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Role of early contrast enhanced CT scan in severity prediction of acute pancreatitis

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SHORT COMMUNICATION

Role of early contrast enhanced CT scan in severity prediction of acute pancreatitis

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Abstract

Severe pancreatitis occurs in approximately 15-25% of patients with acute pancreatitis. The objective of our study was to compare the CT Severity Index (CTSI) with a clinical score (BISAP score) to predict severity of acute pancreatitis. Forty-eight consecutive patients with acute pancreatitis who underwent contrast enhanced CT scan within 72 hours of presentation were included. Results of our study showed that both CTSI and BISAP score were reliable predictors of mortality (p value = 0.019 and <0.001 respectively) and need for mechanical ventilation (p value = .002 and .006 respectively). Positive predictive value of CTSI to predict recovery without intervention was 91.4% as compared to 78% for that of BISAP score. Receiver Operating Characteristics (ROC) Curves showed CT scan was superior to BISAP Score in predicting need of percutaneous or surgical intervention. Early CT scan may be utilized for prediction of clinical course of patients with acute pancreatitis.

Keywords: Contrast Enhanced Computed Tomography, CT Severity Index, BISAP score, Acute Necrotizing Pancreatitis, Mortality.

Introduction

Annual incidence of Acute Pancreatitis (AP) ranges from 13-47/100,000 population.[1] Severe acute pancreatitis develops in 15-25 % of patients with AP[2] resulting in mortality of 2.6-3%.[3] Predicting severity of AP early in the course of disease may potentially improve the outcome by enhanced triage of patients to appropriate level of care and guiding early targeted therapies like enteral feeding via naso-jejunal tube and appropriate antibiotics.[4]

Numerous clinical and radiological scoring systems have been described in literature to predict severity of AP with variable accuracy. BISAP Score was developed in 2008 and has been validated to predict mortality in AP.[5] In BISAP scoring system, one point is given to each of following five parameters i.e. BUN > 25mg/dl, Impaired Mental Status (GCS < 15), presence of Systemic Inflammatory Response Syndrome (SIRS), Age > 60 years, and presence of Pleural Effusion. Mortality ranges from <1% to up to 22% correlated with an increasing BISAP score from 0 to 5.[7]

CT Severity Index (CTSI)[7] is the most commonly used radiological scoring system for severity assessment of AP. CTSI score is shown to correlate with morbidity and mortality[6] but this evidence is based upon studies conducted upon patients in whom CT scans were done after a delay of two to three days from diagnosis. There is very limited data available on the predictive capability of early CT scan in patients with acute pancreatitis.

The objective of our study was to determine the predictive value of early contrast enhanced CT scan in patients with AP and to compare predictive value of CT severity index with that of BISAP Score.

Patients / Methods and Results

Medical records of all adult patients admitted at Aga Khan University Hospital (AKUH), Karachi, with a diagnosis of AP between January 2012 and June 2013 were reviewed. The patients who underwent a contrast enhanced CT scan within 72 hours of onset of AP and had all the workup available for calculation of BISAP score were included. Patients with incomplete medical records or those who were transferred from other hospitals after initial management were excluded from the study. A consultant radiologist who was blinded to the patients' outcomes reviewed all CT scans and calculated a CT Severity Index score. Primary outcome was prediction of mortality by CTSI and BISAP score. Secondary outcome measures were prediction of need for mechanical ventilation, need for percutaneous intervention, need for surgical intervention, and use of inotropes.

Data was analyzed using SPSS Version 19. Chi Square Test was used to analyze categorical outcome measures like mortality, needs of percutaneous or surgical intervention, and need of inotropic or ventilator support. Positive and Negative predictive values were calculated to measure predictive ability of BISAP score and CTSI. Area under receiver operating curve (ROC) was calculated for both BISAP Score and CTSI score to compare both the scoring

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Table: Distribution of Outcome Variables according to categories of BISAP Score and CT Severity Index (CTSI).

Outcome Measure	BISAP Score		P Value	CT Severity Index		P Value
	0-2 (n=41)	3-5 (n=7)		0-5 (n=34)	6-10 (n=14)	
Mortality	1 (2.4%)	4 (57.1%)	<0.001	1 (3.2%)	4 (28.6%)	0.021
Need of Inotropic Support	2 (4.9%)	4 (57.1%)	0.002	1 (3.2%)	5 (35.7%)	0.006
Need of Mechanical Ventilation	2 (4.9%)	4 (57.1%)	0.002	1 (3.2%)	5 (35.7%)	0.006
Need of Percutaneous Intervention	6 (14.6%)	3 (42.9%)	0.077	3 (8.8%)	6 (42.9%)	0.008
Need of Surgical Intervention	5 (12.2%)	2 (28.6%)	0.257	0 (0.0%)	7 (50.0%)	<0.001

