



**ORIGINAL RESEARCH PAPER**

**Radiodiagnosis**

**ROLE OF MODIFIED CT SEVERITY INDEX FOR EVALUATION OF ACUTE PANCREATITIS AND ITS CORRELATION WITH PATIENT'S OUTCOME**

**KEY WORDS:** Acute pancreatitis, Computed Tomography, MDCT severity index

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**ABSTRACT**

Computed tomography is the imaging method of choice for assessing the extent of acute pancreatitis and for its complications . Since morbidity and mortality depend in great measure on the local pancreatic and peripancreatic complication , MDCT severity index plays an important role in the initial assessment of severity of acute pancreatitis based on overall assessment of size , contour and density of the gland and peripancreatic abnormalities. The purpose of this study is therefore to assess the prognostic value of MDCT severity index in acute pancreatitis and to assess correlation between MDCT severity index with clinical outcome. Modified CT severity scoring showed a stronger relationship for all outcome parameters in terms of duration of hospital stay, need for intervention or surgery, evidence of infection, occurrence of organ failure, and mortality in patients with variable grades of severity of pancreatitis

**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 most common presentation of acute pancreatitis. It is generally classified into mild & severe forms. Mild pancreatitis, also called as interstitial or edematous pancreatitis is associated with minimal organ failure and an uneventful recovery<sup>1</sup>. 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 pseudocystformation.<sup>2</sup>

Several clinical scoring systems such as the Ranson's criteria, and acute physiology and chronic health evaluation (APACHE) scoring system are valuable for predicting the severity for group of patients . however these classification system are not necessarily useful for assessing the individual patient, planning treatment and predicting outcome of the individual patient with acute pancreatitis remains difficult<sup>3</sup>.

The severity of pancreatitis will be scored using modified CT severity index. The modified index is 10 point scoring system by assessing the degree of pancreatic inflammation, pancreatic necrosis and extra pancreatic complication..

**MATERIALS AND METHODS**

A prospective study of 50 cases was carried out in the Department of Radiodiagnosis, G.R. Medical College and J.A. Group of Hospitals, Gwalior (M.P.) for a period of 20 month from November 2016 to July 2018. Patients from the emergency and wards of Medicine and Surgery Department, J.A. group of hospital , presenting with the complaint suggestive of acute pancreatitis were evaluated in Siemens somatom definition AS 128 slice CT scan machine .in the study Clinical outcome parameters 1) the length of hospital stay (in days), 2)need for surgical intervention, 3)evidence of infection in any organ system (combination of a fever > 100°F and elevated WBC >15,000/ mm<sup>3</sup>), 4) evidence of organ failure (PaO<sub>2</sub> < 60 mm Hg or need of ventilation, systolic BP of < 90 mm Hg, serum creatinine of >300µmoles/L or urine output of < 500 ml / 24 h) and 5)death.

**Statistical Analysis**

Data analysis was done using SPSS version 16.0 Data transformation by recoding, counting and cross tabulation was performed and obtained information was processed using Pearson chi-square and Fisher's-exact test

**OBSERVATION AND RESULTS**

**Table 1 :Mortele's modified CT scoring in cases of acute pancreatitis (N=50)**

Modified Mortele CTSI	Point	No. of cases	%
Pancreatic inflammation	0	0	0%
• Normal pancreas	2	17	34%
• Intrinsic pancreatic abnormalities with or without inflammatory changes in peri-pancreatic fat.	4	33	66%
• Pancreatic and peri-pancreatic fluid collection or peri-pancreatic fat necrosis.			
Pancreatic necrosis	0	24	48%
• None	2	15	30%
• < 30%	4	11	22%
• < 30%			
Extra-pancreatic complications (One or more of pleura effusion, ascites, vascular complications, parenchymal complications or gastrointestinal tract involvement)	2	36	72%

**Table 2 : Extra pancreatic complications in patients of acute pancreatitis (N=50)**

Findings	No. of cases	%
Extra pancreatic complications	36	72
Pleural fluid	26	52
• Left pleural effusion	16	32
• B/L plural effusion	10	20
Ascites	20	40
Solid organ abnormality	5	10
• Infarction (splenic)	1	2
• Hemorrhage	0	0
• Subcapsular fluid collection	4	8
Vascular complication	5	10
• Venous thrombosis	4	8
• Arterial hemorrhage	0	0
• Pseudoaneurysm formation	1	2
Inflammation of GIT	14	28
• Thickening of wall	14	28
• Intramural fluid collection	0	0

**Table 3 : Patient outcome and duration of hospital using modified mortele CTSI (N=50)**

Outcome parameter/No. of patients	Total (n=50)		Mild (n=6)		Moderate (n=24)		Severe (n=20)	
	No.	%	No.	%	No.	%	No.	%
Average duration of hospital (in days)	14		7		12		19	

Surgical Intervention	3	6	0	0	0	0	3	100
Infection	14	28	0	0	4	28.6	10	71.4
Organ system failure	15	30	0	0	3	20	12	80
Death	3	6	0	0	0		3	100

Average duration of hospital stay, intervention, infection, organ system failure and death was significant (p-value <0.001) with classification according to modified CT severity grade .

**Table 4 : Patient outcome and duration of hospital using currently accepted Balthazar CTSI (N=50)**

Outcome parameter/No. of patients	Total (n=50)		Mild (n=20)		Moderate (n=19)		Severe (n=11)	
	No.	%	No.	%	No.	%	No.	%
Average duration of hospital (in days)	14		10		15		20	
Surgical debridement	3	6	0	0	1	33.3	2	66.6
Infection	14	28	1	7.1	5	35.7	8	57.1
Organ system failure	15	30	1	6.6	6	40	8	53.3
Death	3	6	0	0	1	33.3	2	66.6

Length of hospital stay ,Intervention and death was not significantly (p value = 0.18, 0.13 and 0.13 respectively) associated with CT severity index. Infection, organ system failure and were significantly (p value- 0.001 and 0.006)associated with CT severity grade.

