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Original Research Article

Assessment of Accuracy of BISAP Score as a Predictor of Severe Acute Pancreatitis in Shyam Shah Medical College, Rewa, Madhya Pradesh

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Abstract

Background: The prevalence of acute pancreatitis (AP) has increased in the last 20 years. Most patients with AP experience a clinical course that is mild and self-limited. However, 10% to 20% of patients develop a rapidly progressive inflammatory response, necessitating prolonged hospital stays, and high morbidity and mortality rates. Various scoring systems are already in place to assess the severity of acute pancreatitis. BISAP score offers the advantages of being inexpensive, rapid, and simple.

Aim and Objectives: To analyze the predictive value of BISAP score in developing severe AP (SAP) and mortality rates.

Materials and Methods: This study enrolled 138 patients with acute pancreatitis admitted to surgical wards of Shyam Shah Medical College Rewa, Madhya Pradesh, between January 2022 to December 2022, meeting the inclusion criteria.

Results: The percentage of severity, necrosis, various organ failure, death, and hospital stay increased as the BISAP score increased. Regarding sensitivity and specificity, the accuracy of the BISAP score for predicting severe acute pancreatitis was 76.2% and 63.4%. Patients with severe acute pancreatitis had BISAP scores of 3 and above.

Conclusions: BISAP can be used to identify the patients who are at risk, and this information can serve as early guidance for appropriate and necessary therapy, improving patient outcomes. The present study concludes the increased accuracy of the BISAP score for risk stratification.

Keywords: BISAP Score, Acute Pancreatitis, Scoring System.

Introduction

Acute pancreatitis (AP) is the inflammation of the prior normal pancreas with possible peripancreatic tissue and multiorgan involvement. [1,2] AP is highly variable in terms of its clinical presentation and severity, with most cases having mild and self-limiting. [3,4]

According to the 2012 Revised Atlanta Classification, AP identifies 2 phases of acute pancreatitis early (first 1 or 2 weeks)

and late (after that). AP can be either edematous interstitial pancreatitis or necrotizing pancreatitis, which involves necrosis of the pancreatic parenchyma and peripancreatic tissues, pancreatic parenchyma alone, or just the peripancreatic tissues. The severity of the disease is categorized into three levels: mild, moderately severe, and severe. [5]

In mild AP (MAP), no organ failure and no local or systemic complications occur. In moderately severe AP (MSAP), transient organ failure (resolved within 48 hours) or local complications arise, and in severe AP (SAP), persistent organ failure (longer than 48 hours)takes place. Local complications included acute peripancreatic fluid collection, pancreatic pseudocyst, acute necrotic collection, and walled-off necrosis. [6]

Around 25% of patients with acute pancreatitis develop severe acute pancreatitis, with an average mortality rate of 2-10%. Therefore, early identification of acute pancreatitis enables rapid intervention and treatment and can improve patients' betterment and survival. [7]

Many scoring systems developed for the early detection of severe AP have limitations, i.e., they are not simple, rapid, or economical. [8] In 2008, Wu et al. proposed a new prognostic scoring system for the early prediction of the severity of AP, the bedside index of severity in acute pancreatitis (BISAP). [9] Data for BISAP score collected within the first 24 hours of hospitalization. BISAP score is uncomplicated, quick, and reasonably reliable for assessing disease severity on admission.

Marshal et al. proposed the criteria to assess organ failure in acute pancreatitis. Organ failure-three organ systems should be evaluated to define organ failure. Pulmonary insufficiency-when arterial PO2is less than 60 mmHg in room air or there is a need for a ventilator, renal failure-serum creatinine level more than 2 mg % after rehydration or hemodialysis, shock-systolic blood pressure less than 90 mm Hg. Per the modified Marshall scoring system, a score of 2 or more for one of these three organ systems suggests organ failure.

Over the past years, the management of AP has significantly changed. Primary treatment in early cases is non-surgical and supportive. Patients with infected necrosis with sepsis promptly require intervention, and early admission to intensive care has improved the overall outcome. 10 With rising costs of intensive care treatment of acute pancreatitis and its complications, there is a need for early identification of warning signs and early prompt intervention. This helps the patients to recover faster with less morbidity and mortality. [6,7]

A prospective study on the value of the BISAP scoring system as a method for the early detection of severe AP that was published recently concluded that the accuracy of this method of risk stratification was comparable with other multifactorial scoring systems in patients with AP. [9,10] This study analyses the predictive value of BISAP score in developing severe AP (SAP) and mortality rates.

