ORIGINAL ARTICLE

Diagnostic Accuracy of BISAP Score for Detecting Acute Pancreatitis Keeping Computed Tomography Severity Index as Gold Standard

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ABSTARCT

Objective: To establish the diagnostic accuracy of BISAP in detecting the severe acute pancreatitis keeping computed tomography severity index as gold standard.
Study Design: Cross-sectional study
Place and Duration of Study: Department of Gastroenterology, Hayatabad Medical Complex, Peshawar from April 16th 2018 to 16th October 2018.
Methodology: One hundred and twenty nine patients of age range of 18-60, of either gender having severe acute pancreatitis were included. While patients already diagnosed as severe acute pancreatitis and having known history of chronic pancreatitis were excluded. Patients were subjected to CT scan to confirm whether the severe acute pancreatitis is present or not. All CT scans were reported by single experiences radiologist.
Results: There were 30.3% were males and 69.7% were females with mean age 42±11.03 years. BISAP had sensitivity 92.74%, specificity 80%, positive predictive value 99.13%, negative predictive value 20.76% and the overall diagnostic accuracy was 92.24%.
Conclusion: BISAP had sensitivity 93.61%, specificity 100%, positive predictive value 100%, negative predictive value 40% and the overall diagnostic accuracy was 93.87% in severe acute pancreatitis keeping CT severity index as gold standard.
Keywords: Accuracy, Severe acute pancreatitis, Computed tomography

INTRODUCTION

Acute pancreatitis is defined as sudden onset inflammation of pancreas. The clinical spectrum of acute pancreatitis varies widely ranging from mild self-resolving inflammation to more severe condition characterized by pancreatic necrosis commonly referred to as severe acute pancreatitis. Severe acute pancreatitis can be fatal due to its extra-pancreatic complications.[1] This illustration of severity of acute pancreatitis has evolved over the years and modified from time to time. A number of clinical and biochemical, scoring and classification systems have been devised to elucidate pancreatic inflammation and its severity including Ranson criteria, Glasgow criteria, APACHE II criteria, CT severity index, Atlanta criteria and BISAP score.[2]

Development of multi-organ damage in a period of hours to few days is key in the description of severe acute pancreatitis as depicted by almost all scoring systems in terms of their clinical or biochemical markers.[3] Mortality can reach as high as 40% in the setting of severe acute pancreatitis with multi-organ involvement.[4] While 20% of cases suffer lifelong morbidities which prove to be fatal in the longer term. To avoid these long term complications and reduce mortality, it is important to stratify the severity of acute pancreatitis with absolute accuracy.[5]

In a comparative study by Papachristou and colleagues[6] for predicting multi-organ failure in the settings of acute pancreatitis by BISAP, Ranson's and APACHE-II, reported that all the scoring tools were equally accurate in predicting multi-organ failure with respective areas under the curve (AUCs) as 0.81, 0.94 and 0.78. However, a good scoring tool is one which convenient, quick and easily reproducible.[7] Compared to others, BISAP (bedside index for severity in acute pancreatitis) score is simple, convenient and easily established in clinical settings without compromising its diagnostic power. The reported sensitivity of BISAP is 74.2%, specificity 68.3%, PPV 63.4%, NPV 77.8% and overall accuracy of 70.8% for detecting severe acute pancreatitis.[8,9] In another study, reported sensitivity was 64.8% and specificity of 83.62%.[10]

This study is aimed to evaluate the diagnostic accuracy of BISAP in detecting severe acute pancreatitis keeping CT findings as gold standard. In resource limited settings, diagnosing and evaluating a patient for severity is often delayed of due to non-availability of several biochemical and imaging modalities necessary while working on these scoring tools devised for acute pancreatitis. Precious time could be saved while assessing patient with acute pancreatitis using BISAP tool provided its diagnostic ability is better understood.

