figure-3: Comparative distribution of cases based on Modified CT Severity Index and CT Severity Index

Images-4,5 and 6: Show bulky pancreas with necrotic areas within.Peripancreatic fluid fat stranding and ascites seen.A brilliantly enhancing splenic artery pseudoaneurysmseen at splenic hilum. Images 2 and 3 also show wedge shaped splenic infarct. The case was graded as 10 /10 according to Modified CT Severity Index and 10/ 10 according to CT Severity Index which correlated well with clinical severity. The case was successfully treated with coiling of pseudoaneurysm.

Images-1,2 and 3: Show homogeneously enhancing bulky pancreas with peripancreatic fat stranding peripancreatic fluid and mild ascites. Image 3 shows choledocholithiasis causing upstream dilatation of Common bile duct. The patient was given score of 6/10 according to Modified CT Severity Index and score of 3/10 according to CT Severity Index. Modified CT Severity Index correlated well with clinical outcome.

Image-7: Shows pancreatitis with non-enhancing thrombus within the splenic vein. The case was graded as 6/10 according to Modified CT Severity Index and 3/10 according to CT severity Index. In this case Modified CT severity Index correlated well with clinical course.

added to severity index in addition to the pancreatic inflammation and necrosis findings.

According to Chi square test, the correlation between end organ failure and severity of pancreatitis established by Modified CT severity Index was statistically significant ($P<0.05$), whereas the CT severity index shows statistically insignificant correlation ($P>0.05$) with respect to the same.

The correlation between the systemic infection and severity of pancreatitis established by Modified CT se-

verity index was statistically significant (P<0.05), however CT Severity Index shows statistically insignificant correlation (P>0.05).

There was statistically insignificant (P>0.05) correlation between the severity of pancreatitis established by Modified CT Severity Index and the need for surgical intervention. Statistically significant correlation exists (P<0.05) between the severity of pancreatitis as per CT severity Index and the need for surgical invention.

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. As per CT Severity Index the duration was 7, 14 and 3 days respectively. Mean duration of hospitalisation correlates well with the severity classification based on Modified CT Severity Index (P<0.05) than CTSI (P>0.05).

DISCUSSION

Contrast enhanced Computed Tomography has revolutionized the approach in diagnosing the inflammatory changes in and around the pancreas. It has become the investigation modality of choice in diseases of pancreas, especially pancreatitis with rapid and relatively accurate demonstration of pathology. The major advantage of CT is evaluation of complications like involvement of vascular structures around the pancreas, psuedocyst formation and pancreatic necrosis. Use of helical CT has improved pancreatic imaging tremendously as the entire pancreatic evaluation can be performed in a single breath hold.

During last decade, management of severe acute pancreatitis has changed from a more aggressive surgical intervention towards a more conservative form, except when infected necrosis has been confirmed. Hence it is very important from the treatment aspect to assess the severity of acute pancreatitis and the presence of necrosis by CECT.

Our study showed a statistically significant correlation of grades of severity of pancreatitis based on Modified CTSeverity Index with patient outcome parameters as compared to CTSeverity Index.

Similar statistically significant correlation between the Modified CT severity Index in evaluating acute pancreatitis was reported in various studies.[6,7,8] Inclusion of extrapancreatic complications in Modified CTSeverity Index is responsible for better correlation with clinical severity, thus playing a major role in management of patient. We assume that the presence of ascites and pleural fluid may be responsible for the improved correlation with Modified CTSeverity Index, because they represent early organ dysfunction. Another important difference between the two indices is that, modified index differentiates only between presence and absence of acute fluid collections and, therefore does not require a count of the collections as with CTSI.

However in contrary to our study results, Bollen et al.[9], showed no differences in CT severity grading with both the CT scoring systems in assessment of clinical outcome. The differences between our study and the aforementioned study are attributed to differences in assumed criteria for organ failure.

Limitations of our study are exclusion of patients with acute pancreatitis underwent plain CT examination alone due to financial constraints and those patients with severe pancreatitis cases with renal failure.

Patients who had positive results for acute pancreatitis but didn't undergo Contrast enhanced Computed tomographic evaluation, those who refused admission and management in our hospital and who were not available for follow up were not considered for the study purpose.

CONCLUSION

Our study showed statistically significant correlation between Modified CTSeverity Index 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 Modified CTSeverity Index with patient outcome parameters than grades of severity of acute pancreatitis based on CTSeverity Index. Henceforth Modified CTSeverity Index is a single most important and accurate prognostic tool in screening of acute pancreatitis patients especially when used within three days of symptom onset.

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