

Original research article

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

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Abstract

A severity index scoring will be helpful for a timely diagnosis and as a prognostic marker. There are several clinical scoring systems for assessing the clinical parameters of acute pancreatitis, both in the adult and pediatric population, each predicting clinical outcome with some statistical significance. Study group consists of 50 patient's selected using purposive sampling method from patients admitted to Hospital with clinical impression of acute pancreatitis during study period. Patients admitted to Hospital with clinical impression of acute pancreatitis who underwent contrast enhanced computed tomography during study period within five days of admission were included in the study. Our study showed a significant correlation of grades of severity of pancreatitis based on MCTSI with patient outcome parameters including duration of hospital stay, ICU admission, occurrence of organ failure and systemic infection. However MCTSI was more closely associated with patient outcome than CTSI in our study. Majority of the patients (52%) in our study population were classified as severe AP when MCTSI was applied, while majority (54%) were placed in moderate AP when the CTSI was used.

Keywords: Modified Ct severity index, acute pancreatitis, patient outcome.

Introduction

Acute pancreatitis (AP) is an acute inflammatory condition of the pancreas, clinically characterized by abdominal pain and elevated blood levels of pancreatic enzymes ^[1].

This condition has become the most common reason for hospitalization among the gastrointestinal conditions in the United States, accounting for as many as 230,000 hospitalizations per year. The incidence is on an increasing trend during the past decades and has ranged from approximately 5 to 35 per 100,000 population per year worldwide ^[2].

In the majority of cases, acute pancreatitis is mild and resolves with conservative therapy.

The disease is severe in 10-20% of the cases and lead to significant morbidity and mortality, usually due to multi-system organ failure or local complications ^[3].

Diagnosing the condition within few hours of admission and recognizing those patients who will progress to multi organ system failure to provide appropriate care, including fluid resuscitation, respiratory support and intensive care is important.

A severity index scoring will be helpful for a timely diagnosis and as a prognostic marker.

There are several clinical scoring systems for assessing the clinical parameters of acute pancreatitis, both in the adult and pediatric population, each predicting clinical outcome with some statistical significance ^[4].

The Balthazar scoring system was initially used which was based on the appearance of pancreatic inflammation on CT. Later was improvised as CT severity index (CTSI) by taking both the pancreatic inflammation and the presence of necrosis into account. This CTSI was widely used until Mortelet and his team introduced the Modified CT severity index (MCTSI). This scoring system along with pancreatic inflammation and presence of necrosis, included the presence of extra pancreatic complications and made a significant difference in assessing patient's outcome ^[5, 6].

Alcoholism is a serious health issue as well a social problem, which is one of the major cause of acute pancreatitis in our country. Using a valid scoring system for predicting the course and outcome of the acute pancreatitis and its associated complications is needed to manage this disease entity.

Methodology

This is correlational study that is done in the Department of General Surgery.

Study group consists of 50 patient’s selected using purposive sampling method from patients admitted to Hospital with clinical impression of acute pancreatitis during study period.

Patients admitted to Hospital with clinical impression of acute pancreatitis who underwent contrast enhanced computed tomography during study period within five days of admission were included in the study.

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 extrapancreatic 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

- Patients admitted with clinical suspicion of Acute Pancreatitis who underwent CECT within five days of admission.

Exclusion criteria

- Patients with CT findings of intraductal and parenchymal calcification suggesting chronic pancreatitis
- Patients who are discharged from hospital before they recover from organ failure.

