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Original Article

A Prospective Study of Bedside Index for Severity in Acute Pancreatitis Score in Acute Pancreatitis

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Abstract

Introduction: Acute pancreatitis (AP) is defined as an acute inflammatory process of the pancreas with possible peripancreatic effusion and tissue necrosis with or without multi-organ involvement inducing multiple organ dysfunction syndrome with an increased mortality rate.

Materials and Methods: It is a prospective observational study involving patients diagnosed to have AP at Mahatma Gandhi Memorial Hospital, Warangal, from January 2016 to July 2017.

Results: The present study is done for evaluation of the bedside index for severity in AP score in assessing mortality and intermediate markers of severity in AP.

Key words: Acute pancreatitis, Bedside index for severity in acute pancreatitis score, Organ failure

INTRODUCTION

Acute pancreatitis (AP) is defined as an acute inflammatory process of the pancreas with possible peripancreatic effusion and tissue necrosis with or without multi-organ involvement inducing multiple organ dysfunction syndrome (MODS) with an increased mortality rate.[1] According to the revised Atlanta classification of AP, AP (regardless of presence or absence of chronic pancreatitis) is clinically defined by at least the first two of three features. Abdominal pain consistent with AP (acute onset of a persistent, severe, and epigastric pain often radiating to the back) and serum lipase activity (or amylase activity) at least 3 times greater than the upper limit of normal. Characteristic findings of AP on contrast-enhanced computed tomography (CT) and less commonly magnetic resonance imaging (MRI) or transabdominal ultrasonography (US).[2] If AP is diagnosed on the basis of the first two criteria with no systemic sign of severe systemic inflammatory response syndrome (SIRS) or persistent organ failure, contrast material-enhanced CT may not be necessary for determining patient care. The underlying mechanism of injury in pancreatitis is thought to be premature activation of pancreatic enzymes within the pancreas, leading to a process of autodigestion. Once the cellular injury has been initiated, the inflammatory process can lead to pancreatic edema, hemorrhage, and eventually necrosis. As inflammatory mediators are released into circulation, systemic complications can arise, such as hemodynamic instability, bacteremia (due to translocation of gut flora), acute respiratory distress syndrome (ARDS), and pleural effusions.[5-8]

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MATERIALS AND METHODS

All patients who present at MGMH diagnosed as AP AP defined in accordance with revised Atlanta classification as the presence of any two or three of the following:

a. Abdominal pain suggestive of pancreatitis (epigastric pain often radiating to the back), with the start of such pain considered to be the onset of AP;
b. Serum amylase and lipase levels 3 or more times normal (imaging is to be used if the elevated values are, 3 times normal); and
c. Characteristic findings on CT, MRI, or transabdominal US studies.

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Bedside index for severity in AP (BISAP) score is calculated in all such patients based on data obtained within 24 h of hospitalization.

Individual Components of the BISAP Scoring System

Blood urea nitrogen > 25 mg/dl, impaired mental status (Glasgow coma scale score <15), SIRS is defined as two or more of the following:

a. Temperature of <36 or > 38°C
b. Respiratory rate >20 breaths/min or $PaCO_2$ <32 mmHg
c. Pulse >90 beats/min
d. White blood cell <4000 or >12,000 cells/mm^3 or >10% immature bands.

Age >60 years, pleural effusion detected on imaging. A CT or MRI or USG of the abdomen, obtained at any time in the first 7 days of hospitalization, is required to differentiate necrotizing from interstitial pancreatitis organ failure is defined as a score of ≥2 in one or more of the three (respiratory, renal, and cardiovascular) out of the five organ systems initially described in the Marshall score 12.

Organ failure scores will be calculated for all patients during the first 72 hrs of hospitalization based on the most extreme laboratory value or clinical measurement during each 24 h period. Duration of organ failure will be defined as transient (≤48 h) or persistent (>48 h) from the time of presentation.

Discrimination of the BISAP score for predicting mortality will be evaluated in the prospective cohort, using the area under the receiver operating curve (AUC). The receiver operating curve will be examined for an optimal BISAP score for mortality prediction.

