Original Research Article

A comparative evaluation of radiologic and clinical scoring system in the early prediction of severity in acute pancreatitis

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Abstract

Background: Acute pancreatitis refers to an acute inflammatory process of the pancreas, usually accompanied by abdominal pain and elevations of serum pancreatic enzymes. This syndrome is usually a discrete episode, which may cause varying degrees of injury to the pancreas, and adjacent and distant organs. Acute pancreatitis is a serious disease with high morbidity and mortality rates some 80% were mid attack which recovers rapidly with conservative management. The rest of 20 % were severe, with protracted course that needs intensive care and specialized management.

Materials and methods: It was a prospective study. First 50 patients attending the surgical emergency ward with clinical features of Acute Pancreatitis were evaluated clinically and subjected to laboratory and radiological investigations as per the designed Performa. Data pertinent to the scoring systems were recorded within 24 hours of admission to the hospital. For each of 50 patients included in the study, BISAP and MCTSI scores were calculated by the manner described by Knaus, et al. and Cardinal Health Database system.

Results: BISAP and MCTSI was correlated well for mortality with high positive value of 0.904 which was highly significant (0.01). The ROC analysis for Mortality showed BISAP score had AUC of 0.904, P value (0.001) which was more than MCTSI score which had AUC of 0.845, P value (0.007). So BISAP was highly accurate with P value (0.001) and confidence interval of 0.873. BISAP score was highly sensitive (100%), specificity (60%) at score more than 3.5. MCTSI score sensitivity was 85%, specificity was 77% at score more than 7.

Conclusions: BISAP score was found to have more sensitivity, specificity and Diagnostic accuracy than MCTSI score in prediction of assessing the severity of acute pancreatitis. Hence, BISAP score

found to predict more number of patients and likelihood of progressing to severe disease. Larven, et al. stated the same in their study 42. Hence, BISAP is considered as better available score for assessing the severity than MCTSI score.

Key words

BISAP score, MCTSI score, SIRIS.

Introduction

Acute Pancreatitis is a common disorder due to development of acute inflammation of normally existing Pancreas. Acute Pancreatitis includes varying type of diseases from mild self-limiting symptoms to fulminant multi organ failure and high mortality. The overall mortality rate is 3-10%, where in 11-30% of cases with severe disease manifested as pancreatic necrosis [1]. The incidence of acute pancreatitis has wide variability within populations, with about 1–5 cases per 10,000 population per year [2]. Eighty percent of the cases of acute pancreatitis are related to alcohol use or biliary stones. Pancreatitis may be classified as mild, moderate or severe based on physiological findings, laboratory values, and radiological imaging. Mild disease is not associated with complications or organ dysfunction and recovery is uneventful [3]. In contrast, severe pancreatitis is characterized by pancreatic dysfunction, local and systemic complications, and a complicated recovery. In addition, pancreatitis may be further classified into acute interstitial and acute hemorrhagic disease. In the first type, the gland architecture is preserved but is edematous. Inflammatory cells and interstitial edema are prominent within the parenchyma. Hemorrhagic disease is characterized by marked necrosis, hemorrhage of the tissue, and fat necrosis. There is marked pancreatic necrosis along with vascular inflammation and thrombosis [4]. Acute Pancreatitis was diagnosed when two of the three following criteria were met: Elevated Amylase/ Lipase defined as three times the upper limits of normal, Radiological evidence of pancreatitis and abdominal pain. In 1879, Reginald Fitz described the classic clinicopathological features of acute pancreatitis and discussed in detail about the ineffectiveness and hazards of early operative intervention [5]. The reason behind the assessment of severity is mainly for practical purpose, where mild pancreatitis responds to supportive treatment very well but severe acute pancreatitis needs some intensive monitoring of numerous parameters, specific therapeutic interventions and it has very good prognosis. An ideal prognostic method should be able to differentiate between patients with mild and severe disease, easy to use and widely available and should be accurate, and should have low inter observer variability. It should also be able to apply early in disease process so that patient who could prone to develop potential complications will be closely monitored and treated if possible empirically. Several scoring scales exist that predict both mortality and morbidity in patients with acute pancreatitis [6]. These system include: [7, 8]

- Ranson's criteria
- Balthazar computed tomography (CT) grading
- Imrie Glasgow coma scale (GCS)
- Bank's clinical criteria
- Simplified acute physiology score (SAPS)
- Acute physiology and chronic health health evaluation evaluation (APACHE) 1 ,11,111 and O
- Modified CT severity index (MCTSI)

The GCS and Ranson's multiple scoring systems require 48 hours of data collection; however, APACHE can be calculated at any time and shows prognostic correlation with acute pancreatitis, as increasing scores are associated with poor prognosis.

