# Role of C-Reactive Protein in Assessing Severity of Acute Pancreatitis

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## I.   Introduction

Based on the revised ATLANTA classification of 2012, the diagnosis of acute pancreatitis requires two of the following three features

- Abdominal pain consistent with acute pancreatitis i.e acute onset of a persistent, severe, epigastric pain often radiating to the back;
- Serum lipase or serum amylase activity atleast three times greater than the upper limit of normal and
- Characteristic findings of acute pancreatitis on CECT.

  Acute pancreatitis is calculated from the time of onset of abdominal pain (not the time of admission to the hospital).

  Pancreatitis is identified and stratified into categories due to the following reasons:
- Patients with potentially severe acute pancreatitis who require aggressive early treatment require early identification at the time of diagnosis.
- To identify such patients for possible transfer to specialist care in secondary care setting.
- After receiving such referrals, there are advantages to the treating doctor to stratify these patients into subgroups based on the presence of persistent organ failure and local or systemic complications

  There are many different scoring systems like RANSON, APACHE, BISAP, MCTSI. While, each has its own set of advocates our study aims to study the role of serum C-reactive protein(C-RP) in assessing the severity of acute pancreatitis.

## II.  Material & methods

- A prospective study of 60 patients with acute pancreatitis hospitalized in our general surgery department were included in our study.
- Patients who had acute pancreatitis by Atlanta classification were included.
- Exclusion criteria:

1. Any Active inflammatory disease other than acute pancreatitis.
2. Liver failure/cirrhosis

- Serum CRP levels was estimated 72hrs after presentation of symptoms.
-  RANSON scoring & Balthazar scoring was done for all patients
- The CT scan report was considered as the gold standard for categorizing the patients as having mild pancreatitis, acute severe pancreatitis with necrosis or haemorrhage.
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## III. Observation & Results

- In our study most of the patients who had pancreatitis belonged to middle age with incidence less in extremes of age. The age group of 21-30 years had the highest cohort with 16 patients with corresponded to 26.7% of total patients
- The incidence of pancreatitis was higher in males as compared to females. Out of the total 60 patients, 37 were males corresponding to 61.7% of total patients.
- Most of the patients in our study had pancreatitis due to unknown causes. 17% of the patients had cholelithiasis while 12% had alcohol abuse history.
- During the course of our study 18 patients required ICU admission for management of various complications. The most common reason was low BP with tachycardia which necessitated round the clock monitoring. This corresponded to 30% of patients.
- Out of the 18 patients, 10 had multiple organ dysfunction syndrome which necessitated intensive care. 8 patients required inotropic support (nor-adrenaline) which corresponded to 13.3% of total patients.

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- Inspite of best management practices, 2 patients died during the course of the study. One of which was due to ARDS. The other patient died due to shock not relieved despite inotropic support.
- Our study took modified CT severity Index as the gold standard as it had the best sensitivity and specificity among all predictive indices with regard to predicting severity of acute pancreatitis.

**Case Processing Summary**

| C-RP | Valid N (listwise) |
|---|---|
| Positive | 38 |
| Negative | 22 |

- Smaller values of the test result variable(s) indicate stronger evidence for a positive actual state.
- a. The positive actual state is >= 150.



**ROC Curve**
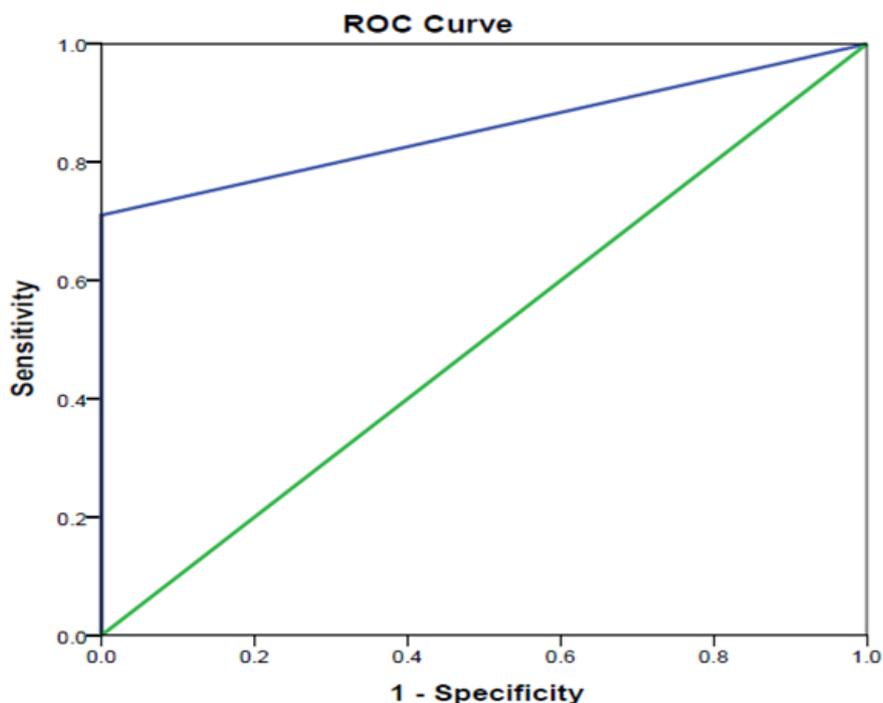
**Area Under the Curve**

Test Result Variable(s): MCTSI

| Area | Std Error | Asymptotic Sig | Asymptotic 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| .855 | .049 | .001 | .760 | .950 |