Results

Table 1: Distribution of cases based on severity as determined by CTSI

CTSI	Number of patients	Percentage
0-2 (Mild)	9	18.0
3-6 (Moderate)	27	54.0
7-10 (Severe)	14	28.0
Total	50	100.0

Table 2: Distribution of cases based on severity as determined by MCTSI

MCTSI	Number of patients	Percentage
0-2	5	10.0
4-6	19	38.0
8-10	26	52.0
Total	50	100.0

P value 0.006

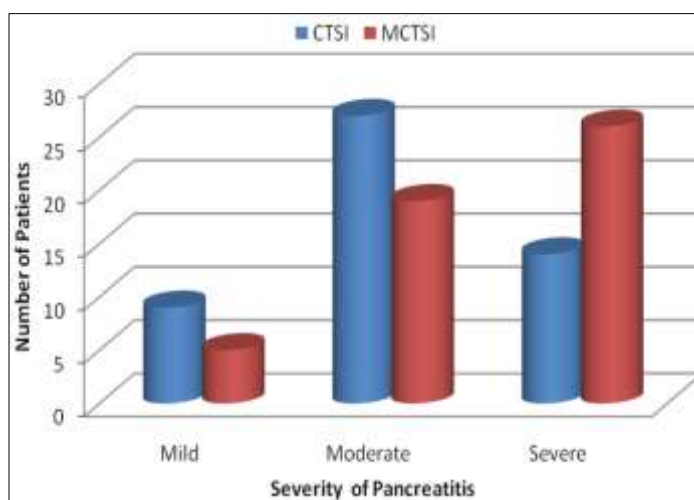


Fig 1: Comparison of grading severity of pancreatitis between CTSI and MCTSI

Table 3: Association between MCTSI and duration of hospital stay in acute pancreatitis

MCTSI	Number	Mean duration of hospital stay	Std. Deviation
Mild	5	4.4000	.54772
Moderate	19	5.5789	1.50243

Severe	26	10.9615	2.80686
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Pearson Chi-Square- 39.44, p value- 0.001

As the severity of the pancreatitis increased, the duration of hospital stay increased.

Table 4: Association between MCTSI and rate of ICU Admissions in Acute Pancreatitis

			ICU-Admission		
			No	Yes	
MCTSI	0-2 Mild	Number	5	0	
		Percentage	18.5%	0.0%	
	4-6 Moderate	Number	18	1	
		Percentage	66.7%	4.3%	
	8-10 Severe	Number	4	22	
		Percentage	14.8%	95.7%	
	Total		Number	27	23

Pearson Chi-Square- 32.56, p value- 0.001

There were more no of ICU admissions in severe pancreatitis group as predicted by MCTSI than in mild and moderate case, some even requiring mechanical ventilator support.

Table 5: Significant association between MCTSI and organ failure

			Organ-failure		
			No	Yes	
MCTSI	0-2 Mild	Number	5	0	
		Percentage	18.5%	0.0%	
	4-6 Moderate	Number	17	2	
		Percentage	63.0%	8.7%	
	8-10 Severe	Number	5	21	
		Percentage	18.5%	91.3%	
	Total		Number	Number	23

Pearson Chi-Square- 26.538, p value- 0.001

There were more no of patients with organ failure in severe pancreatitis group 91.3% than in mild and moderate cases.

Table 6: Significant association between MCTSI and systemic infection in acute pancreatitis

			Infection		
			No	Yes	
MCTSI	0-2 Mild	Number	5	0	
		Percentage	11.6%	0.0%	
	4-6 Moderate	Number	19	0	
		Percentage	44.2%	0.0%	
	8-10 Severe	Number	19	7	
		Percentage	44.2%	100.0%	
	Total		Number	Number	7

Pearson Chi-Square- 7.513, p value- 0.023

There were 7 patients with associated systemic infection accounted as sepsis and all were in severe pancreatitis group.