The ability of this cutoff value to predict the development and duration of organ failure as well as pancreatic necrosis will then be evaluated.

$P < 0.05$ was chosen to be significant for all tests given the multiple testing conducted among the study cohort.

Inclusion Criteria

All cases of AP present at MIMS from January 2016 to July 2017 were included in this study.

Exclusion Criteria

All cases of AP with organ failure at or within 24 h of presentation were excluded from the study. Patients with incomplete clinical data, those who were symptomatic for more than 72 h at admission, patients with chronic pancreatitis were excluded from the study.

RESULTS

Of 40 cases studied 32 were males and 8 were females, and the ratio of M:F = 4:1. Males were more commonly affected, i.e., 80% [Table 1].

Age group of patients ranges from 14 to 60 years, with peak incidence being in 4th decade, i.e., 32.5%. The mean age of presentation is 36.62 years [Table 2].

Etiology

The leading cause of AP is alcohol in 36 (90%) patients, gallstones in 4 (10%) patients [Table 3].

Of 40 patients, 37 (92.5%) patients had no organ failure. Remaining 3 (7.5%) developed organ failure. All those patients who developed organ failure had BISAP score 3. In organ failure, renal failure (RF) 2 (5%) is most common [Table 4].

Of 12 patients with BISAP score ≥3, 2 (16.6%) patients developed transient RF. None of them with BISAP score <3 developed transient organ failure [Table 5].

Out of 40 patients, 1 (2.5%) patient developed persistent organ failure [Table 6].

Of 12 patients with BISAP score ≥3, 1 (8.3%) patient developed persistent organ failure. None of them with BISAP score <3 developed persistent organ failure [Figure 7].

1 (2.5%) patient in this study died. His BISAP score was 4 and he had developed MODS [Table 8].

Of 40 patients, 12 (30%) had severe pancreatitis and 28 (70%) were classified as having mild pancreatitis [Table 9].

Of 40 patients, 3 (7.5%) patients had an ICU stay of >5 days. Mean ICU stay is 2–10 days [Table 10].

DISCUSSION

AP remains a serious disease. It is defined as an inflammatory process of the pancreas with possible peripancreatic tissue and multi-organ involvement inducing MODS with an increased mortality rate 1. The majority of patients present with mild disease, however, approximately 20% run a severe course and require appropriate management in an intensive care unit. According to RAC, AP has been defined as in, mild, moderate, and severe form.

Table 1: Distribution of sex in the study population

Sex	*n* (%)
Male	32 (80)
Female	8 (20)
Total	40 (100)

Table 2: Age distribution total number of cases – *n*=40

Age group (in years)	*n* (%)
11–20	3 (7.5)
21–30	10 (25)
31–40	13 (32.5)
41–50	10 (25)
51–60	4 (10)

Table 3: Distribution of etiological factors among study populations

Causal factor	Number of patients (%)
Alcoholic	36 (90)
Gallstones	4 (10)
Others	0 (0)

Table 4: Distribution of organ failure among the study population

Organ failure	BISAP ≥3	BISAP <3	Total (%)
Renal	2	0	2 (5)
Respiratory	0	0	0 (0)
Cardiac	0	0	0 (0)
MODS	1	0	1 (2.5)
None	9	28	37 (92.5)
Total	12	28	40 (100)

Table 5: Transient failure rates and its correlation with BISAP score

Transient organ failure	BISAP >3	BISAP <3
Yes	2	0
No	10	28
Total	12	28

BISAP: Bedside index for severity in acute pancreatitis

Table 6: Persistent organ failure in the study population

Persistent organ failure	Frequency (%)
Yes	1 (2.5)
No	39 (97.5)
Total	40 (100)

Table 7: Persistent organ failure and its correlation with BISAP score in the study population

Persistent organ failure	BISAP ≥3	BISAP <3
Yes	1	0
No	11	28
Total	12	28

BISAP: Bedside index for severity in acute pancreatitis

Table 8: Mortality rate in the study population

Mortality	Number of patients (%)
Yes	1 (2.5)
No	39 (97.5)
Total	40 (100)

