

Severity Valuation of Acute Pancreatitis with CT Severity Index and Modified CT Severity Index

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ABSTRACT

Introduction: The pancreatitis is one of the commonest intestinal disorder and existing as a clinically most complex disease due to the challenges in determining its severity. The severity stratification plays a main role in planning the treatment, prediction of organ failure among the acute pancreatitis patients. Though, many methods are existing, computer topography (CTSI) and modified CTSI are mainly used in hospitals. The present study aimed to analyse the disease severity among the patients admitted to the clinic.

Methods: This research was conducted on the patients who presented with acute pancreatitis diagnosed either clinically or ultrasonography (n=101, 14 were excluded in the study). All patients were subjected to CECT abdomen, according to which CT severity index and Modified CT severity index was calculated based on Revised Atlanta Score (RAS).

Results: Outcome was assessed by several factors which included duration of hospital stay, ICU admission, mortality or survival of the patient. Types of intervention tried i.e conservative or surgical. It was observed that as the severity index and score progressed for the patients, the outcome of the disease was also more morbid which was evident by the increase in revised atlanta Score of the patient. CT Severity Index (CTSI) and Modified CT Severity Index (MCTSI) increased concomitantly with Revised Atlanta Score (RAS).

Conclusion: In conclusion, it was observed that CT is an important solitary imaging modality to evaluate subjects with acute pancreatitis.

Key words: Abdominal computed tomography, Complications, Pancreatic diseases, Pancreatic necrosis.

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INTRODUCTION

Acute Pancreatitis (AP) is a complex disease with a wide range of clinical implications and challenge for its optimal diagnosis. Though the majority of the patients may recover completely, 15-20% of them develop severe disease recurrence and resulting in higher mortality rate (up to 20-30%). Diagnosing the disease severity is one of the main challengeable complications in AP patients. Presently, the disease severity has been classified in to two main phases. In first phase, the onset of systemic inflammatory response syndrome lead to the development of Multiple Organ Dysfunction Syndromes (MODS) accompanied with severe pancreatic inflammation and/or necrosis. About, 50% deaths were recorded by this type worldwide in first week of disease attack. Usually, the second phase occurred if there is no halt or immune

modulation after the first phase. It is characterized by the development of compromised pancreatic necrosis or fluid aggregation with potential progression to sepsis, MODS and death. Meanwhile, the data analysis on the patients revealed that the half of pancreatic necrosis patients develops the localized organ failure and their severities normally do not affect the remote organ complications [1]. Showed that the infection rate was increased with severity and time course of the disease. Their study showed that nearly 24% patients develop infection on surgery at first week and followed by 46% and 71% on their second and third weeks respectively. It was also showed that the increase in organ failures reflected on higher mortality rates (30-100%) based on the variation in MODS [2]. Thus identification of disease severity is one of the main criteria to formulate the treatment regime and analysing the disease complications. The Severity stratification is important during the initial work-up of cases and the serum/urinary amylase concentration is a common method for diagnosis the AP patients and found to be prone for error in one-fifth of AP patients. Recently, a sophisticated method, called computer topography had been developed for finding disease stages. The CT severity

index and modified CT severity index. Though, those two systems are widely used, there not adequate studies for comparing the outputs. Therefore, the aim of the present study was to assess the severity of AP using CTSI and MCTSI in patients admitted to bharath institute of higher education and research, Chennai for correlating clinical outcome measures, and to concord disease severity using Revised Atlanta Classification (RAC) method.

MATERIALS AND METHODS

In the present prospective study, 101 patients were recruited from department, of general surgery, bharath institute of higher education and research, Chennai during the period February 2018 to May 2019. The study was conducted after getting proper ethical permission (IRB number:LHMC/ECHR/2014/504). The patient's data related with their demographic details, previous clinical history and laboratory assessment were reviewed along with the CT findings. Of the 101 patients, 14

showed chronic pancreatitis and excluded from the study. The CT scan was performed by trained clinicians and the assessment was done by a surgeon with 17 years of experience (median of 6 days; range 5–11 day).

RESULTS

Totally, 101 patients were recruited and 14 of them were excluded from the study. The remaining patients were followed up until their hospital discharge, or death or AMA. The study showed that a strong correlation between the gender and disease prevalence. In the present study, 84 patients were male and 16 of them were females (Table 1 and Figure 1) and the ratio seemed to be 5.2:1 in favour of males. The present study also revealed the disease prevalence in aging (Table 2 and Figure 2) and the predominance was observed in age groups between 31-45 and 46-60 years.

