Study to Assess the Severity of Pancreatitis Based on Ranson's Scoring and Modified CT Severity Index

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Original Research Article

ABSTRACT

Background: Acute pancreatitis is an emergency condition requiring intensive care and 20% of patients fall under the severe category with severe complications and requires early assessment.
Objectives: To assess the severity of pancreatitis based on Modified CT severity index and Ransons's score in a tertiary health care centre.
Materials and Methods: This is prospective study done on 80 patients diagnosed of acute pancreatitis, ranson's criteria was calculated within 48 hours and Modified CT severity index was measured in all the patients with CECT to identify the severity and prognosis of the disease.
Results: Out of the 80 patients 61 were males and 19 were females and alcohol was the commonest etiology of acute pancreatitis. Ranson's criteria showed 31 patients with mild and 49 with severe pancreatitis. MCTSI score showed 18 patients of severe pancreatitis and all were under the severe category of Ranson's criteria.
Conclusion: Ranson's score and Modified CT severity index helps in identifying severity in early stage and provide better treatment for the early prognosis of the patients.

1. INTRODUCTION

Acute pancreatitis is defined as an inflammatory condition of the pancreas with possible, peripancreatic tissue and multiorgan involvement inducing multiorgan failure with an increased morbidity and mortality rate [1]. The mild interstitial edematous pancreatitis occurs in majority of patients and it is usually self-limiting but 20% of patients develop severe pancreatitis with local complications like pancreatic necrosis, infection or pseudo cyst formation and systemic organ failure[2].The incidence of acute pancreatitis per 100,000 population ranges from 5 to 80 cases per year with an overall mortality of 5–10%[3].The unpredictability and variability of the disease lead to the usage of clinical scoring methods to assess the severity of pancreatitis for early management in critical care for the better prognosis of the patients. The Ranson's scoring is the commonest system used to evaluate the severity of pancreatitis and Modified CT scoring is the radiological evaluation technique to improve the assessing capabilities. The main purpose of this study is to evaluate the severity of acute pancreatitis with the help of Modified CT severity score and Ranson's criteria.

2. MATERIALS AND METHODS

This is a prospective study conducted in a tertiary health care center with 80 patients admitted in the general surgery department with complaints related to acute pancreatitis. The general demographic details of the patients were collected for assessment. The Ranson's criteria were calculated in these patients based on the 11 laboratory and clinical parameters. First five parameters were assessed as the patient was admitted and the remaining six parameters in 48 hours of admission. Total score of 11 and one point for each parameter, ≤ 3 were considered as mild pancreatitis and > 3 were considered as severe pancreatitis.

2.1 Ranson's Criteria

At admission/diagnosis:

i. Age > 55 years
ii. WBC > 16,000/mm3
iii. Blood Glucose > 200 mg/dl
iv. Serum LDH > 350 U/L
v. AST >250 U/L

At 48 hours:

vi. Hematocrit decrease >10%
vii. Blood Urea Nitrogen increase > 5 mg/dL
viii. Serum Calcium < 8 mg/dL
ix. Base deficit > 4 mmol/L
x. Fluid Sequestration > 6000 mL
xi. PaO2 < 60 mm Hg

Scoring: For each positive criterion a point is given.

Modified CT severity index was calculated with the help of CECT in all the patients and scoring includes the complications involving the structures surrounding the pancrease and grading the fluid collection around the pancrease, along with pancreatic necrosis.

MCTSI was calculated which is represented in (Table - 1).

Acute pancreatitis CECT results were classified as mild (0-2 points), moderate (4-6 points), or severe (8-10 points) pancreatitis using the modified CT severity index [4].