Table 9: Distribution of severity in the study population

Severity	Number of patients (%)
Mild AP (score <3)	28 (70)
Severe AP (score ≥3)	12 (30)
Total	40 (100)

Table 10: Distribution of patients according to ICU stay

ICU stay	BISAP ≥3	BISAP <3	Total (%)
>5 days	3 (7.5%)	0	3 (7.5)
<5 days	9 (22.5%)	28 (70%)	37 (92.5)
Total	12 (30%)	28 (70%)	40 (100)

ICU: Intensive care unit, BISAP: Bedside index for severity in acute pancreatitis

Definition of Severity of AP[2-4]

Mild AP

Mild AP is characterized by the absence of organ failure and the absence of local or systemic complications.

Moderately severe AP

Moderately severe AP is characterized by the presence of transient organ failure or local or systemic complications in the absence of persistent organ failure.

Severe AP

Severe AP is characterized by persistent organ failure. MODS, the extent of pancreatic necrosis, infection, and sepsis is the major determinants of mortality in AP.[9] Pancreatic necrosis is considered as a potential risk for infection, which represents the primary cause of late mortality. The occurrence of acute respiratory (ARDS), cardiovascular (cardiovascular disease), and RFs can predict the fatal outcome in SAP. A wide range of mortality (20–60%) has been reported in sap. Early diagnosis and prognostic evaluation are extremely important and may reduce the morbidity and mortality associated with sap. On account of differences in outcome between patients with the mild and severe disease, it is important to define that group of patients who will develop severe pancreatitis, predicting which still represents a challenge for the clinician.

Interestingly, when seeking medical attention (usually 12–24 h after the onset of pain), most patients do not exhibit

multiple organ dysfunctions, which is likely to emerge by the second or 3rd day. Identification of patients at risk for mortality early in the course of AP is an important step in improving outcome "write Wu *et al*., from Brigham and women's hospital and Harvard medical school in Boston, Massachusetts, and colleagues, "current methods of risk stratification in AP have important limitations." Most patients with AP recover without complications; the overall mortality rate of this illness is between 2–5% and 6–7%. Multiple risk stratification tools for AP have been developed, but their clinical usefulness is limited. Older measures such as the Ranson's criteria and modified Glasgow score use data that are not routinely collected at the time of hospitalization. In addition, both require 48 h, thereby missing potentially valuable early therapeutic window.

The APACHE II score is the most widely used prediction system currently, but it requires the collection of a large number of parameters. APACHE II was originally developed as an intensive care instrument and requires the collection of a large number of parameters, some of which may not be relevant to prognosis. For this purpose, a simple and accurate clinical scoring system that is BISAP scoring system was developed. This scoring system used for stratifying patients according to their risk of hospital mortality and is able to identify patients at increased risk of mortality before the onset of organ failure. Data for BISAP score collected within the first 24 h of hospitalization.

The ability to stratify patients early in their course is a major step to improving management strategies in AP. The severity of AP was defined on the basis of the BISAP score. The ability to risk stratify patients early in their disease course has several important implications. First, early identification of high-risk patients may alert doctors to institute aggressive resuscitation efforts and to consider specialty care referral. Second, it is a major step in improving future management strategies in AP.

In this study, of 40 patients, 12 (30%) had severe pancreatitis that is they had BISAP score more than or equal to 3 and 28 (70%) were classified as having mild pancreatitis having BISAP score of <3. The majority of patients, the disease was self-limiting. Among 40 patients in this study, 32(80%) were males and 8 (20%) were females. Male to female ratio was 4:1.

The mortality rate of this study was 2.5%, i.e., one patient had died from MODS with persistent organ failure with BISAP score of 4. In the present study, the majority of patients who had BISAP score, more than 3 was above 40 years of age. With respect to etiological factors of AP, we found alcohol being the most common cause of AP, accounting for 90% of cases, gallstones being the second most common, accounting for 10% of cases.