MATERIALS AND METHODS

This cross-sectional study, comprising of 129 patients was carried out in Department of Gastroenterology Hayatabad Medical Complex, Peshawar from 16th April 2018 till 16th October 2018. Both male and female patients in the age range of 18-60 years were included. Patients already diagnosed as severe acute pancreatitis and patients having known history of chronic pancreatitis were excluded. Patients having acute pancreatitis and satisfying the selected criteria for acute pancreatitis were enrolled. Informed written consent was taken from all study participants. History and complete physical examination was done. Patients were assessed on the basis of BISAP scoring and the final score suggestive of severe acute pancreatitis were recorded. The scoring systems and examinations were done under supervision of senior consultant. Confirmation of severe acute pancreatitis was done on CT scan. All CT scans were reported by single experiences radiologist. Patients were managed accordingly as per hospital protocol. The data was entered and analyzed through SPSS-23. Diagnostic accuracy of BISAP was determined in terms of sensitivity, specificity, positive predictive value, negative predictive and accuracy using 2×2 table.

RESULTS

Thirty nine (30.3%) patients were male while 90 (69.7%) patients were female with a male to female ratio of 0.42:1. The mean age was 42±11.03 years. Majority of patients, 80 (62%) patients were in age range 20-40 years, followed by 49 (38%) patients were in age range 41-60 years (Table 1).

Table 1: Demographic information of the patients

Variable	No.	%
Gender		
Male	39	30.3
Female	90	69.7
Age (years)		
20-40	80	62.0
41-60	49	38.0

Severe acute pancreatitis on computed tomography severity index was reported among 129 patients was analyzed as SAP on

computed tomography severity index was positive in 124(96%) patients and was negative in 5 (4%) patients while SAP on BISAP was positive in 116 (90%) patients and was negative in 13 (10%) patients. Diagnostic accuracy of SAP on BISAP taking computed tomography severity index as gold standard was analyzed as the sensitivity was 92.74%, specificity was 80%, positive predictive value was 99.13%, negative predictive value was 30.76% and the overall diagnostic accuracy was 92.24% (Tables 2-3).

Table 2: Frequency of severe acute pancreatitis on computed tomography severity index (CTSI) and bedside index for severity in acute pancreatitis (BISAP)

Severe acute pancreatitis	CTSI	BISAP
Positive	124 (96%)	116 (90%)
Negative	5 (4%)	13 (10%)

Table 3:Comparison of BISAP VS CTSI

SAA on BISAP	SAP on CTSI		Total
	+ve	-ve	
+ve	115	1	116
-ve	9	4	13
Total	124	5	129

Sensitivity = 115/124 X 100 = 92.74%
Specificity = 4/5 X 100 = 80%
Positive predictive value = 115/116 X 116 = 99.13%
Negative predictive value = 4/13 X 100 = 30.76%
Accuracy = 119/129 X 100 = 92.24%

DISCUSSION

Acute pancreatitis is among the most common gastrointestinal disorders requiring hospital admission. Aetiology of acute pancreatitis varies widely with alcohol being the most common cause in the western countries in contrast to gall stone pancreatitis in Asian countries including Pakistan. Clinical spectrum of acute pancreatitis range from mild pancreatic inflammation to more severe inflammation with extra-pancreatic manifestations including multi-organ failure (severe acute pancreatitis) seen. Several scoring systems consisting of clinical, biochemical and imaging tools have been devised to assess the severity of acute pancreatitis including Ranson's score, BISAP score, APACHE-II score, SOFA score etc. Every scoring tool carries its own merits and demerits.[11]

In our study, mean age of the patients was 42±11.03 years. 30.3% patients were males while 69.7% patients were females. BISAP had sensitivity 92.74%, specificity 80%, positive predictive value 99.13%, negative predictive value 30.76% and the overall diagnostic accuracy was 92.24%. Bezmarević and colleagues[12] conducted study on the diagnostic accuracy and applicability of BISAP score. They concluded reported that BISAP is a simple, easy to obtain and clinically oriented scoring system that can predict mortality and severity of AP early in the course of disease i.e. within 24 hours and has a reported sensitivity of 74.2%, specificity 68.3%, PPV 63.4%, and NPV 77.8% and an overall accuracy of 70.8% with an overall prevalence of 57% SAP. These results are in coherence with the results of our study.