Table 1. Modified CT severity index [4]

Prognostic indicator	Points
❖ Pancreatic inflammation:	
➢ Normal pancreas	0
➢ Intrinsic pancreatic abnormalities with	2
or without inflammatory changes in peripancreatic fat	4
➢ Pancreatic or peripancreatic fluid collection or peripancreatic fat necrosis	
❖ Pancreatic Necrosis:	
➢ None	0
➢ Less than 30% necrosis	2
➢ More than 30% necrosis	4
❖ Any extra pancreatic complications like pleural effusion, ascites, vascular complications, or parenchymal complications	2

3. RESULTS

Study group consist of 80 patients in which 61 patients were males and 19 patients were females (Table – 2). The mean age of the study was 30-70yrs and nearly 61 patients belong to the age group of 30-50yrs and only 4 patients were above the age of 60yrs (Table – 3). According to the Ransons's score 31(39%) patients had mild pancreatitis with the score ≤ 3 and 49(61%) were suffering from severe pancreatitis with the score > 3.The etiology of pancreatitis was also recorded, and alcohol seems to be the commonest etiology with 59 (74%) patients affected due to it (Table – 4). Modified CTSI score categorized patients into three categories mild, moderate and severe. According to it 27 patients belonged to the mild category and 35 were in moderate category and the remaining 18 belong to the severe category of pancreatitis. Table -5 shows the relationship between Ranson's score and the Modified CT severity index.

4. DISCUSSION

In this study 61(76%) patients were male, and 19(24%) patients were females as compared to Kim et al[5] study which had 70% males and Balthazar et al[6] which had 75% males and this shows that acute pancreatitis is more common among males. The mean age group in our study is 30-50 yrs and it consist 61(76%) patients compared with Khanna et al[7] study showed 40.5 yrs as mean age and Balthazar et al. [7]

showed mean age 41-55yrs, this shows that incidence of pancreatitis is increasing in the younger age group as compared to other studies due increased compliance of alcohol in the younger age group as shown to be the commonest etiological factor in our study and it includes 59(74%) of patients. The gallstone stones appear to be the next commonest of cause of pancreatitis in our study with 11(14%) patients affected but there is a significant decrease as compared due to increased incidence of alcohol.

In our study, Ranson's score showed those 31 (39%) patients of mild pancreatitis and 49(61%) patients of severe pancreatitis, whereas Papahristou GI et al [8] found those 138 (74.6%) patients of mild pancreatitis and 47(25.4%) patients of severe pancreatitis. In another study, Cho J H et al [9] discovered that 14 (87%) of patients have mild pancreatitis, and 21 (13%) have severe pancreatitis. There is very high incidence of acute pancreatitis as compared to others due to admission of patients only in the very sick stage in the tertiary health care center and also the usual presentation of the patients with symptoms are only seen in later stages of the disease as there are no significant complaints in the early stages.

The modified CTSI score categorized patients into mild, moderate or severe and in our study, 27(34%) patients of mild pancreatitis, 35(44%) patients of moderate and 18(22%) patients of severe pancreatitis were found. A study by

Table 2. Gender based distribution.

Characteristics	Category	Patients (n=80)
Sex	Male	61(76%)
	Female	19(24%)

Table 3. Age wise distribution

Age	Patients (n=80)	Percentage
30-40yrs	30	37.5%
41-50yrs	31	39%
51-60yrs	15	19.5%
>60yrs	4	4%

Table 4. Etiology of pancreatitis

Etiology	N%
Alcohol	59 (74%)
Gall stone disease	11 (14%)
Idiopathic	6 (7%)
Trauma	4 (5%)

Table 5. Correlation of Ranson's sore and MCTSI

MCTSI	Patients	Ranson's score			
		≤ 3 Mild	Percentage	>3 Severe	Percentage
Mild	27	26	96%	1	4%
Moderate	35	5	14%	30	86%
Severe	18	0	0%	18	100%
Total	80	31	39%	49	61%

Ahamad Irshad et al[10]showed 9(18%) patients of mild, 19 (38%) of moderate and 50(44%) of severe pancreatitis. Another study by Mortele et al[11] presented 42(66.6%) of mild,19(28.78%) of moderate and 5(7.57%) of severe pancreatitis. There is increase in moderate and severe cases of acute pancreatitis as compared to other studies due to late presentation of patients in a tertiary health care center and the significant alcohol abuse seen in younger age group of patients.

