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To evaluate accuracy of multislice CT scan as early predictor of severe pancreatitis

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Abstract
Background: In this study 200 patients with an aim to evaluate accuracy of Multislice CT Scan as early predictor of Severe Pancreatitis at Index Medical College, Indore, of the departments of General Surgery & General Medicine with a diagnosis of acute pancreatitis.
Method: This is a prospective observational study to evaluate whether the C-reactive protein (CRP) levels and blood urea nitrogen predict the severity of pancreatitis by correlating these levels with CT severity index. Patients were enrolled in the study after obtaining informed patient consent.
Result: Spearman's rho of bivariate analysis was done to see the correlation between the CECT on day 3rd with Marshall scoring system on 7th day of admission. Spearmans rho value was 0.772, which shows the strongest positive correlation. Kruskall-Wallis Test was applied to calculate the p value of test is 0.000, which was found statistically significant.
Conclusion: To conclude, present study was again emphasize to significance of serial monitoring of BUN and CRP on day 1st 3rd 6th and Multi-slice CT scan as early prediction of severity of Pancreatitis. Although CECT alone is an excellent modality to predict the severity of Pancreatitis, but the levels of BUN & CRP acts as an adjunct to predict the severity more accurately.

Keywords: Multislice CT scan, severe pancreatitis & accuracy

Introduction
In 1896, Hans Chiari invoked a role for pancreatic enzymes in the pathogenesis of pancreatic necrosis and proposed a theory of tryptic autodigestion initiated by activation by bile as initially proposed by Claude Bernard or alternatively by enterokinase as had been suggested by Nicholas Petrovich Shepovalnikov [1, 2] in 1889.
Worldwide, the incidence of acute pancreatitis is between 4.9 and 73.4 cases per 100,000. Pancreatitis is 2 to 3 times higher in African Americans when compared to Caucasians. Clinically, Acute Pancreatitis is usually characterized by the acute onset of symptoms in a previously healthy individual and the disappearance of those symptoms as the attack resolves. The incidence of acute pancreatitis has increased during the past 20 years and responsible for more than 03 lac hospital admission annually in the United States [3].
The local injury induces the release of TNF-alpha and IL-1. Both cytokines produce further pancreatic injury and amplify the inflammatory response by inducing the release of other inflammatory mediators, which causes distant organ injury. This abnormal inflammatory response is responsible for mortality during the early phase of acute pancreatitis [4].

Material & Method
This is a prospective observational study to evaluate whether the C-reactive protein (CRP) levels and blood urea nitrogen predict the severity of pancreatitis by correlating these levels with CT severity index. Patients were enrolled in the study after obtaining informed patient consent.
In this study 200 patients were studied between January 2017 to July 2019 at Index Medical College Hospital & Research Centre, Indore, Madhya Pradesh of the departments of General Surgery & General Medicine with a diagnosis of acute pancreatitis.

Patients were diagnosed on the basis of
1. Typical epi-gastric abdominal pain.
2. Elevation in amylase and/or lipase levels to at least 3 times of normal.
3. Abdominal USG findings.

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Inclusion criteria
- Age group 25-60 years.
- Male and female both.
- Mild and severe both patients.
- Cholelithiasis
- Alcoholic patients
- Traumatic
- Drug induced
- Endocrine disorder

Exclusion criteria
- Less than 25 or more than 60 years of age
- Those patients not giving consent
- All cancer and Tuberculosis cases

Statistical analysis
The analysis was done using Quantitative analysis test: Kruskall-Wallis test and Spearmans bivariate correlation analysis to calculate the p-value of statistical significance. The p-value for statistical significance was taken as <0.05.

Results
The Clinical severity assessment was done on the basis of 3 parameters of modified marshall scoring system:
- Respiratory status (PaO2:FiO2)
- Renal status (serum creatinine)
- Cardiovascular status (systolic BP, mmHg)

On the basis of clinical parameters used in modified marshall scoring system, out of 50 patients included in this study 10 were found as severe according to modified marshall scoring system on 7th day of admission.

Table 1: Clinical severity assessment

Severity	No. of Patient	%age
Severe	40	20%
Non severe	160	80%
Total	200	100%

(Non-severe included mild and moderate pancreatitis)

Now these 3 parameters were graded into: *mild, moderate* and *severe* and lebelled them an imaginary code *0, 1, 2* for the convenience of study.

Table 2: Severity Score

Severity	Marshall score (out of total score 12)	Study code
Mild	<2	0
Moderate	2-6	1
Severe	>/6	2

On 3-5 days of illness CECT was found severe in 13 cases out of which 10 cases were actually serious according to modified marshall score system, rest.

Table 3: Illness CECT

CTSI	Severe (marshall>6)	Nonsevere (marshall<6)	Total
Severe(8-10)	10	3	13
Non severe(<8)	0	37	37
Total	10	40	50

Table 4: On the basis of previous table following data were observed

Days	Sensitivity	Specificity	PPV	NPV	False negativity	Accuracy
3rd day of admission	100%	92.5%	76.92%	100%	0%	94%

Table 4: Quantitative analysis of data agreement: Cross tabulation

CTSI	Marshall<2	Marshall 2-6	Marshall >6	Total
0-2	36(18%)	28(14%)	0(0%)	64(32%)
4-6	16(8%)	68(34%)	0(0%)	84(42%)
8-10	0(0%)	12(6%)	40(20%)	52(26%)
Total	52(26%)	108(54%)	40(20%)	200(100%)

Spearman's rho of bivariate analysis was done to see the correlation between the CECT on day 3rd with Marshall scoring system on 7th day of admission. Spearmans rho value was 0.772, which shows the strongest positive correlation. Kruskall-Wallis Test was applied to calculate the p value of test is 0.000, which was found statistically significant.

Discussion
CECT alone was a good indicator of severity and The CT severity index has shown an excellent correlation with the development of severity in our study with the sensitivity (100%), specificity (92.5%) and accuracy (94%) to predict the severity of pancreatitis on 3rd day [5]. In this study, 13 patients out of 50 patients having MCTSI >8 and among those patients 10 patients were found severe on clinical presentation on 7th day, i.e. multi slice CT is a very accurate predictor of development of complications in a case of acute pancreatitis [6].
In this study, we found all the three parameters which was taken in this study, are statistically significant with the severity of disease [7]. A rising level of BUN and CRP are correlated well with severe presentation of disease. Among all the three parameters, CECT was found the excellent modality to predict the severity of disease with highest sensitivity, specificity and accuracy.
At the end of discussion we found that Patients with high CRP, respiratory and renal failure (high BUN) have a longer ICU stay i.e. high BUN and CRP were found to be associated with a longer time to recovery but not associated with presence of complications always, but a rising trend in BUN and CRP in initial 48-72 hours are very well associated with complication. While CTSI score of >8 were significantly associated with presence of complications but not with increased time to recovery [8].

Conclusion
To conclude, present study was again emphasize to significance of serial monitoring of BUN and CRP on day 1st 3rd 6th and Multi-slice CT scan as early prediction of severity of Pancreatitis. Although CECT alone is an excellent modality to predict the severity of Pancreatitis, but the levels of BUN & CRP acts as an adjunct to predict the severity more accurately.

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