Once the acute pancreatitis has been diagnosed, assessment of severity is extremely important for

execution of appropriate measures, preferably in an ICU setup with close monitoring.

BISAP (The Bedside Index for Severity in AP) [9]

This new scoring system has been developed recently for early detection of patients with risk of in hospital mortality. The BISAP score has been developed and validated retro respectively. On a large population based study, done by Cardinal Health Clinical Outcomes Research Database, Marlborough, USA. This score was published recently for clinical and research purpose, for its accuracy and reliability in patient stratification. The BISAP includes:

- Blood urea nitrogen (BUN) >25 mg/dl
- Impaired mental status (GCS<15)
- SIRS
- Age >60 years
- Pleural effusion

SIRS was defined by presence of two or more of the following criteria:

- Pulse rate >90/min
- Respiratory rate >20/min or PaCO2 <32mmHg.
- Temperature>100.4F or <96.8F/<36 or >38
- WBC count >12,000 or < 4,000 cells/mm or presence of more than 10 % immature blasts.

One point was given for each variable present for a total of 5 score ranges from 0 to 5. A BISAP score 3 or more has been found to have high mortality and have predicted the necrosis and organ failure very well. The aim of this study was to compare the accuracy of computed tomography (CT) and clinical scoring systems for predicting the severity of acute pancreatitis on admission and to correlate the outcome of the study with the scores observed, in terms of disease severity and mortality.

Materials and methods

It was a comparative analytical study done from January 2015 to December 2015 in Department of General Surgery, Govt. Stanley Medical College and Hospital, Chennai. The study was conducted after obtaining the Institutional Ethical Committee approval.

Inclusion Criteria

- Characteristic abdominal pain.
- Serum amylase/lipase (>3 times of its normal value).
- Presents within 24 hours of onset of symptoms
- Age: 30 to 70 years
- Chest X – ray and Abdominal X- ray were taken.

Exclusion criteria

- Pancreatic abscess
- Pancreatic pseudocyst
- Pancreatic necrosis and COPD
- Bronchial asthma
- DM
- HT
- CAD patients presenting more than 24 hours of onset of pain
- CKD and renal failures patients
- CVA patients and salivary gland disease
- Bowel obstruction
- Myocardial infarction
- Cholecystitis
- Perforation

First 50 patients attending the surgical emergency ward with clinical features of Acute Pancreatitis were evaluated clinically and subjected to laboratory and radiological investigations as per the designed Performa. Data pertinent to the scoring systems were recorded within 24 hours of admission to the hospital. Once diagnosis was established the patient disease severity was assessed by following two scoring system.

Statistical analysis

Appropriate statistical tools for each of 50 patients included in the study were applied, BISAP and MCTSI scores were calculated by the manner described by Knaus, et al. and Cardinal

Health Database system. Patients were classified to have mild or severe acute pancreatitis according to the definitions set by Atlanta Classification guidelines (1992). Survivors were defined as patients discharged alive from the hospital and non – survivors were those who died from pancreatitis or its complications during hospitalization. Patients were observed prospectively until discharge or death. BISAP score more than or equal to 3 and MCTSI score more than or equal to 8 were expected to predict severe Acute Pancreatitis.

Results

The age group of patients enrolled in this study ranges from 30 to 70 years. The peak incidence of the disease was noted in the 6th decade of life (**Graph – 1**). The length of hospital stay ranges from 1 day to 30 days. The Mean length of hospital stay was 8.32+/- 7.742 days in this study, increasing BISAP and MCTSI scores was correlated well with the duration of hospital stay as per **Graph - 2**.

The most common presentation was predominantly abdominal pain (100%), vomiting (74%), fever (64%), and jaundice (18%) as per **Graph – 3**. The BISAP and MCTSI correlation with organ failure was as per **Graph - 4**. BISAP and MCTSI correlation with other complications were as per **Graph - 5**.

Graph – 1: Age distribution.