Materials and Methods

A retrospective study was performed on patients coming to Shyam Shah Medical College, Rewa, Madhya Pradesh were included in this study, with APas per definition, from January 2022 to December 2022. BISAP score was calculated from the laboratory and radiological findings.

One hundred and thirty-eight consecutive patients admitted with a diagnosis of acute pancreatitis in various surgery wards of Shyam Shah Medical College, Rewa, Madhya Pradesh, were considered for the study.

The institutional ethics committee's approval for research on human subjects

was taken. Throughout the study, strict ethical norms were maintained. Patients ' written informed consent was taken in their local language (mother tongue).

Both males and females above the age of 20 years were included in the study with features as per the established diagnosis of acute pancreatitis as per revised Atlanta classification and definition by international census 2012 were included in the study. Patients aged less than 20 years with chronic pancreatitis, infection at presentation (cholangitis, cholecystitis, pneumonia), and known cases of carcinoma pancreas were excluded.

As per the revised Atlanta classification and definition by the international census 2012, AP is defined as patients having two of the following three features -characteristic abdomen pain, the elevation of pancreatic enzymes more than three times the normal values, characteristic findings in contrast-enhanced computed tomography (CECT), i.e., edema of the pancreas, altered fat and fascial planes, fluid collections, necrosis (a non-enhancement area more than 30% or 3cm).5BISAP incorporates five parameters -blood urea nitrogen >25 mg/dl, presence of an impaired mental status, systemic inflammatory response syndrome (SIRS), age >60 years, and detection of pleural effusion by imaging. [9,10] Systemic inflammatory response syndrome(SIRS) is defined by the presence of at least two of the following, pulse >90 beats per minute, respirations >20 per minute, PaCO2<32 mmHg, temperature >38°C or <37°C, white blood cell count >12,000 or <4,000 cells/mm3, or >10% immature neutrophils (bands). [11,12]

Patients with symptoms of acute pancreatitis were identified, and history and details of local and systemic examinations were collected. The following were collected from the patient charts: sex, age, blood pressure (mm Hg), respiratory rate (breaths per minute), oxygen saturation (%), pulse rate (beats per minute), the BISAP score at admission, the creatinine level (mg/dl), Ht (%), blood urea nitrogen BUN (mg/dl), and the glucose level at admission (mg/dl). The etiology, morbidity, and mortality data were also collected. The BISAP score was evaluated at admission using the parameters available in the first 24 hours. Imaging studies of plain radiographs of the chest and abdomen, ultrasonography (USG) of the abdomen and pelvis, and CECT of the abdomen and pelvis were collected. BISAP score was calculated from the laboratory and radiological findings, and patients were categorized using the revised Atlanta criteria.

Statistical analysis

The data was collected appropriately and adequately charted using Microsoft Excel. Numeric data are presented as mean ± SD. Simple mathematical expressions like percentages were also used. Statistical analyses were done using the statistical package for social science (SPSS) software, the latest version.

Results

Table 1 Male and female ratio

S. No	Sex	Frequency
1.	Male	117
2.	Female	31

One hundred thirty-eight patients were admitted and included in our study, of which 117 were males(84%), and 31 were females (16%). The mean age was in the 4th decade. Of the study population, 32 patients (26%) had severe acute pancreatitis, with 3 mortalities(2.2%).

Table 2: Severity of acute pancreatitis

Severity	Mild	Moderate	Severe
Male	48	37	32
Female	12	8	1

Table 3: Etiology distribution between gender

Sex	Alcohol	Biliary	Idiopathic
Male	81	22	12
Female	2	18	2

Alcohol was the most common etiology (62%), followed by biliary pancreatitis (28%), and the remaining were idiopathic (9%) pancreatitis. It was found that Acute pancreatitis affects all ages, and most of the cases were between the age group of 21 to 50 years. All the patients aged ≥60 years old we admitted presented with severe AP.

Raised BUN is an independent predictor of severe pancreatitis. We saw raised BUN in 26 (81.2%) out of 32 patients with severe pancreatitis. 60.87% of patients had SIRS, and all patients with severe acute pancreatitis were found to have SIRS. We found that pleural effusion was the most sensitive among the various parameters. All patients SAP had pleural effusion.