Correlation of MCTSI and ranson's score showed that in mild MCTSI score patients all had ranson's score ≤ 3. In 35 patients of moderate MCTSI score 14% had≤3 ransons score and 86% had >3 ransons score. All the 18 patients with severe MCTSI had Ransons score >3. In comparison with Khanna A K et al[7] showed 37(51.4%) patients of mild pancreatitis and 35(48.6%) patients of severe pancreatitis. CTSI was less than 5 in 23 (42.6%) of the patients, whereas it was greater than 5 in 31 (57.4%). All the patients presented with high MCTSI score also had high ranson's score which shows the value of combined usage of scores in assessing the severity of pancreatitis for better prognosis. The patients with higher ranson's score had more chances of developing local complications and also MCTSI score is more useful in predicting the local complications which show significant rise in all these patients with high ranson's as shown in our study. As a result, early detection of these problems aids in the reduction of major morbidity and mortality, as well as the provision of appropriate care.

5. CONCLUSION

Ranson's scoring and MCTSI score are useful in assessing the severity of pancreatitis in early stages to follow the appropriate mode of management in the critical care for the better prognosis of the patients. The ranson's score majorly depends on the clinical and biochemical variables to assess the severity and MCTSI score is based on radiological appearance which asses the local complications of severe

pancreatitis like necrosis and collection of fluid in the peripancreatic space and hence combined usage of both the scoring systems helps in early assessment of the severity as compared to it individually.

CONSENT

Proper informed consent was acquired from all the participants of the study.

ETHICAL APPROVAL

The approval for this study was obtained from the institutional ethics committee.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Al Mofleh IA. Severe acute pancreatitis: pathogenetic aspects and prognostic factors. World journal of gastroenterology: WJG. 2008;14(5):675.
2. Kumar V, Abbas AK, Fausto N, Aster JC. The Pancreas: Robbins and Cotran Pathologic Basis of Disease. Elsevier. 2010;19:893
3. Harshit Kumar A, Singh Griwan M. A comparison of APACHE II, BISAP, Ranson's score and modified CTSI in predicting the severity of acute pancreatitis based on the 2012 revised Atlanta Classification. Gastroenterology report. 2018;6(2):127-31.

4. Mortele KJ, Wiesner W, Intriere L, Shankar S, Zou KH, Kalantari BN, Perez A, VanSonnenberg E, Ros PR, Banks PA, Silverman SG. A modified CT severity index for evaluating acute pancreatitis: improved correlation with patient outcome. American Journal of Roentgenology. 2004;183(5):1261-5

5. Kim YS, Lee BS, Kim SH, Seong JK, Jeong HY, Lee HY. Is there correlation between pancreatic enzyme and radiological severity in acute pancreatitis?. World journal of gastroenterology: WJG. 2008;14(15):2401.

6. Balthazar EJ, Ranson JH, Naidich DP, Megibow AJ, Caccavale R, Cooper MM. Acute pancreatitis: prognostic value of CT. Radiology. 1985;156(3):767-72.

7. Khanna AK, Meher S, Prakash S, Tiwary SK, Singh U, Srivastava A, Dixit VK. Comparison of Ranson, Glasgow, MOSS, SIRS, BISAP, APACHE-II, CTSI Scores, IL-6, CRP, and procalcitonin in predicting severity, organ failure, pancreatic necrosis, and mortality in acute pancreatitis. Hpb Surgery;2013.

8. Papachristou GI, Muddana V, Yadav D, O'connell M, Sanders MK, Slivka A, Whitcomb DC. Comparison of BISAP, Ranson's, APACHE-II, and CTSI scores in predicting organ failure, complications, and mortality in acute pancreatitis. Official journal of the American College of Gastroenterology| ACG. 2010;105(2):435-41.

9. Cho JH, Kim TN, Chung HH, Kim KH. Comparison of scoring systems in predicting the severity of acute pancreatitis. World journal of gastroenterology: WJG. 2015;21(8):2387.

10. Banday IA, Gattoo I, Khan AM, Javeed J, Gupta G, Latief M. Modified computed tomography severity index for evaluation of acute pancreatitis and its correlation with clinical outcome: a tertiary care hospital based observational study. Journal of clinical and diagnostic research: JCDR. 2015;9(8):TC01.

11. Mortele KJ, Wiesner W, Intriere L, Shankar S, Zou KH, Kalantari BN, Perez A, VanSonnenberg E, Ros PR, Banks PA, Silverman SG. A modified CT severity index for evaluating acute pancreatitis: improved correlation with patient outcome. American Journal of Roentgenology. 2004;183(5):1261-5.

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