Table 1: Gender Distribution among patients with AP.

Sex	Male	Female
Number	84	16

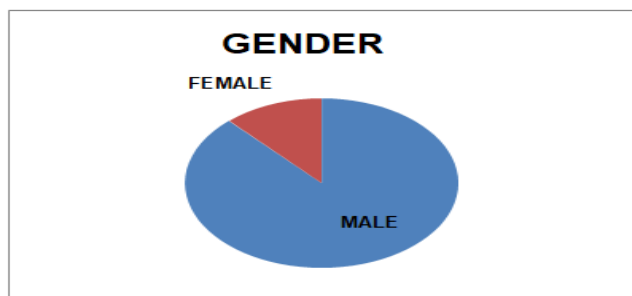


Figure 1: Gender distribution among patients with AP.

Table 2: Age Distribution among patients with AP.

Age	18-30	31-45	46-60	61-75	>75	TOTAL
Number	13	30	38	15	5	101

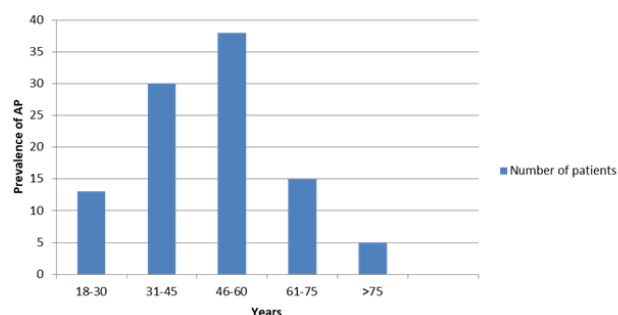


Figure 2: Age distribution among patients with AP.

Table 3 revealed the relation of the disease severity according to the Balthazar CTSI scoring system, and

revised Atlanta classification. Moderate severity was found in most of the patients. The Modified CTSI scoring system also showed similar results on studied AP patients (Table 4). Balthazar grading in patients with acute pancreatitis was also studied in the present study. The mild was found higher in all of the methods followed by moderate and most severity (Table 5). Of the studied patients, 70% did not show any organ failure. 40 of them (<30%) had necrosis and 5 had (>30%) had pancreatic necrosis (Table 6, Figures 3 and 4). The comparative analysis between the CTSI and MCTSI showed that the both of the methods had given similar results (Table 7 and Figure 5).

Table 3: CT severity index and revised atlanta Score.

		RAS	Total		
		Mild	Moderate	Severe	
Ctsi	Mild	55	1	0	56
	Moderate	11	19	10	40
	Severe	0	0	5	5
Total		66	20	15	101

Table 4: Modified severity index.

		Ras			Total
		Mild	Moderate	Severe	
Modified cts1	Mild	55	2	0	57
	Moderate	11	18	10	39
	Severe	0	0	5	5
Total		66	20	15	101

Table 5: Comparison of pancreatitis severity according to the balthazar CTSI, modified CTSI scoring system, and revised Atlanta classification.

Severity	Balthazar CTSI	Modified CTSI	Clinical RAS
	Number of cases %	Number of cases %	Number of cases %
Mild	56	57	66
Moderate	40	39	20
Severe	5	5	15

Table 6: Correlations of pancreatic necrosis and organ failure.

Necrosis	Organ failure			P
	Absent	Transient	Persistent	
Absent (n=56)	55	1	0	<0.001
<30% necrosis (n=40)	0	0	5	
>30% necrosis (n=5)	66	20	15	

Table 7: Comparison of patients with clinical severity parameters and days of hospitalization with severity grading according to CTSI and modified CTSI.

Outcome parameters	CTSI			P	MCTSI			P
	Mild	Moderate	Severe		Mild	Moderate	Severe	
Mean duration of hospital stay (days)	7	8	14		7	8	14	
Organ failure								
Transient	1	19	0		10	8	2	
Persistent	0	10	5		0	10	5	
Need for intervention	0	1	1		0	1	1	
Mortality	0	0	2	<0.01	0	0	2	<0.01

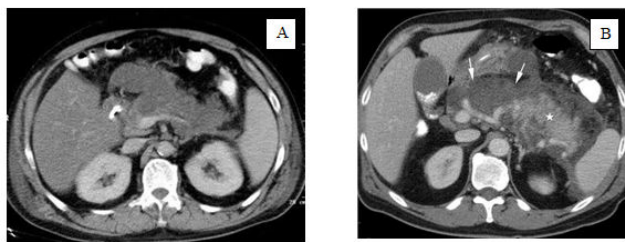


Figure 3: CT Acute Pancreatitis (a) and acute necrotic pancreatitis.