Table 7: Association between MCTSI and surgical intervention in Acute Pancreatitis

			Surgical-intervention		
			No	Yes	
MCTSI	0-2 Mild	Number	5	0	
		Percentage	10.6%	0.0%	
	4-6 Moderate	Number	19	0	
		Percentage	40.4%	0.0%	
	8-10 Severe	Number	23	3	
		Percentage	48.9%	100.0%	
	Total		Number	47	3

Pearson Chi-Square 2.946, p value-0.229

Table 8: Association between MCTSI and Mortality in Acute Pancreatitis

			Mortality	
			No	Yes
MCTSI	0-2 Mild	Number	5	0
		Percentage	10.6%	0.0%
	4-6 Moderate	Number	19	0
		Percentage	40.4%	0.0%
	8-10 Severe	Number	23	3
		Percentage	48.9%	100.0%
Total		Number	47	3

Pearson Chi-Square 2.946, p value-0.229

Discussion

In evaluation of the severity of acute pancreatitis both MCTSI and CTSI severity index severity grading was applied and evaluated in the study population. Both the MCTSI and CTSI severity grading were entered in cross tabulation and evaluated using Pearson Chi square test. The Pearson Chi square test showed significant association ($p < 0.001$) in both MCTSI and CTSI severity grading.

Our study showed a significant correlation of grades of severity of pancreatitis based on MCTSI with patient outcome parameters including duration of hospital stay, ICU admission, occurrence of organ failure and systemic infection. However MCTSI was more closely associated with patient outcome than CTSI in our study. Majority of the patients (52%) in our study population were classified as severe AP when MCTSI was applied, while majority (54%) were placed in moderate AP when the CTSI was used. Several other studies reported a strong correlation between the CT evaluation and the clinical severity of acute pancreatitis and some studies have not corroborated these findings.

This difference in statistical significance between CTSI and MCTSI in our study may be attributed to the inclusion of extrapancreatic complications in the MCTSI system. We assume that the presence of ascites and pleural fluid may be responsible for the improved correlation with MCTSI, because they may be early indicators of organ dysfunction.

Similar study was done by Mortelet KJ, *et al.* [7] In his study, when applying the modified index, the severity of pancreatitis and the following parameters correlated more closely than when the previously established CTSI was applied: the length of the hospital stay, the need for surgical or percutaneous procedures, and the occurrence of infection.

In contrary to our study results, Bollen TL, *et al.* [7] showed no statistically significant differences between the two CT scoring systems with regard to all the studied severity parameters. The differences observed may be due to differences in criteria for organ failure and clinically severe AP.

The study by Irshad, *et al.* [9] showed similar results like ours, showing significant association between the CT severity grading and clinical parameters including duration of the hospital stay, intervention procedure, occurrence of organ failure and mortality [10].

Mean duration of hospital stay was 4, 5 and 11 days in mild, moderate and severe pancreatitis case respectively.

Our study shows that mean duration of hospitalization correlates well with the severity classification based on the MCTSI.

23 of 50 patients (46%) were found to have end organ failure.

2 (10%) patients with moderate pancreatitis and 21 (80%) patients with severe pancreatitis developed organ failure. ($p=0.001$).

Our study statistics shows that, highly significant correlation exists between the prediction of end organ failure with the classification of Acute Pancreatitis according to the MCTSI ($p=0.001$).

23 of 50 patients (46%) required ICU care among which one had moderate pancreatitis and 22 patients had severe pancreatitis according to the MCTSI score

10% patient with moderate pancreatitis and 85% patients with severe pancreatitis were admitted to ICU. ($p=0.001$).

Our study shows that highly significant correlation exists between ICU admission and Severity of Acute Pancreatitis according to the MCTSI ($p=0.001$).

3 of 50 patients (6%) underwent surgical intervention in the form of necrosectomy and drainage procedure and all 3 had severe pancreatitis according to MCTSI score.

3 (12%) patients with severe pancreatitis underwent surgical intervention.

Percutaneous intervention including aspiration and drainage were required in 2 severe acute pancreatitis patients (4%) during their stay in the hospital and one patient went on to receive surgical debridement.

No intervention was done among mild and moderate pancreatitis group ($p=0.229$).

Study doesn't show significant evidence to predict need of surgical intervention comparing with grading of acute pancreatitis according to the MCTSI.

Conclusion

- Our study showed highly significant correlation between the MCTSI score and the prediction of end

organ failure, systemic infection, ICU admission 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.

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