**Table 5 :Comparison of severity group according to the Balthazar CTSI and Morteale modified CTSI**

Severity	Modified CTSI		Balthazar CTSI	
	No.	%	No.	%
Mild	6	12	20	40
Moderate	24	48	19	38
Severity	20	40	11	22

**DISCUSSION**

The present study was undertaken to evaluate the acute pancreatitis on CT and the patient was prognostically correlation on the basis of CT severity index (including the modified computed tomography severity index and Balthazar's computed tomography severity index). A total of 50 patients with symptoms and signs referable to acute pancreatitis were included in this study.

**Demographics:**

1. The study group included patients in the range of 15-68 years with mean age of presentation being 39.26 years. Maximum number of patients with acute pancreatitis was seen in the age group of 26-35 years of age (26%)
2. The study group consisted of 33 males and 17 female patients with sex ratio 1.94:1
3. Chronic alcohol abuse was the most common cause of pancreatitis (56%), second was gallstones (34%) followed by idiopathic(18%)cause.
4. All patients presented with abdominal pain . 68% had vomiting, 34% patients had fever and 12 % of patients had jaundice at the time of presentation.
5. 88% patients had direct and indirect evidence of pancreatitis on ultrasound and in 12% ultrasound was normal.

**CT findings in acute pancreatitis**

Peripancreatic inflammatory changes seen as fat standing in the mesentery, greater omentum and transverse mesocolon were the most common CT findings seen in 88% of the cases of acute pancreatitis. Mendez et al4 found that out of 32 patients, 28(87.5%) exhibited extrapancreatic spread of the inflammatory process. This correlated to the findings of our study.

Twenty six patients (52%) had necrosis of the pancreas. 15(30%) patients had less than 30% and 11 (22%) patients had > 30% necrosis. Block et al5 in his study 67 patients for identification of pancreatic necrosis in severe acute pancreatitis found that twenty nine (43%) patients showed minor necrosis of the pancreas and 38 (57%) patients extensive necrosis.

Extra-pancreatic and systemic complications occurred in 36(72%) of the patients in our study. The most common complication was pleural effusion seen in 52% of the cases with left pleural effusion being commoner... Balthazar et al6 also found left pleural effusion to be the most common abnormality (43% of the cases) which is similar to the present study.

Ascites was found to be present in 20 patients (40%) in our study. Solid organ abnormalities were seen in only 5 patients (10%). Most of (8%)in the form of subcapsular fluid collection, one patient had splenic infarction. venous thrombosis was seen in 4 patients (8%) and pseudoaneurysm was seen in one patients. In a study by Morteale KJ7 splenic vein thrombosis was seen in 19% of the cases, splenic infraction in 7%, and subcapsular hemorrhage in 2% cases and perisplenic inflammatory fluid collections in 58% of the patients. Renal complications were seen in two patients.

Comparison of Balthazar and Morteale CTSI with patient outcome According to Balthazar CT severity index, amongst the patients with mild pancreatitis (n=20), average duration of hospital stay was 10 days, one (7.1%) patient each had evidence of infection and organ system failure. None of the patients required surgical intervention and no mortality was seen in this group.

In the moderate group pancreatitis group (n=19), average duration of hospital stay was 15 days, one patients required surgical intervention . 5 patient had evidence of infection .6 patient developed organ system failure and one death occurred in this group.

In the severe group (n=11), average duration of hospital stay was 20 days, all 3 patients who underwent surgical intervention (debridement and pancreatic necroscopy), 8 patients each had evidence of infection and developed one or more organ system failure, 66.6% mortalities occurred in this group.

According to the modified scoring system, average duration of hospital stay in mild pancreatitis group (n=6) was 7 days. None of the patients in this group had adverse outcome or mortality seen.

In the moderate group (n=24), average duration of hospital stay was 11 days, 4 out of 24 patients had evidence of infection and 3 out of 24 patients had organ system failure. None of the patients required surgical intervention with no mortality in this group.

In the severe group (n=20), average duration of hospital stay was 19 days, all 3 patients required surgical intervention , 10 patients had evidence of infection and 12 patients had evidence of organ system failure, all the mortalities happened in this group.

The strong relationship between the Modified CT severity index and the patient outcome in this study corroborates with the findings of Morteale et al.2 Modified CT scoring system correctly predicted the outcome in all the patients as compared with Balthazar CTSI. This is mainly due to the presence of extrapancreatic complication. Grading of necrosis into 30-50% and more than 50% (as in Balthazar system) or just more than 30% (as with Morteale system) did not contribute markedly to the change in severity scores. This also correlated with the study by

Banday IA et al<sup>8</sup> which concluded that Modified CT Severity Index is a simpler scoring tool and more accurate than the Balthazar CT Severity Index..

### CONCLUSION

Contrast enhanced Computed Tomography is helpful to stage the severity of inflammatory process, detect the pancreatic necrosis and depict local complications and grading of severity of acute pancreatitis. Extrapancreatic complications, included in the CT scoring system (MCTSI) were significantly correlated with end organ failure and adverse clinical outcome.

The scores obtained with the modified Mortelet index, show a stronger correlation for all outcome parameters in all the patients better than the Balthazar CTSI index.

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