Patients with a BISAP score ≥3 carry a higher risk of severity, organ failure, and mortality than a BISAP score of <3. There was one organ failure and one mortality in patients with a BISAP score 3. In patients with a BISAP score ≥4, we had 3 organ failures and two deaths. There was an increasing trend in the percentage of severity, organ failure, necrosis, and mortality with increasing BISAP scores. Patients with BISAP ≥3 were more frequent in patients with SAP, with transient or persistent organ failure and pancreatic necrosis.

Accuracy in predicting severe acute pancreatitis by BISAP score was 76.2% based on sensitivity and 63.4% based on specificity.

Discussion

A new prognostic scoring system, the bedside index for severity in acute pancreatitis (BISAP), is a simple and accurate method for early identification of patients at risk of in-hospital death. [13] The BISAP scoring method overcomes the shortcomings and challenges of the current prognostic scoring systems. Ranson and Glasgow scores need 48 hours to calculate, as well as information that is not typically obtained at admission and isn't easily accessible in small centers. [2,14-16]

According to Singh et al., organ failure occurred far more frequently in patients with a BISAP score below 3 than in those with a BISAP score above 3. According to our analysis, a BISAP score 3 was highly predictive of organ failure. [10]

The most widely used scoring system is APACHE II, which was first developed for the prognostication of ICU patients. However, it requires several parameters, some of which are irrelevant to AP. Additionally, the chronic health profile component of the score involves thorough medical history and records, which are challenging to collect for all patients. For clinicians, it is cumbersome and challenging to recall. [14,17-19]

These require data to be collected at admission and then at 48 hours. CTSI is not useful for prognosis in the early stages of the disease as the morphological changes develop late. [1,14,20]

Compared to other scoring systems, the BISAP score has several advantages for determining severity. First, it's easy to calculate the score because it requires standard imaging, laboratory investigation studies, and vital signs taken at the time of presentation or within 24 hours. Second, the score was developed and tested using

36,248 acute pancreatitis cases spread over 389 hospitals, reflecting the full spectrum of healthcare delivery. [9] The third is that the score predicts in-hospital mortality.

Both BISAP and APACHE II use age, GCS, and SIRS. With the addition of BUN and pleural effusion parameters, BISAP attains a high predictive ability to detect severe AP and mortality, equivalent to the complex APACHE II. A BISAP score of 3 was linked to more severe disease, more organ failure, and higher death, hence most authors selected a BISAP score of three as their cutoff and a BISAP score of 2 or more by few. [2,21-24]

The extrapancreatic organ failure and local pancreatic problems that are present in severe illness are defined by the revised Atlanta classification, and more recently, organ failure has been seen to be a much stronger predictor of severe disease and length of hospitalization. [2,21]

BISAP predicts the severity and likelihood of progression to organ failure more accurately in the early stage of the disease, thus adding to the advantage of this scoring system. Park et al., in their retrospective study of 303 patients, compared the BISAP scores with other scoring systems. [2] AUCs for BISAP predicting severe pancreatitis

, organ failure, and death were 0.80, 0.93, and 0.86, respectively, which were similar to those for APACHE-II (0.80, 0.95, 0.87) and Ranson criteria (0.74, 0.84, 0.74) and greater than AUCs for CTSI (0.67, 0.57, 0.42). In his study, BISAP predicted severity, death, and especially organ failure in acute pancreatitis as well as APACHE-II did and was better than Ranson criteria, CTSI, CRP, hematocrit, and BMI.

In this study, we evaluated the usefulness of BISAP as an early marker of the severity of acute pancreatitis. To provide a standard approach, a larger prospective study comparing all scores and individual parameters is required to overcome the limitations of our research; it is conducted in a single tertiary care center. Also, various institutions' approaches to prognosticating Acute Pancreatitis take different methods based on their preferences.

Conclusion

A long history of attempts to find prognostic or predictive markers that accurately stratify the risk. BISAP is an easy-to-calculate clinical prediction scale, requiring only physical examination, vital signs, laboratory data, and imaging to detect pleural effusion that is usually documented on presentation. It has the advantage of simplicity and can be performed within the first 24 hours of admission. The patients at risk can be identified, and it can act as an early guide for the accurate and required treatment resulting in improved patient outcomes. There is an increasing trend in these outcomes with increasing BISAP. We concluded that the BISAP score is a reliable way of predicting the severity, necrosis, organ failure, and mortality of patients with acute pancreatitis.

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