Age distribution

	31-40	41-50	51-60	61-70	Total
No. of Patients	10	15	7	18	50
Percentage(%)	20	30	14	36	100
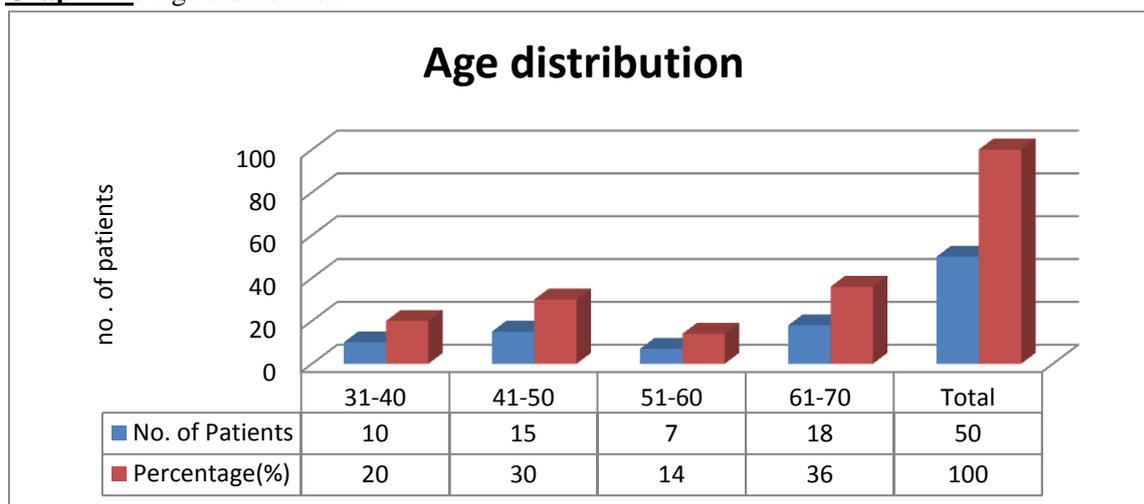
Graph – 2: Length of hospital stay.

