

To Study the Predictive Outcomes of Different Scores in Acute Pancreatitis Patients.

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Abstract:

Background: Acute Pancreatitis (AP) is an easily seen and recurring disorder. This condition is characterized by long term pain in the abdomen area, frequent exacerbations of the disease, and insufficiency of the exocrine and/or endocrine. The Atlanta Classification is accounted as the universal method for the evaluation of the acute pancreatitis severity. To evaluate the severity of the AP, scoring systems like Evaluation (APACHE)- II and CT Severity index are widely practised. The listed scoring systems looks complicated and tough to perform though with average sensitivity. A newer and advanced scoring system has been introduced termed Bedside Index for the evaluation of severity of the AP. This has been reported to be accurate and an easy way to identify the risk associated in the patients suffering from AP.

Objectives:

1. The present study evaluates the newer scoring system for its accuracy in assessing the severity of acute pancreatitis.
2. To estimate association between stages of AP and procalcitonin level.

METHODOLOGY: A time bound prospective, cross sectional study in which patients presenting with AP at AVBRH were examined and assessed. The study was implemented in Department of Medicine, AVBRH that is a teaching tertiary care hospital located in the Wardha district sub urban area. The study was performed after issuing the approval from institute ethical committee. The patients who visited with the chief complaint of abdominal pain that is acute in nature were examined. The investigations for evaluation was done

including Serum amylase and ultrasonography abdomen. The final diagnosis was confirmed depending on the Atlanta criteria for AP.

EXPECTED RESULTS: The study aims to predict outcomes of different scores in AP patients and as previous studies which has been conducted outside India, have concluded that out of all scoring systems in comparison, the Modified Glasgow Scale was presented with maximum sensitivity to evaluate the seriousness of the acute pancreatitis.

Keywords: Acute Pancreatitis, procalcitonin, Ranson score, CT severity index, BISAP score, modified Glasgow score.

INTRODUCTION:

Acute Pancreatitis (AP) is an easily seen and recurring disorder, where inflammation of the pancreas with variable connection of surrounding tissues and organs [1]. This condition is characterized by long term pain in the abdomen area, frequent exacerbations of the disease, and insufficiency of the exocrine and/or endocrine.

The acute pancreatitis prevalence ranges from 30/10,000 to 50/100,000 in general population [2]. Depending on severity, the Mild interstitial pancreatitis (AIP) is been detected in 80% of patients suffering from AP and 20% constitutes those patients who were suffering from severe acute necrotizing pancreatitis. In mild cases the rate of mortality was found to be low but in cases with the severe symptoms the rate of mortality was found to be 20%. [3].

The patients presenting with the mild disease usually were found to be treated spontaneously with no further sequelae, but out of all 10% - 20% patients might progress to severe disease with mortality rate of 30% [4,5]. The mild group can be benefitted by following certain protocols including fluid resuscitation, recommended antibiotic administration, close observation and absolute treatment methods like endoscopic sphincterotomy and radiologic interventions [6]. The early interpretation of the occurrence of the disease, associated risk and the severity plays a vital role in early interventional treatment and timely interventions that would be advantageous for better prognosis and higher survival rate in patients.

The Atlanta Classification has long been used as the universal method to evaluate the seriousness of the acute pancreatitis [7]. The revision of classification was performed in 2012 and organ failure that is persistent in nature was emphasized, because of the prior definitions that were confusing in terms of severity.

Since 1970, the (APACHE) [8] has been practised for investigating the seriousness of the acute pancreatitis. Balthazar CT index was then developed in 1990. These tools were widely practised since then for the assessment of the seriousness of the disease. The systems for scoring have multiple factors associated and complicated which makes it difficult to be used in the regular clinical practise [9]. Overall high negative predictive value is being resulted and the sensitivity of the index is average [10,11]. A newer scoring system has been introduced named Bedside Index to investigate the seriousness of acute pancreatitis. This index system for scoring the disease has been reported to be simple and accurate too identify the associated risk of mortality and severity of the disease. [12,13]. There are very limited studies interpreting the various scoring systems comparison for investigating the severity of the disease including BISAP depending on revised Atlanta Classification.

The prominent cause of occurrence of AP in India is prevalence of gallstones and high consumption of alcohol [14]. Some other less reported causes include hypercalcemia, pancreatitis induced by drugs, and deranged lipid. The smoking had been reported in 30% of the acute pancreatitis patients that have greater mortality of 20% [15]. It was found with the results depicted in one study that smoking had a correlation with AP with a relative risk of 3.57 in patients with no history of consumption of alcohol [16]. There are now many indices available to evaluate the pancreatitis patients therefore, the present study was planned to interpret the efficacy and predictive outcomes of various scoring system in patients with AP. The present research aimed to interpret the predictive value of each scoring system in assessment of the seriousness of AP and to also correlate between the levels of procalcitonin and severity of AP.

