



A Comparative Analysis on BISAP and MCTSI in Predicting Prognosis in Patients with Acute Pancreatitis

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Abstract

An often encountered surgical emergency is acute pancreatitis and poses a significant therapeutic challenge for the health care providers. It requires high clinical suspicion and careful monitoring to treat patients diagnosed with acute pancreatitis effectively. Bedside Index for Severity in Acute Pancreatitis (BISAP) is a scoring system which is simple and has 5 variables that would precisely predict severity as early as within the first 24 hours of the course of acute pancreatitis. Balthazar et al⁽¹⁾, introduced a grading system, Computed tomography Severity Index(CTSI) for acute pancreatitis which included the entire estimation of the contour, density and size of pancreas, pancreatic necrosis, peripancreatic collection in computed tomography to assess the prognosis in acute pancreatitis⁽²⁾. The present study uses the Bedside Index for Severity in Acute Pancreatitis scoring system for grading the severity of acute pancreatitis in patients within 24 hours of hospital admission compared to Computed tomography Severity Index taken 48 hours after onset of symptoms and categorizes the management plan accordingly.

Keywords: Acute Pancreatitis, Bedside index, Computed tomography, Blood urea Nitrogen, Scoring system

Introduction

Acute pancreatitis, a ubiquitous diagnosis, that plagues our population, has a multitude of causes, the commonest amongst them being alcohol and gall stones. Our study will try to ascertain the causes in our rural population and thus advance measures to curb the same. Despite a plethora of clinical, biochemical, radiological investigations to aide one in the diagnosis of acute pancreatitis, feasibility, availability and affordability hamper the confirmation of diagnosis and hence a clinician depends on various clinical criteria and his clinical acumen to arrive at the diagnosis. Amongst the various prognostic scoring systems, BISAP and modified CTSI remain the fulcrum to assess prognosis. Our study will

attempt to correlate these scores with the clinical outcome at our rural setup.

The disease can manifest in many ways, ranging from a self-limiting mild form, that responds to conservative treatment, to a more fulminant form of the disease that may involve several organ systems leading to a cataclysmic failure of normal physiology. Hence the need for vigorous testing, to identify patients who may fall victim to the more malignant form of the disease and institute early treatment and to anticipate course of the disease.

A myriad of causes have been implicated in the development of acute pancreatitis. Traditionally, gall stone disease has accounted for the most number of cases, but there has been a shift of late, with more

cases occurring secondary to the toxic effects of ethanol. There seems to be an upward trend in iatrogenic causes as well, due to increasing availability and an increase in therapeutic applications of ERCP.

Diverse scoring systems have been developed to establish the severity and prognosis of acute pancreatitis. The earliest iteration of which, was developed by Ranson in 1974. It predicts the severity of the disease, which is based on multiple (11) parameters that are obtained at the time admission and after 48 hours after admission. Ranson's score has low positive predictive value (50%) and high negative predictive value (90%).

Thus its use rests mainly in ruling out the disease, as several parameters need to be measured after a period of admission, thereby limiting its application in everyday clinical setting. Hence an early therapeutic window to institute appropriate therapy is missed. The APACHE II, which is the commonest scoring system used worldwide, had been originally developed as a risk stratification tool in intensive care, but the superfluous nature of the parameters, makes it untenable in a rural setup. In order to fill the void, the BISAP score was introduced, which is elegant, feasible and accurate and thereby plays a major role in everyday clinical practice.

BISAP, Bedside index for severity in Acute Pancreatitis, scoring system picks patients with high morbidity and risk of mortality, before organ failure sets in. Details for this scoring is collected within 24 hours of admission, which helps in identifying patients who are at risk of developing a malignant form of the disease, and helps in treating the same early and effectively, thereby decreasing the mortality and morbidity.

CECT is the most accurate in diagnosing the disease, its extent and as an adjunct can predict prognosis and therefore is considered the gold standard.

Aims and Objectives

The ulterior motive behind the study was to identify the commonest etiology of acute pancreatitis in our rural setting and to compare the efficacy of BISAP score, a relatively cost effective method of predicting prognosis with the accepted gold standard, modified CT based Severity Index (MCTSI), thereby extending

the application of BISAP in resource deficient centers as a viable alternative to MCTSI.