The test result variable(s): MCTSI has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased.

a. Under the nonparametric assumption

b. Null hypothesis: true area = 0.5

| P-Value | Highly Significant at P ≤ .01 |
|---|---|

## C-RP * MCTSI Crosstabulation

Count

|  |  | MCTSI | | Total |
|---|---|---|---|---|
|  |  | >= 8 | < 8 |  |
| C-RP | >= 150 | 27 | 11 | 38 |
|  | < 150 | 0 | 22 | 22 |
| Total |  | 27 | 33 | 60 |

- Sensitivity 100.00
- Specificity 66.67
- PPV 71.05
- NPV 100.00
- Accuracy 83.3

## COMPARISON OF RANSONSCORE AS PREDICTOR:

| RANSON Score at admission * RANSON Score at 48 hrs Crosstabulation | | | RANSON Score at 48 hrs | | Total |
|---|---|---|---|---|---|
|  |  |  | Non Severe | Severe |  |
| RANSON Score at admission | Non Severe | Count | 48 | 11 | 59 |
|  |  | % of Total | 80.0% | 18.3% | 98.3% |
|  | Severe | Count | 0 | 1 | 1 |
|  |  | % of Total | 0.0% | 1.7% | 1.7% |
| Total |  | Count | 48 | 12 | 60 |
|  |  | % of Total | 80.0% | 20.0% | 100.0% |

|  | **Non Severe** | **Severe** |
|---|---|---|
| At admission | 98.3% | 1.7% |
| At 48 hrs | 80.0% | 20.0% |

## IV. Discussion
- Robert *et al*, demonstrated that the Ranson score at the time of admission in mild acute pancreatitis and in severe acute pancreatitis were 1.9±0.9 and 2.2±0.5. Our study also showed similar results. This shows that RANSON criteria by itself is not a sensitive scoring system at the time of admission.
- Leung *et al,* demonstrated that CTSI is superior to both RANSON & APACHE scoring systems as the index better corresponds to level of severity. The index also enables predicting chances of mortality. This in turn helps the physician to better manage the patient.
  While imaging is useful in both diagnosis and separating patients into different categories, it is usually avoided in the first week. The reasons for this are as follows.

- Imaging is not clear on the presence and extent of pancreatic and peripancreatic necrosis during the first few days of disease. Whenever required, a CECT 5–7 days after admission is more reliable in establishing the presence and extent of pancreatic necrosis.
- The extent of morphologic changes and necrosis is not directly proportional to the severity of organ failure.
- Asymptomatic persons with peripancreatic fluid collections or pancreatic necrosis usually do not always require treatment at that time.
- Del Prete*et al* published a study in which they studied 109 patients with pancreatitis over a nine year period. They showed that serum C-RP on day 3 is a reliable marker to predict severity of acute pancreatitis.
- Ad Meyer *et al* showed that the rate of fall of C-RP level from peak concentrations provided greater differentiation between grades of severity rather than a single score.
- Giedrius*et al* showed that the best time to measure serum C-RP is the $3^{rd}$ day after onset of symptoms. But importantly the value of serum C-RP stays high even till the $7^{th}$ day. This makes C-RP a very attractive marker as many patients do not come to hospital immediately after onset of symptoms.
- Sarbu*et al* showed that CRP test is the best method for the detection of pancreatic necrosis at cut-off values of 150 mg / dl, with a specificity of 92% and an accuracy of 96%.
- In our study, Serum C-RP was elevated in 38 cases. This correlated favourably with the actual severity grading of patients with acute pancreatitis.
- Serum C-RP level was able to predict acute pancreatitis with a sensitivity of 100% and a specificity of 66.67%. The p value was highly significant at <0.01.
- These findings were consistent with the study by Sarbu*et al* which showed a positive predictive value of serum C-RP in the prediction of severity of acute pancreatitis

## V. Conclusion

Based on our study, we can come to a conclusion that serum C-RP is a very sensitive, reliably specific, cheap, easy to measure & compare single marker in the prediction of severity of acute pancreatitis. the level of sensitivity is comparable to Modified CT severity index. This enables us to avoid unnecessary imaging in already diagnosed patients with acute pancreatitis. this can in turn help us in deciding on the level of management required and antibiotic use needed.