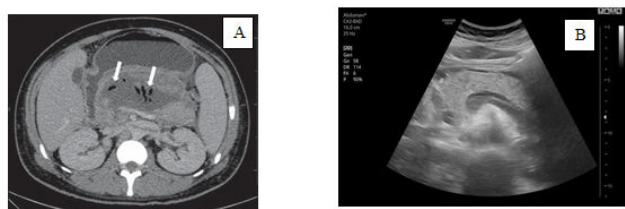


Figure 4: CT Acute Pancreatitis Walled off Necrosis and USG Acute Necrotic Pancreatitis.

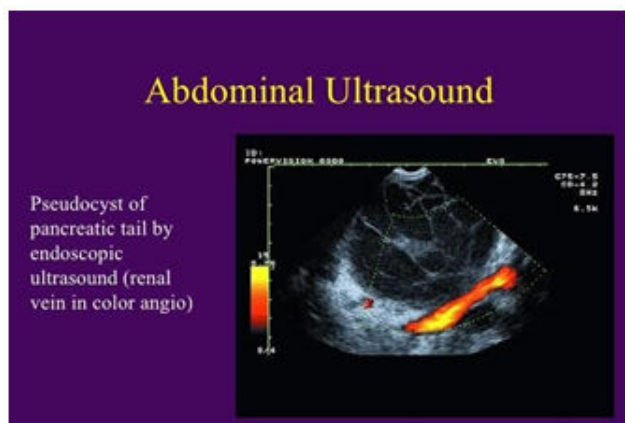


Figure 5: USG Acute Pancreatitis with Pseudocyst.

DISCUSSION

Acute pancreatitis is commonly found in patients with the changed life style such as smokers, alcoholics etc., Hospitalization was also one the main criteria for determining its severity. The present study was aimed to

analyse the disease severity using two basic methods viz., CTSI and MCTSI with their clinical outcomes based on RAC. The study showed that the presence of the substantial correspondence between the methods related with the outcome parameters including mean duration of hospital stay, manifestation of persistent of, evidence of infection, need for intervention, and mortality. Both of the methods showed better correlation in grading the disease severity. We found a strong correlation between the gender and age. The study revealed that the male were more prone for AP and its associated comorbidities. Our results were concordance with the previous studies [3,4]. The present study also showed the aging is one of the factors for disease progress and previous studies. The age group range in this study was 18 to 89 years with majority of patients in the age group of 46 to 60 years. In this study, in 18 to 30 age group, only 13 males were there; In 31 to 45 years age group, number of patients were 30; In 46 to 60 years age group number of patients were 38; In 61 to 75 years age group only 15 patients were there and more than 75 years of age, 5 patients. Several previous studies also showed such kind of similar results [5,6]. The present study had showed a strong correlation between organ failure (transient or persistent) with necrosis ration. 40 patients had less than 30% necrosis while, 5 patients only had more than 30%. The result was statistically significant ($p < 0.001$). Similarly, [7-9] banks, freeman, and gastroenterology and isenmann, rau and beger also showed that the necrosis could be one of the main factor in determining the severity, microbial infection and mortality ration among the AP patients. A comparison was done for the patients, with clinical severity parameters and days of hospital stay with severity grading according to CTSI and Modified CTSI. Sahu, et al. [10] also showed the similar results based on their study. Further, the Mean duration of hospital stay is minimum of 7 days in mild CTSI/MCTSI, and maximum of 14 days in severe CTSI/MCTSI. 2 patients of moderate CTSI/MCTSI needed surgical intervention which was carried in our hospital or outside in surgical gastroenterology department. Mortality was seeing in 2 patients with severe CTSI/MCTSI. Of the total 101 patients, 93 patients got discharged, 2 patients expired and 6 patients went out against medical advice.

CONCLUSION

In conclusion, it was observed that both CTSI and MCTSI showed noteworthy correlation with clinical outcome parameters, as well as good concordance with grading of severity as per the revised atlanta classification. CT is an important solitary imaging modality to evaluate subjects with acute pancreatitis.

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