Original Article

Study of correlation between C Reactive protein and CT Severity Index in assessing the severity of acute pancreatitis

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Abstract:

Background: Various methods have been used to predict progress of acute pancreatitis. C-reactive protein (CRP) is a nonspecific mediator of inflammation produced by hepatocytes in liver and is induced by cytokine (particularly IL-6) stimulation. Current accepted gold standard for assessing severity of acute pancreatitis is contrast enhanced CT imaging (CECT).

Objective: To study correlation between CRP and CECT Severity Index in assessing severity of acute pancreatitis

Methods: Present diagnostic-evaluation study was conducted over two years among 25 cases of acute pancreatitis. Proper history, physical examination and appropriate investigations were done for diagnosis of acute pancreatitis. CRP levels were estimated at admission, 48hrs, 96hrs and at first week. CECT Severity Index was assessed at 7th day and was graded as per standard guidelines.

Results: Males were affected than females. Most common age group affected was 31-40 (44%). Mean age of presentation was 42.44± 12.1. Most common cause of acute pancreatitis was alcoholism (84%). Most patients were in mild pancreatitis group as per CT severity index. There was positive correlation between CRP values at admission, 48hrs, and 96hrs & at 1st week with CT Severity Index. Sensitivity of CRP in predicting severity of acute pancreatitis decreased from 100% at 48hrs to 50% at 96hrs. Specificity of CRP increased from 52.4% at 48hrs to 100% at 96hrs. Positive predictive value of CRP increased from 28% at 48hrs to 100% at 96hrs. There was only mild decrease (i.e. 100% to 91.3%) in Negative predictive value of CRP from 48hrs to 96hrs.

Conclusion: Therefore, CRP is a very sensitive test at 48hrs and a very specific test at 96hrs.

Key words: acute pancreatitis, sensitivity, specificity, CRP, CT severity index

INTRODUCTION

Acute Pancreatitis is highly variable in clinical presentation and severity. In majority of patients the course is mild and self-limiting but in about 20% of patients it may become fulminant and progress to multisystem organ failure and death. Because of this potential for catastrophic deterioration the stratification of severity is essential so as to identify those patients who are likely to develop severe acute pancreatitis and manage these patients aggressively in order to improve the outcome. [1]

Various methods have been used to predict the progress of acute pancreatitis such as clinical evaluation in combination with several biochemical markers and testing of various serological markers. [2] Scoring systems like RANSON'S, APACHE II, and GLASGOW scoring are useful in assessing the severity but these are too complex, more difficult to perform and require repeated measurements. [3]

Biochemical markers like Procalcitonin, Interleukins, TNF-α, MCP-1, TAP have been shown to have good predictive value but these tests are very expensive and are not readily available. Studies have been done to compare these markers with C - reactive protein (CRP). C-reactive protein is a nonspecific mediator of inflammation produced by hepatocytes in the liver and is induced by cytokine (particularly IL-6) stimulation. CRP has been found to be comparable to these markers and equally effective in predicting the severity of acute pancreatitis. Therefore, acute phase reactant CRP which is the best established and most cost effective and readily available predictor of inflammation has been included in the study. [4]

The current accepted gold standard for assessing the severity of acute pancreatitis is contrast enhanced CT imaging [5] (CECT). Balthazar and Ranson developed a grading system based on CECT findings. [6] The grades are derived by assessing the degree of pancreatic and peri-pancreatic inflammation, fluid collection and parenchymal necrosis. [6, 7]

We attempted to study the correlation of C Reactive protein and CT Severity Index in assessing the severity of acute pancreatitis.

MATERIALS AND METHODS

This study was conducted in the Department of General Surgery at KIMS, Narketpally for a period of two years from October 2009 to September 2011 among 25 cases of acute pancreatitis. All cases of Acute Pancreatitis i.e. all patients presenting with acute abdominal pain and having serum amylase level that is three times higher than the normal limit were included in the study. Patients with raised renal parameters, patients who were allergic to contrast and immuno-compromised patients were excluded from the study.

Institutional Ethics Committee permission was obtained. Consent was taken for enrolment into the study. Proper history was obtained, physical examination and appropriate investigations were done to make the diagnosis of acute pancreatitis. CRP levels were estimated at admission, 48hrs and 96hrs and at the end of first week. CT Severity Index was assessed at 7th day and was graded as per standard guidelines. [5, 6]

The values were entered in excel sheet and analyzed with the help of correlation coefficient for finding of correlation of CRP levels at admission, 48hrs, 96hrs and end of first week with CT Severity Index and correlation of changes in the levels of CRP with CT Severity Index. CT Severity Index is a gold standard in predicting the severity of acute pancreatitis. If CT Severity Index is [8] <5 -mild pancreatitis, ≥5 severe pancreatitis. If CRP value after 48hrs is [9] < 150 -mild pancreatitis, ≥ 150 -severe pancreatitis. Taking these values as standard we have

measured the Sensitivity, Specificity, Positive & Negative predictive value of CRP in our study

RESULTS:

Table 1: Distribution of cases as per age and sex

Characteristics		Number	%
Age (years)	0-20	1	4
	21-50	16	64
	> 50	8	32
Sex	Male	22	88
	Female	3	12

Most common age group of presentation of acute pancreatitis in this study was between the age group of 31-40, followed by patients in the age group of 51-60. Mean age of presentation was 42.44± 12.1. Acute pancreatitis was more prevalent amongst the males (88%)

Table 2: Distribution of patients according to etiology and CT severity index of acute pancreatitis