Background/rationale:

It is observed that in most cases, patients present in later course of disease. The present study elaborates the role of biomarkers and scoring systems in assessment of the outcomes of the disease when the patient present late.

The present study aimed to interpret the relationship of Ankle Brachial Index categories with mortality, cardiovascular outcomes including microvascular complications in pre diabetic patients.

PICO FORMAT

P- Subject of AB.

I- study of Outcome

C- Comparison of predictive outcomes of different scores in AP patients

O- To study the association of outcomes of different scores with mortality.

Objectives:

1. To report the best system for scoring prediction status for severity of acute pancreatitis.
2. To establish a relationship among the levels of procalcitonin and seriousness of acute pancreatitis.

RESEARCH METHODOLOGY:

The present study was a time bound prospective cross sectional study where the patients with AP were recruited for the study. The patients who visited the Acharya Vinoba Bhave Rural Hospital were enrolled for the present study and were evaluated.

Methods:

Study protocol: The present study was implemented in Department of Medicine, AVBRH that is a teaching tertiary care hospital located in the Wardha district sub urban area. The study was performed after issuing the approval from institute ethical committee.

Patient selection: The patients who visited with the chief complaint of abdominal pain that is acute in nature were examined. The investigations for evaluation was done including Serum

amylase and ultrasonography abdomen. The final diagnosis was confirmed depending on the Atlanta criteria for AP.

Study design: Observational prospective Study.

Inclusion criteria:

1. Acute pancreatitis patients who visited the hospital within 2 weeks of onset of symptoms
2. Patients older than 12 years were recruited
3. Patients who were ready to sign the informed consent were enrolled for the study.

Exclusion criteria:

1. Chronic pancreatitis patients
2. Patients who received treatment somewhere else before reporting to the hospital for the treatment in emergency

Methods: Every patient underwent a complete examination and detailed case history was recorded. Any history of diabetes, smoking, alcohol, family history and medications were recorded. The history of any co morbid conditions like hypertension, kidney diseases, cancer and liver diseases were recorded.

On admission of the patients in hospital the clinical and biochemical parameters were investigated along with the recording of the same parameters after 48 hours of admission. The data is recorded with respect to demographics, hemogram, physical examination, LFT and levels of procalcitonin. The cut off value to interpret the severity of the procalcitonin levels had been accounted as 0.5 ng/mL interpreted based on the previous literature.

As per the guideline of the hospital the patients were treated. The patients who showed an improvement in first 72 hours had been recorded as mild cases. If the symptoms did not resolve in more than 72 hours and there was no improvement shown, then contrast-enhanced CT of abdomen had been performed on the patients with no organ failure.

The computed tomography findings were evaluated depending on the modified CT severity index (MCSI). The Atlanta criteria was used to grade the severity, the CT evaluation and incidence of organ failure were accounted as the gold standard for the assessment of seriousness of AP. Four systems of scoring were utilized to evaluate the extent of the disease (APACHE) II score, bedside index for severity in AP (BISAP), modified Glasgow score (MGS), and Ranson score at 24 hours followed by the admission of the patient and after 48 hours of the admission. Each of the patient were observed until their discharge or death.

EXCLUSION CRITERIA:

Chronic pancreatitis patients and the patients who received treatment somewhere else before reporting to the hospital for the treatment in emergency were exempted from the study.

STATISTICAL ANALYSIS

The data recoded were recorded in the format which can be subjected to statistical analysis. The recoded data was analysed using IBM, SPSS (IBM Corp., Statistics for Windows, version 24.0, Armonk, NY). The data with Continuous parameters were presented as mean $\pm$ standard deviation (SD). The categorical data was presented as frequency distribution. Unpaired T test was utilized to interpret the significant association between the independent

groups. Chi square test was utilized to establish the significant association between the categorical parameters. $P \leq 0.05$ was considered to be statistically significant.

Sample size:

A sample refers to the group of people or items that are selected from a huge population for establishing a relation or performing a research. The sample represents the whole population based on which you can impose the findings of the study on whole population.

The formula for sample size determination is as follows:

$$n = (Z_{\alpha/2}^2 \times P(1-P)) / d^2$$

Where, $Z_{\alpha/2}$ being the level of significance at 5% i.e.

95% confidence interval = 1.96

P = Prevalence of AP = 0.3%

d = desired error of margin = 4 %

Therefore, the least sample size required to perform the study and establish significant relationship is 70 patients.