The proportion of two main causes greatly depends on the geographical and cultural variations. Alcohol is the main cause in the United States of America and Finland, gallstones in southern Europe, whereas central and northern Europe sees a similar frequency of the two factors or a predominance of alcohol.

In this study, of 40 patients, 37 (92.5%) had no organ failure and 3 (7.5%) patients developed organ failure. Of 12 patients, 2 (16.6%) patients had transient organ failure and 1 (8.3%) had persistent organ failure. Intransient organ failure group, 2 patients had a transient RF. Of 40 patients in this study, none had developed pancreatic necrosis.

The mortality rates of patients with AP vary from 2 to 9% while in severe cases, it is estimated at 30%. According to a recent study, the mortality rates among severe AP patients have decreased from 50–58% in 1978–1982 to 12–18% in 1993–1997. Furthermore, the early deaths of patients with AP were rare: 9 of 10 deaths occurred later than 3 weeks after disease onset.

The overall mortality in this study was 2.5% which is similar comparable with other studies. Perez *et al*. reported an overall mortality rate of 14% among 99 patients with pancreatic necrosis but found that the concomitant presence of organ failure at admission or during hospitalization was associated with a nearly 50% mortality rate. Rau *et al*. noted a 19-fold increased the risk of mortality among 230 patients with sterile necrosis, treated either operatively or conservatively, with multisystem organ failure. Ransons score, which requires 11 signs for computation, recorded at admission and 48 h is primarily aimed to evaluate the function of early operative intervention inpatients of AP. It is cumbersome, and accurate Ranson's score takes 48 h to complete, and not all laboratories measure all the parameters in routine blood tests (e.g., serum lactate dehydrogenase).

More recently, the APACHE II system, developed for general use in intensive care units, has supplanted Ranson score because it can be applied at any point in time, unlike Ranson score, which is calculated only 48 h after admission. Ranson criteria and the APACHE II system are very cumbersome to use, and both are limited by their complexity. BISAP is a newly developed prognostic scoring system. It also has the advantage of being applicable at any time during the course of AP, unlike Ranson score. In this regard, it is much like the APACHE II system but is much simpler to use. Therefore, it has been proposed

that the primary advantage of BISAP over the traditional scoring systems, such as Ranson score and APACHE II, is its simplicity.

CONCLUSION

The present study is done for evaluation of the BISAP score in assessing mortality and intermediate markers of severity in AP. The BISAP score was evaluated among 40 cases of AP admitted to our institution during the period of January 2016–July 2017. BISAP scores were calculated in all cases using data within 24 h of presentation. Based on the data and results obtained in the present study, the following conclusions can be drawn: AP is more commonly seen in males. Age group ranges from 14 to 60 years, with peak incidence seen in a 4th decade. The mean age of presentation is 36.62 years. The most common etiological factor is alcoholism followed by gallstones. 30% patients had BISAP score more than or equal to 3 and 70% had BISAP score <3. The severity of AP is graded as mild in 70% and severe AP in 30% of patients. Transient organ failure is seen in 16.6%, and persistent organ failure in 2.5% of patients with BISAP score ≥3. Overall, in this study group, mortality was 2.5% and organ failure seen in 7.5% and pancreatic necrosis in 0% of patients. 1 (2.5%) patient died of MODS with BISAP score of 4. 7.5% of patients had an ICU stay of >5 days. Present study infers that BISAP scores of ≥3 represent a simple way to identify patients at risk of increased mortality and the development of intermediate markers of severity within 24 h of presentation. Although most patients with AP recover without complications, the overall mortality rate of this illness is between 2% and 5%. Multiple risk stratification tools for AP have been developed, but their clinical usefulness is limited. Older measures, such as the Ranson and modified Glasgow score, use data that are not routinely collected at the time of hospitalization, and these tools cannot be completed until 48 h after admission. The APACHE II score is most widely used prediction system currently, but it requires the collection of a large number of parameters. Our study found that BISAP score represents a simple way to identify patients at risk of increased mortality and the development of intermediate markers of severity within 24 h of presentation.

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