Length of Hospital Stay

	1-7 days	8-14 days	15-21 days	22-28 days	>28 days	total
No. of Patient's	31	10	3	3	3	50
Percentage(%)	62	20	6	6	6	100
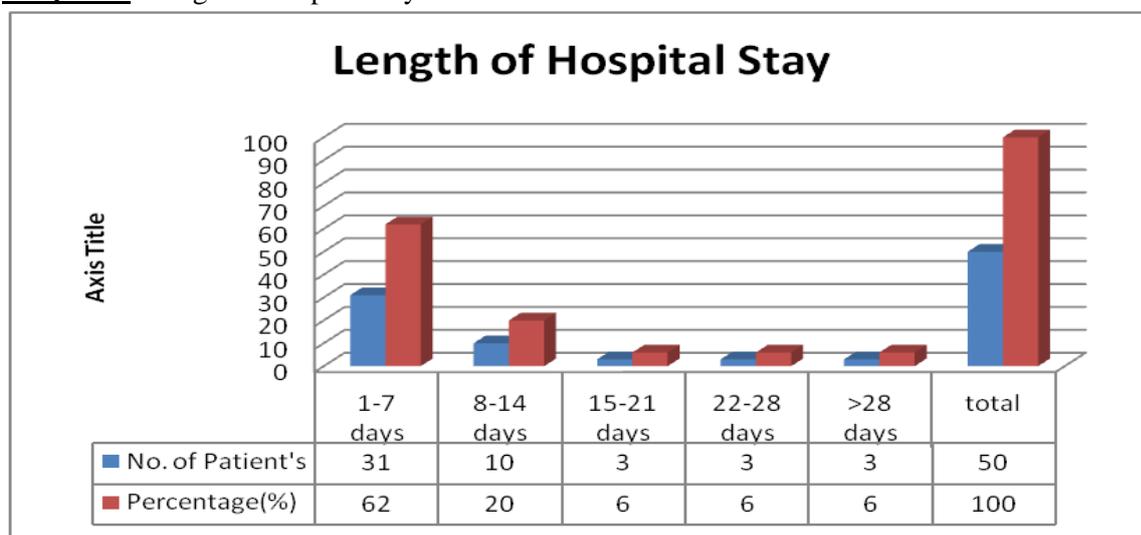
**Graph - 3:** Clinical features of patients during hospital stay.
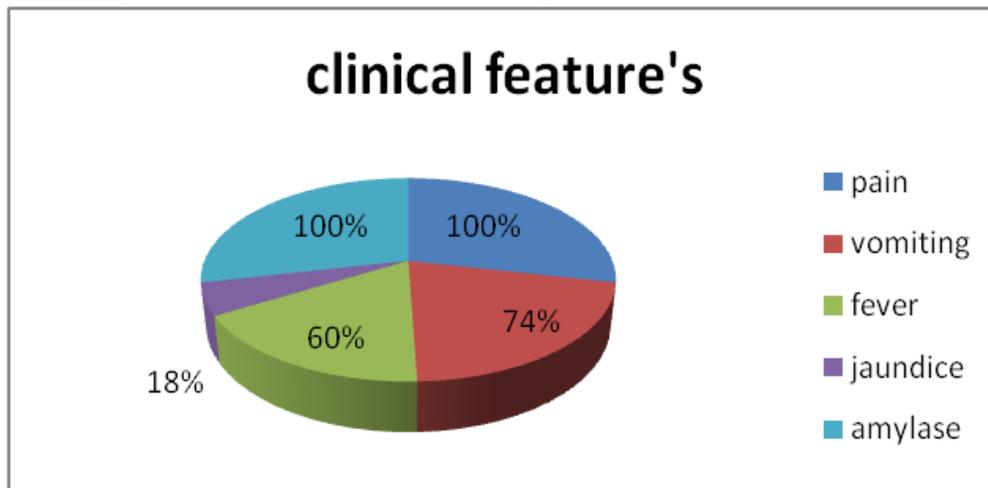
Graph – 4: The BISAP and MCTSI correlation with organ failure.
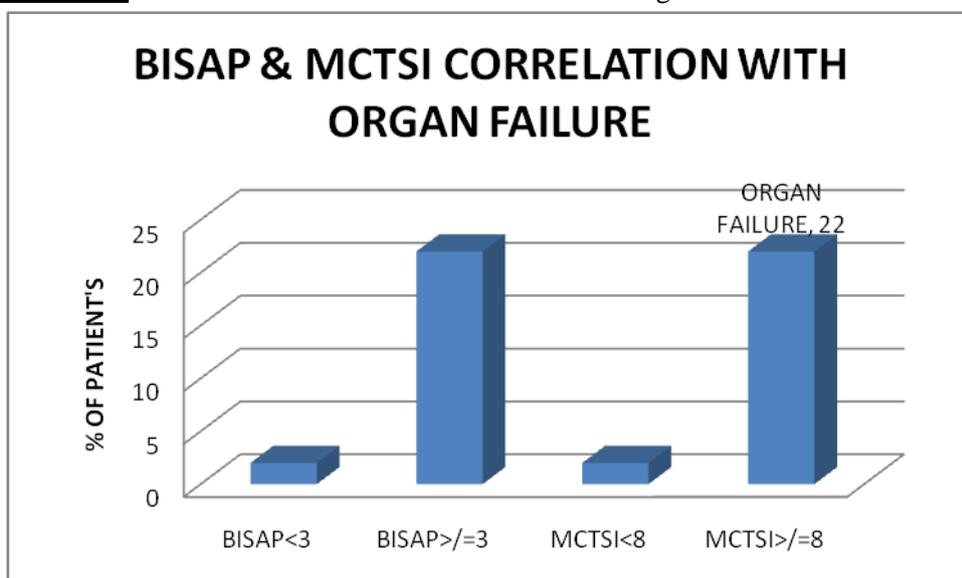
Graph – 5: BISAP and MCTSI correlation with other complications.
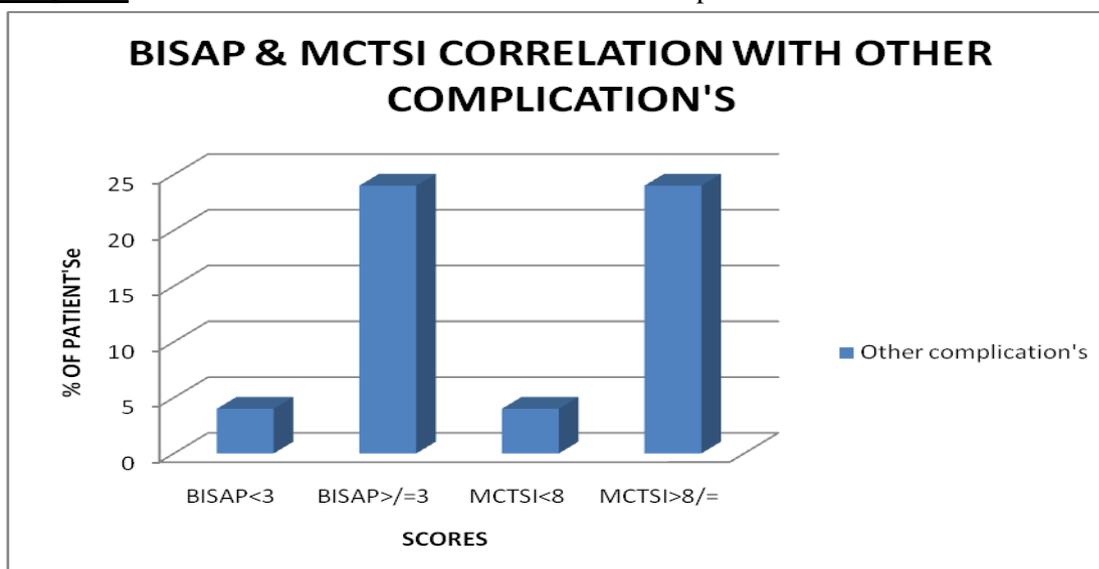
Discussion