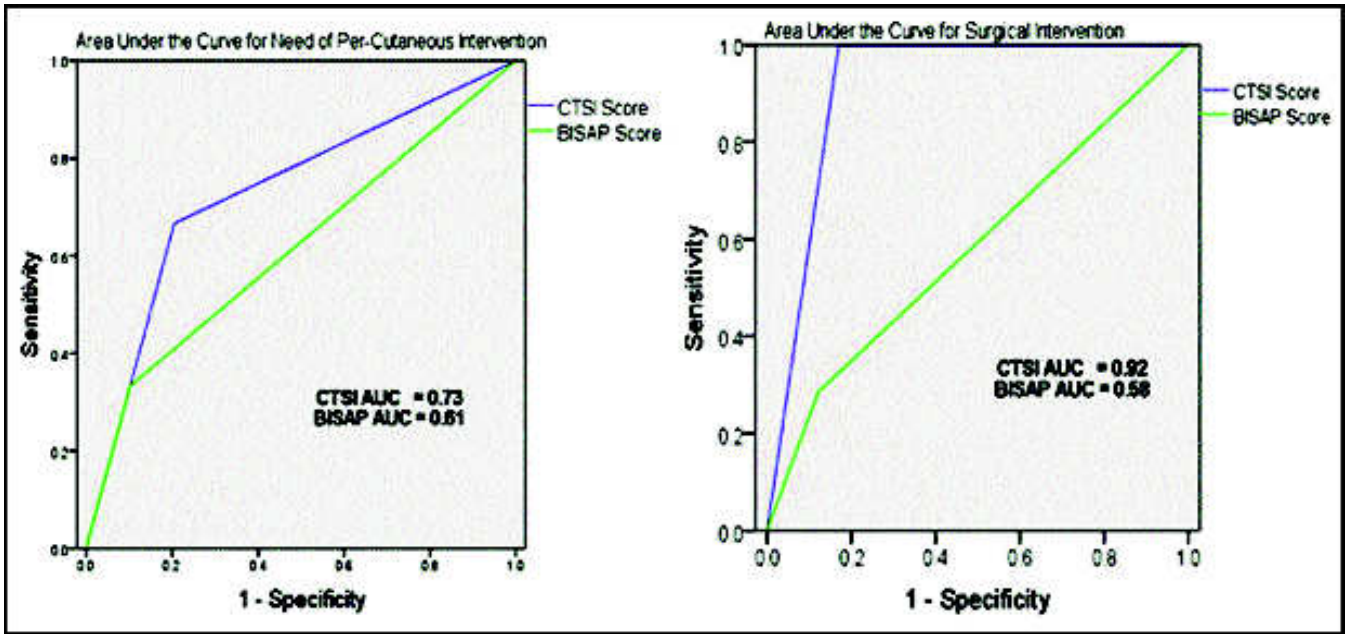

Figure: Area under the receiver operating curve for need of percutaneous and surgical intervention.

systems. The ethical review committee of the institution approved the study.

A total of 48 patients were included in the study. Mean age of patients was 46±18 years and 58% were males. BISAP score of 0-2 was present in 41 patients and 7 patients had a score of 3-5. On the other hand, 34 patients had CTSI score of 0-5 and 14 patients had a score of 6-10. Overall hospital mortality was 10.4%, while mechanical ventilation and inotropes were required in 12.5% of our patients. Percutaneous intervention was required in 18.8% of patients, while surgical intervention was required in 14.6% of patients.

There was significant difference in mortality for two categories based upon of BISAP score and two categories of CTSI. Both CTSI and BISAP score were reliable predictors of mortality (p value = 0.019 and <0.001 respectively) and need for mechanical ventilation (p = 0.002 and 0.006 respectively). On the other hand, higher CTSI had significantly higher risk of radiological or surgical intervention but that was not true for BISAP score. Detailed results are shown in the attached Table. Positive predictive value of CTSI to predict hospital course without any intervention was 91.4% as compared to 78.0% for BISAP score, the difference was statistically significant. Comparison of both the scores to predict need for percutaneous and surgical intervention is done using Receiver Operating Characteristics (ROC) Curves as shown in the attached Figure.

Discussion

There is an ongoing debate about timing of CT scan in patients with AP. Some investigators favour early CT scan for purpose of prognostication.[7] Others have observed no additional advantage of CT scan over clinical parameters to predict outcome.[8] We found that early CT scan can predict mortality and need of invasive monitoring and

resuscitation in patients with AP. This predictive ability of CTSI for these parameters was similar to BISAP score suggesting no additional advantage of early contrast enhanced CT scan over clinical scores in predicting mortality.[8]

On the other hand, prediction of need for intervention during course of disease was superior with CTSI than BISAP score. We found that lower score on CTSI is better predictor of no need of intervention during course of disease as compared to a lower BISAP score. Though huge data is available that demonstrates correlation between necrosis of pancreas appreciated upon CT scan and eventual need of intervention, but all this data is based upon CT scans done later in the course of disease.[6] Early prediction of necrosis can help guide the clinician in deciding level of care required and unnecessary utilization of resources can be avoided. Considering radiation exposure due to CT scans and risks associated with it routine use of CT scan for prognostic purpose may not be recommended in every case and decision to get early CT scan should be based upon clinical condition of patient.[9]

Despite the limitations of small numbers and retrospective analysis of CT scans in our study, our results highlight a new direction in the utilization of early contrast enhanced CT scan in patients with AP. Results of our study indicate that early contrast enhanced CT scan may be useful in predicting the outcome and need for intervention in patients with acute pancreatitis. With wider availability of multi-detector CT scanners, future studies may be focused on this new aspect of CT scans.

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Conflict of Interest: None.

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