Lab Investigations :

- Hemoglobin
- Blood lipids: high-density and low-density cholesterol, triglycerides, total cholesterol
- Platelet count
- CRP
- Hematocrit
- Mean platelet volume (fl)
- AST
- ALT
- Platelet distribution width (%)
- Amylase
- Procalcitonin

Expected Outcomes/Results:

The study aims to predict outcomes of different scores in AP patients and as previous studies conducted outside India have concluded that, Modified Glasgow Scale were found to have highest sensitivity in prediction of seriousness of the AP out of all four compared scoring system. The Ranson scoring system was found to have better accuracy in predicting the severity of the disease, assessment of organ damage and risk of mortality depending on the (ROC) curves. In previous investigations it was also reported that procalcitonin was found to have highest sensitivity, specificity, positive predictive value, negative predictive value and accuracy for evaluation of the seriousness of the acute pancreatitis.

DISCUSSION:

The severity of the Acute pancreatitis disease might vary. Most of the patient presenting with AP usually show the mild symptoms and only 10 -20 % patients presents with severe symptoms and mortality associated with the disease [4]. Cho et al. in their research showed that 161 patients presenting with AP were found to have severe AP with APACHE II score

≥ 8 as in accordance with the present study [15]. They also reported that APACHE II score showed higher accuracy in assessment of mortality [15]. The results of the present study were in concordance with the outcomes presented by Cho et al. that interpreted that BISAP score ≥ 3 were found to have higher predictive value in interpretation of the seriousness of the disease and to interpret the risk of mortality [15]. The study reported that the patients who showed the BISAP score ≥ 3 were found to have 76.1 times higher chances to have severe AP and also 121.7 times higher chances of risk of mortality [7]. BISAP score ≥ 3 was shown by 5 patients who had developed organ failure which is found to be in concordance with the results depicted by the present study [17]. Khanna et al. presented that the BISAP scores ≥ 3 were found to have higher sensitivity (74%) but the specificity is less (68%) [18]. Park et al. in their research depicted that the BISAP score of more than 2 were to be statistically significant in predicting the organ damage, risk of mortality and severity of the AP [19]. The previous investigation reported that AUC for BISAP and Ranson score in presuming the severity of AP and mortality were found to be 0.8 and 0.86 respectively and 0.74 and 0.74 respectively [8].

In accordance with the present study, Khanna et al. demonstrated that Modified Glasgow Scoring system has 75% of diagnostic accuracy for presuming the severity of AP [7]. The Ranson scoring method was found to have better AUC for presuming the severity of the disease [18]. Papachristou et al. in their research reported that the Ranson scoring system has better predictive value for investigation of the severity of the disease (0.94) and in identifying the risk of mortality (0.95) when compared to the results depicted by the present study [17]. Cho et al. demonstrated that AUC for Ranson score in their study has a predictive value of 0.804 (0.717- 0.892), sensitivity of assessment was found to be 81.8%, specificity was found to be 59.1% and Positive predictive values was found to be 76.9% for evaluation of the severity of disease and predictive value of 0.861 (0.734-0.988), sensitivity 87.5%, specificity 57.2%, and positive predictive value of 5.3% for interpreting the risk of mortality [18]. The previous study revealed that 3 of the patients has Ranson score of more than 3 while admitting in hospital and 17 patients were presented with the Ranson score of more than 3 after 48 hours of admitting when compared to the present research [19]. Simoes et al. in their study revealed that Ranson score showed sensitivity of 91.2% for the prediction of the severity of the disease but the specificity was less when compared to the present study [20]. Kim et al. in their research stated that depending on the ANC the Ranson scoring system depicts the highest accuracy for presuming the severity of disease [21]. Khanna et al. suggested that the levels of procalcitonin had an AUC of 0.88 for the presumption of the severity of AP [18]. Different studies on acute pancreatitis were reported by Gawande et. al. [22], Kambale et. al. [23] and Jameel et. al. [24]. A number of related studies on hepatobiliary system were reviewed [25-28].

The present study had certain limitations, firstly the present study had used the original Atlanta classification instead of revised Atlanta classification. Secondly, the levels of procalcitonin was investigated only once while at the admission of the patient in the hospital. Thirdly, the assessment of Sensitivity and specificity was performed with the Wilson method using OpenEpi calculator available online.

CONCLUSION:

Modified Glasgow Score in the present study was found to have highest sensitivity in presuming the seriousness of the acute pancreatitis. The Ranson scoring was found to have higher accuracy in presumption of the severity of AP, organ damage and risk of mortality on admission depending on ROC curves. The levels of Procalcitonin was found to be the best predictor and were shown to have highest sensitivity, specificity, positive predictive value, negative predictive value and accuracy to diagnose AP. APACHE II and Modified Glasgow Score had been found to have higher accuracy for the diagnosis of AP. On admitting to the hospital, Ranson scoring system was found to be the best system for presumption of severity of AP out of all four scoring system. APACHE II scoring system was found to be the best predictor of assessing the risk of mortality in severely diseased patients. The levels of procalcitonin was found to have the highest sensitivity, specificity, positive predictive value and accuracy to diagnose the AP, seriousness of the disease, organ damage and risk of mortality.

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