Materials and Methods

Inclusion criteria

1. Patients with a clinical picture consistent with the diagnosis of acute pancreatitis, along with radiological evidence of inflamed pancreas will be considered to have acute pancreatitis.
2. First episode of Acute Pancreatitis
3. Age > 18 years and Age < 80 years

Exclusion Criteria

Proven cases of chronic pancreatitis.

1. Hereditary pancreatitis.
2. Acute pancreatitis patients with organ failure at or within 24 hours of presentation
3. Pregnancy
4. Chronic kidney disease
5. Traumatic pancreatitis with head injury
6. Mental retardation

All the patients included in the study has to answer a questionnaire regarding the history of Alcoholism, Gall stone disease, Trauma, Drug intake and family history of dyslipidemia. Their vital signs were recorded immediately after admission. They all were subjected to complete blood count, random blood sugar, renal function test, Serum amylase/lipase, serum calcium, lipid profile and liver function tests

An abdominal X-ray and USG abdomen was done as early as possible, that is within 24 hours of presentation. They were subjected to CECT during hospitalization, usually after initial stabilization, that is between 48 to 96 hours. For each of 50 patients included in the study, BISAP scores and modified CTSI scores were calculated.

The collected data were analyzed with IBM. SPSS statistics software 23.0 version was used to describe the data descriptive statistics, frequency analysis. Percentage analysis was used for categorical variables and the mean & S.D were used for continuous variables. CHI SQUARE TEST AND P-

VALUE on BISAP Score with CTSI was done.

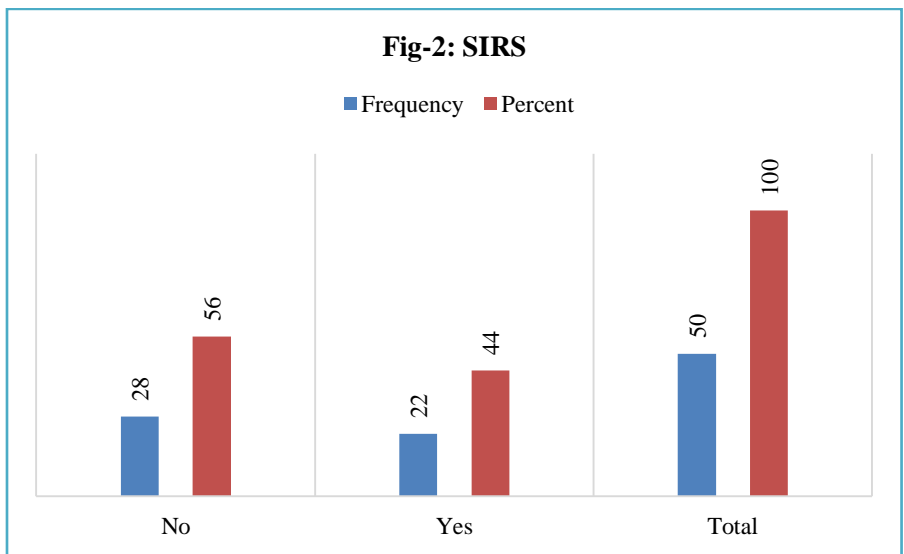
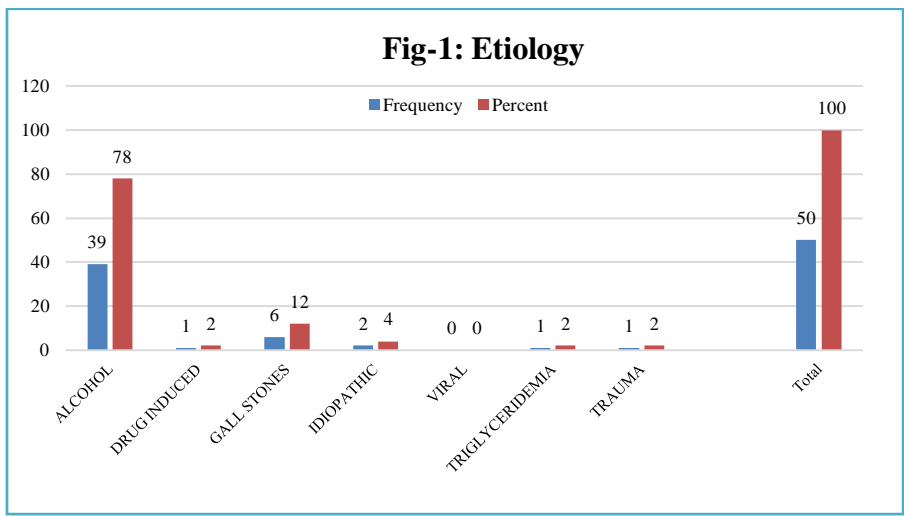
Biliary Pancreatitis was defined as the presence of gall stones/biliary sludge in the gall bladder or bile duct, which was documented by any radiological methods.