Acute pancreatitis is a common disorder with wide spectrum of illnesses. Severe pancreatitis having high morbidity and mortality rate, multiple interventions have been tried to prevent this [10]. Early hospitalization may be beneficial to identify those who require aggressive interventions to prevent the severe attack of AP. In this study, the two different scoring systems (BISAP and MCTSI) were compared and analyzed to assess the severity in patients with acute pancreatitis. An attempt also made to compare this study with previous similar studies done by others. Acute pancreatitis found 10 times more common in males than females in this study [11]. This could be explained by the fact that, in this study alcohol has found to be most common etiological factor and it's more common in males. Patient's less than 30 years were excluded from this study because the normal values of heart rate and respiratory rate are higher at younger age group. So, if these patients had been included in this study, they could have got higher scores incorrectly and could have predicted incorrectly as at risk for developing severe pancreatitis, even with mild disease. In this study the mean age was 52.6 years. The mean age of non- survivors in this study was found to be 61 years as compared to survivors 43.33 years [12]. Taking 70 years as cut off value, increasing age was found to be correlated well with increasing incidence of mortality. Thus age is considered as a significant contributory factor in predicting the outcome of severe acute pancreatitis [13]. The most common etiological factor in this study was alcohol and gall stones as second most common cause 68% and 20 % respectively. The mean length of hospital was 8.32 +/- 7.742. BISAP and MCTSI were correlated well for mortality with high positive value of 0.904 which is highly significant (0.01). The ROC analysis for Mortality showed BISAP score had AUC of 0.904, P value (0.001) which was more than MCTSI score which had AUC of 0.845, P value (0.007). So BISAP was highly accurate with P value (0.001). Cross tabulation test for outcome showed Chi –Square value of 4.545 with degree of freedom of 1 and P value 0.33 for BISAP scoring which was highly significant when compared to MCTSI which had Chi – Square Value of 8.352 with degree of freedom 1 and P value 0.04. The ROC curve for complications showed BISAP score AUC (0.903) with P value (0.001) and MCTSI score AUC (0.850) with P value (0.008). So BISAP was highly accurate in detecting complications when compared to the MCTSI score. BISAP score of more than 2 has high sensitivity 96% and specificity 76% and MCTSI score of more than 3 has sensitivity 96% and specificity 64 % in detecting complications [14]. BISAP score was found to have more sensitivity, specificity and diagnostic accuracy than MCTSI score in prediction of assessing the severity of acute pancreatitis. Hence, BISAP score found to predict more number of patients and likelihood of progressing to severe disease. Hence, BISAP is considered as better available score for assessing the severity than MCTSI score [15].

Conclusion

From this study, alcohol (68%) was found to be the most common etiological factor for acute pancreatitis. Males were most commonly affected than female with a ratio of 10: 1. The most common age group of patients affected was in 6th decade. The overall mortality in patients with severe acute pancreatitis was 12%. The BISAP score predicted the Mortality significantly over the MCTSI score in patients with severe acute pancreatitis. The BISAP score predicted the disease severity significantly over the MCTSI score in patients with acute pancreatitis. From this study, we conclude that BISAP score could be simple and accurate clinical scoring system for the evaluation of disease severity in acute pancreatitis, so CT needed not be taken in first 24 hours of admission.

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