Factor		Number	%
Etiology	Gall stones	4	16
	Alcoholism	21	84
CT Severity index	0-3	15	60
	4-6	8	32
	7-10	2	8

Most common cause of Acute pancreatitis was Alcoholism. Most common cause amongst females was Gall stones. Most common cause amongst males was Alcoholism. Most patients were in the mild pancreatitis group

Table 3: Correlation of CRP levels at admission, 48hrs, 96hrs and end of first week with CT Severity Index

Time	Correlation coefficient	P
At Admission and CTSI	0.473	0.017
At 48hrs and CTSI	0.766	0.000008
At 96hrs and CTSI	0.707	0.000077
At the end of first week and CTSI	0.639	0.00059

There is a moderate correlation between CRP value at admission and CT Severity Index at the end of first week and it is statistically significant. There is a strong correlation between CRP values at 48hrs, 96hrs and at the end of first week with the CT Severity Index and it is statistically significant.

Table 4: Sensitivity, Specificity, Positive & Negative Predictive value of CRP at & after 48hrs

	CTSI ≥5	CTSI <5
CRP >150	4	10

CRP <150	0	11

Sensitivity = (4/4+0) ×100 = 100%, Specificity = (11/11+10) ×100 = 52.4%, Positive Predictive Value = (4/4+10) ×100 = 28.6%, Negative Predictive Value= (11/0+11) ×100 = 100%, Accuracy= (4+11/4+10+11+0) = 60%, Positive Likelihood ratio= (1/1-.524) = 2.10

Table 5: Sensitivity, specificity, positive predictive value and negative predictive value of CRP at 96hrs

	CTSI ≥5	CTSI <5
CRP >150	2	0
CRP <150	2	21

Sensitivity = (2/2+2) ×100 = 50%, Specificity = (21/21+0) ×100 = 100%, Positive Predictive Value = (2/2+0) ×100 = 100%, Negative Predictive Value= (21/2+21) ×100 = 91.3%, Accuracy= (23/2+0+2+21) = 92%

Discussion:

23 were males and 2 were females. Most common age group affected was 31-40 (44%). Mean age of presentation was 42.44± 12.1. Most common cause of acute pancreatitis was alcoholism (84%). Most patients were in mild pancreatitis group as per CT severity index. There was positive correlation between CRP values at admission, 48hrs, and 96hrs & at the end of 1st week with the CT Severity Index. Sensitivity of CRP in predicting the severity of acute pancreatitis decreased from 100% at 48hrs to 50% at 96hrs. Specificity of CRP increased from 52.4% at 48hrs to 100% at 96hrs. Positive predictive value of CRP increased from 28% at 48hrs to 100% at 96hrs. There was only mild decrease (i.e. 100% to 91.3%) in Negative predictive value of CRP from 48hrs to 96hrs.

The mean age of presentation of Pancreatitis in the present study is comparable with Gunay Gurleyik et al [2], Kaya E et al [10], Su Mi Woo et al [11] studies.

Incidence of Acute Pancreatitis was more amongst males in the present study and Su Mi Woo et al [11] study. Incidence of acute pancreatitis was more amongst females in Gunay Gurleyik et al [2] study and the incidence was almost equal amongst males and females in Kaya et al [10] study

Alcoholism was the main cause for Pancreatitis in the present study and Su Mi Woo et al [11] study. Gall stones were the main cause for pancreatitis in Gunay Gurleyik et al [2] and Kaya et al [10] study. This result may be due to the fact that the present study and Su Mi Woo et al [11] study are Asian studies and Gunay Gurleyik et al [2] and Kaya et al [10] study are western studies. Asian population is more susceptible to alcoholic pancreatitis as compared to western population, as western population has enzyme for fast acetylation of alcohol thus can digest alcohol faster than the Asian population. Hence are less susceptible to the toxic effect of alcohol on pancreas.

Sensitivity, Specificity, Positive predictive value, Negative predictive value and accuracy of CRP in predicting the severity of Acute Pancreatitis of the Present study and Gunay Gurleyik et al [2] Study are comparable

Comparison of Sensitivity, Specificity, Accuracy of CRP in assessing the severity of Acute Pancreatitis. Cut off value of CRP for defining severe pancreatitis was set at ≥ 150. There

was a decrease in sensitivity of CRP from 48hrs to 96 hrs. in the present study and Chaw-Fung Jiang et al [3] study. There was increase in the specificity of CRP from 48hrs to 96 hrs. in the present study and Chaw-Fung Jaing et al [3] study. Present study showed increase in Accuracy from 48hrs to 96hrs whereas Chaw- Fung Jiang et al [3] study showed only mild change.

Comparison made keeping the cut off value of CRP at 83 mg/l at 48hrs, between mild and severe pancreatitis.

Sensitivity, Specificity, Positive predictive value, Negative predictive value, Accuracy and positive likelihood ratio in the present study, Kim YS et al [12] study and Su Mi Woo et al [11] study are all comparable.

Conclusion

Present study revealed that the levels of CRP after 48hrs correlates with the CT severity Index scores and it is a good indicators of severity of acute pancreatitis. Changes in the level of CRP at admission and 48hrs correlates with CT Severity Index and can be used to predict the severity of acute pancreatitis. Changes in the level after 48hrs did not correlate well with CT severity Index but further studies may be required to establish it. Therefore, it is concluded that CRP is a cheap and most readily available method of predicting the severity of acute pancreatitis and can be used routinely for all patients.

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