Alcoholic Pancreatitis was considered, when the patient found to have regular high intake of alcohol daily, or if there was binge of alcohol consumption prior to the onset of illness and has no signs of other causes.

Idiopathic pancreatitis was the one with no identifiable etiological factor based on the history and investigations. Patients were observed prospectively till discharge from the hospital.

Results and Observation

In our study population, the commonest age group afflicted by the disease belonged to the age group of 26-35 which accounted for 32% of the study population followed by the age group between 36-45 years, which accounted for 30% of the patients. The mean age of involvement was 37 years of age. There was also a clear predilection for the disease to afflict men (86%) compared to women (14%) in our demography. The commonest etiology in our demographic was alcohol, which was the predominant cause (78%), followed by gall stones (12%). 44% of the study population had evidence of SIRS.



In our study population, 7 out of 50 patients had a high BISAP score (14%). 3 patients (6%) had a severe pancreatitis according to MCTSI, while 7(14%) had moderate disease.

Table-1: MCTSI and outcome

			Complication	Improved	Total
CTSI	Mild	Count	5	35	40
Total		% within outcome	35.71	97.22%	80.00%
	Moderate	Count	6	1	7
		% within outcome	42.86%	2.78%	14.00%
	Severe	Count	3	0	3
		% within outcome	21.43%	0.00%	6.00%
Total		Count	14	36	50
		% within outcome	100.00%	100.00%	100.00%

Table-3: BISAP score and outcome

			Outcome		Total
			Complication	Improved	
BISAP	High	Count	7	0	7
		%within Outcome	50%	0%	14.0%
	Low	Count	7	36	43
		%within Outcome	50%	100%	86.0%
Total		Count	14	36	50
		%within Outcome	100.0%	100.0%	100.0%

Table-3: Cross Tabulation BISAP and MCTSI

			CTSI Category		Chi Square	P value
			MILD	Moderate and severe		
BISAP Category	Mild	Count	40	3	37.080	<0.001
		% within CTSI Category	100.0%	22.2%		
	Severe	Count	0	7		
		% within CTSI Category	0.0%	77.8%		
Total		Count	40	10		
		% within CTSI Category	100.0%	100.0%		

An analysis of the outcomes as compared with BISAP and MCTSI was cross tabulated and the difference was found to be statistically significant with $P < 0.001$, which reiterates that BISAP is a better predictor of severity of disease, as all cases that had a high BISAP (7) score developed complications (100%), whereas almost 3% of patients with moderate CTSI recovered without complications. Thus, BISAP is more accurate than MCTSI in predicting outcomes according to our study. During the course of our study, three patients succumbed to the disease and all three had high BISAP and SEVERE score in MCTSI. Therefore, MCTSI is a better predictor for mortality. The collected data were analysed with IBM. SPSS statistics software 23.0 Version was used to describe about the data descriptive statistics, frequency analysis and percentage analysis. Test for significance was achieved by using the Pierson's CHI SQUARE test.

Discussion

A plethora of scoring systems are available for predicting prognosis in patients with acute pancreatitis, amongst which, Ranson's scoring system and APACHE scoring system are the most widely practiced. The drawbacks of these scoring system lies in that fact that a period of admission for 48 hours is required to satisfy the elements and a number of investigations are required, which may not be readily available in remote centers. With Ranson and APACHE⁽⁸⁾ scoring system the severity and prognosis of acute pancreatitis cannot be predicted until 48 hours. To overcome these deficiencies, Wu et al., in the Brigham Pancreas Center devised a score to predict the severity in acute pancreatitis within the first 24 hours of admission (Singh VK et al., 2009)^(3,11). Based on a series of trials, they established a scoring system, based on five simple parameters, which was easily replicable and was conceived as the Bedside Index for Severity in Acute Pancreatitis (BISAP) (Chen L et al., 2013)⁽⁴⁾. The components of the score have the same acronym as that of the score.