In a review analysis of 10 cohort studies on the diagnostic accuracy of BISAP by Gao et al[13], BISAP score ≥3 showed 56% sensitivity, 91% specificity for the diagnosis of severe acute pancreatitis. In comparison, the respective values for the outcomes of severe acute pancreatitis showed 51% (43%-60%) pooled sensitivity and 91% (89%-92%) pooled specificity. The results of this study are much lower than our study. Compared to our study, Papachristou et al[14] reported much values (37.5%) for sensitivity of BISAP for the diagnosis of SAP, though the specificity (92.4%) was

in agreement to our study. This disparity could be explained by the fact that cut off for sensitivity in our study was set at BISAP score of 2 compared to the studies conducted by Gao et al[13] and Papachristou et al[14] who set 3 for their studies. The best cut off for BISAP as calculated by Youden index is set at 2. Another disparity compared to the previous literature is the higher values for sensitivity than specificity of BISAP for predicting severe acute pancreatitis. Factors such as genetics, lifestyle and race may have played their role in this respect but we could not address this gap and it is one of the limitations of this study.

CONCLUSION

BISAP had sensitivity 93.61%, specificity 100%, positive predictive value 100%, negative predictive value 40% and the overall diagnostic accuracy was 93.87% in severe acute pancreatitis keeping computed tomography severity index as gold standard.

REFERENCES

1. van Baal MC, van Santvoort HC, Bollen TL, Bakker OJ, Besselink MG, Gooszen HG, et al. Systematic review of percutaneous catheter drainage as primary treatment for necrotizing pancreatitis. Br J Surg 2011;98(1):18-27.
2. Neri V. Role of surgery in the treatment of pancreatitis and its complications Surg Endosc 2009;23(12):2770-77.
3. Banks PA, Bollen TL, Dervenis C, Gooszen HG, Johnson CD, Sarr MG, et al. Classification of acute pancreatitis - 2012: revision of the Atlanta classification and definitions by international consensus. Gut 2013;62(1):102-11.
4. Phillip V, Steiner JM, Algül H. Early phase of acute pancreatitis: assessment and management. World J Gastroenterol 2014;5(3): 158-62.
5. Zhu HH, Jiang LL. Serum inter-cellular adhesion molecule 1 is an early marker of diagnosis and prediction of severe acute pancreatitis. World J Gastroenterol 2012; 18(20): 2554-60.
6. Papachristou GI, Muddana V, Yadav D, O'Connell M, Sanders MK, Slivka A. Comparison of BISAP, Ranson's, APACHE-II, and CTSI scores in predicting organ failure, complications, and mortality in acute pancreatitis. Am J Gastroenterol 2010;105:435-41.
7. Bollen TL, Singh VK, Maurer R, Repas K, van Es HW, Banks PA, et al. A comparative evaluation of radiologic and clinical scoring systems in the early prediction of severity in acute pancreatitis. Am J Gastroenterol 2012; 107(4):612-9.
8. Bezmarević M, Kostić Z, Jovanović M, Micković S, Mirković D, Soldatović I. Procalcitonin and BISAP score versus C-reactive protein and APACHE II score in early assessment of severity and outcome of acute pancreatitis. Vojnosanitetskipregled 2012;69(5):425-31.
9. Khanna AK, Meher S, Prakash S, Tiwary SK, Singh U, Srivastava A. Comparison of Ranson, Glasgow, MOSS, SIRS, BISAP, APACHE-II, CTSI scores, IL-6, CRP, and procalcitonin in predicting severity, organ failure, pancreatic necrosis, and mortality in acute pancreatitis. HPB Surgery 2013.
10. Yang YX, Li L. Evaluating the ability of the bedside index for severity of acute pancreatitis score to predict severe acute pancreatitis: a metaanalysis. Med Princ Pract 2016;25(2):137-42.
11. Siregar GA, Siregar GP. Management of severe acute pancreatitis. Open Access Maced J Med Sci 2019;7(19):3319-23.
12. Bezmarević M, Kostić Z, Jovanović M, Micković S, Mirković D, Soldatović I. Procalcitonin and BISAP score versus C-reactive protein and APACHE II score in early assessment of severity and outcome of acute pancreatitis. Vojnosanitetskipregled 2012;69(5):425-31.
13. Gao W, Yang HX, Ma CE (2015) Correction: The Value of BISAP score for predicting mortality and severity in acute pancreatitis: a systematic review and meta-analysis. PLOS one 10(10): e0142025.
14. Paachristou GI, Muddana V, Yadav D, O'Connell M, Sanders MK, Slivka A, et al. Comparison of BISAP, Ranson's, APACHE-II and CTSI scores in predicting organ failure, complications, and mortality in acute pancreatitis. Am J Gastroenterol 2010; 105(2):435-441.