Each parameter is equally weighed and is assigned 1 point

- Blood Urea Nitrogen (BUN) level in blood more than 25 mg/dL
- Impaired sensorium, (less than 15/15 in Glasgow

Coma Scale)

- Presence of Systemic inflammatory response syndrome, ie.,
 - Temperature of less than 36 degrees or more than 38 degrees Celsius
 - Respiratory rate more than 20/min
 - Pulse rate more than 90/min
 - WBC count less than 4,000 cells/mm³ or more than 12,000 cells/mm³ or immature bands > 10%
- Age more than 60
- Imaging showing Pleural effusion,

A score of 3 or above is considered high, with 7 to 12 fold increase in risk of impending organ failure. The risk for mortality furthers with increasing BISAP (De Beaux AC et al., 1995)^(5,6)

- Mortality rate discerned with score 0 was 0.1%
- Mortality rate discerned with score 1 was 0.4%
- Mortality rate discerned score 2 was 1.6%
- Mortality rate discerned with score 3 was 3.6%
- Mortality rate discerned with score 4 was 7.4%
- Mortality rate seen with score 5 was 9.5%

In 1985 Balthazar et al., conjured a scoring system based on the contour, density and size of pancreas, pancreatic necrosis, peripancreatic collection on a computed tomography to assess the prognosis in acute pancreatitis (Balthazar EJ et al., 1985)⁽¹⁾. In 1990 Balthazar modified his scoring system by adding the severity of pancreatic necrosis. This modified Index had better accuracy in predicting prognosis than his earlier grading system (Balthazar EJ et al., 1990, Tenner S et al., 1997, Bollen TL et al., 2011)^(3,12)

BISAP score, stratifies the risk of organ failure at the time of admission. Contrast enhanced CT is usually done after the initial stabilization of the patient, usually after 48 hours. Therefore initial assessment and institution of appropriate treatment lies with the index of BISAP. The MCTSI is better in predicting the local complications (Thamilselvam P et al., 2008, Khanna AK et al., 2013, Yadav J et al., 2016)⁽¹³⁾. In statistical analysis of the study, a significant p value

of 3 had developed multiorgan failure and he suggested that the BISAP score stratifies patients prior to onset of organ failure (Layer et al., 2009)⁽⁹⁾. Similarly, Georgios I et al., in their study, patients with higher BISAP score developed more complications than patients with lesser score and he also said that the BISAP score predicts risk in acute pancreatitis more precisely. Its variables are clinical parameters which are simple to get (Georgios I et al., 2010)⁽⁶⁾. Stuart Sherman et al in his study- BISAP score in 397 consecutive acute pancreatitis patients at a tertiary care hospital showed similar observations like our study. In his study, mortality rate was high in patients with higher BISAP score⁽⁷⁾. A score of 3 was determined to be the ideal value to predict mortality. Mortality was 18% in patients with BISAP \geq 3 and 1% in patients with score less than 3. When BISAP score was \geq 3, there was significant risk of developing organ failure and pancreatic necrosis. The clinical outcome of patients with acute severe pancreatitis is determined by the early recognition of the severity of the disease and severity based management of the high risk patients. In the past, surgery was the mainstay of management of severe acute pancreatitis. Surgery for pancreatitis had high morbidity and mortality⁽¹⁰⁾, in the present years most of the severe acute pancreatitis are initially managed conservatively in Intensive Care Unit and monitored for signs of deterioration. Scoring systems in acute pancreatitis help in stratifying these patients so that human and clinical resources can be appropriately utilised to manage the patients with severe disease (Tenner S et al., 2013).⁽¹²⁾

Conclusion

The study demographic showed a significant disparity when it came to the etiology, with 78% of the study population developing acute pancreatitis secondary to ethanol consumption, which is in stark contrast to the universally accepted cause of gall stones. This disparity may be explained by the higher prevalence of alcoholism in our rural setting, with the disease afflicting a significant proportion of men (86%). In our study, a statistical significance was noted between BISAP and MCTSI in predicting outcomes for the patients. BISAP score was more accurate in predicting outcomes in patients compare to MCTSI. The components used to stratify the risks were also easily available whilst calculating BISAP score. Patients with severe pancreatitis according to

MCTSI had a higher mortality in our study (100%). Therefore, MCTSI is an accurate predictor of mortality. Thus, there is ample evidence to institute BISAP, in all patients with acute pancreatitis, as it is equivalent to other prognostic indices in estimating morbidity and mortality.

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