Original Research Article

Observational study of comparison of BISAP score with Ranson's score and APACHE II scores in assessing severity and prognosis in patients of acute pancreatitis

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ABSTRACT

Background: Acute pancreatitis is one of the most common diseases of gastrointestinal tract, leading to tremendous emotional, physical and financial burden. Acute pancreatitis is an acute inflammation of the prior normal gland parenchyma which is usually reversible (but acute attack can occur in a pre-existing chronic pancreatitis) with raised pancreatic enzyme levels in blood and urine. It may be first attack or relapsing attacks with an apparently normal gland in between. Biliary tract disease and alcoholism are the commonest cause of pancreatitis.
Methods: It was an observational study at Surat municipal institute of medical education and research (SMIMER), Department of Surgery. In present study authors used BISAP score, RANSON'S score and APACHE II score to evaluate the severity and mortality in cases of pancreatitis. In present study authors have compare all the scoring system on the basis of CT scan findings. In present study authors have included all patients above age of 18 years. Patient below 18 years of age, acute on chronic pancreatitis and hereditary pancreatitis were not included.
Results: In this retrospective study, we found that incidence of colorectal carcinoma is more between 40-60 years of age with male predominance; lymph node metastasis is more than metastasis in any other sites. CT scan can diagnose lymphatic metastasis and infiltration in surrounding tissue more accurately. Percentage of sphincter saving procedure were low in rectal malignancies in our study.
Conclusions: All three-scoring system assess the prognosis of the patient, but the prognosis assessed by APACHE II score is better, but for quick and easy assessment, BISAP score is good for prognosis because APACHE II score uses more parameters to assess the prognosis and BISAP score uses less parameters to assess the prognosis.

Keywords: APACHE II score, BISAP score, Pancreatitis, Ranson's score

INTRODUCTION

Acute pancreatitis is one of the most common disease of gastrointestinal tract, leading to tremendous emotional, physical and financial burden.[1-3] Acute pancreatitis is a common disease with high morbidity and mortality. Its incidence has been increased over the past decades and it is estimated in 38 per 100000 populations per year.[4] Mortality in acute pancreatitis may range from 1% to up to 26% in severe pancreatitis. Identification of patients at risk for mortality early in the course of acute pancreatitis is an important step in improving outcome. The management of acute pancreatitis is still a challenge facing the clinician.[5] Acute pancreatitis is an acute inflammation of the prior normal gland parenchyma which is usually reversible (but acute attack can occur in a pre-existing chronic pancreatitis) with raised pancreatic enzyme levels in blood and urine. It may be first attack or

relapsing attacks with an apparently normal gland in between. Biliary tract disease and alcoholism are the commonest cause of pancreatitis.[6,7] Other causes include medications, infections, trauma, metabolic disorders and surgery. In up to 30% of people with acute pancreatitis, the cause is unknown. To assess the severity and prognosis, various scoring system is used. These are: Ranson's score, APACHE II score and a simplified scoring system for early prediction of mortality was developed from a large cohort of patients with acute pancreatitis. This scoring system, referred to as the Bedside Index of Severity in Acute Pancreatitis B incorporates five clinical and laboratory parameters obtained within the first 24 hours of hospitalization.[8] Presence of three or more of these factors was associated with substantially increased risk for in-hospital mortality among patients with acute pancreatitis.[5] Compared with traditional scoring system, BISAP is more convenient to use with fewer items and is a simple and accurate method for early identification of patients at risk of in-hospital death.

METHODS

This study was conducted on patient presenting at General Surgery OPD, Surat Municipal Institute of Medical Education and Research (SMIMER). It was an observational type of study. Sample was collected from August 2015 to June 2017 according to inclusion criteria from indoor record case sheet. Sample size calculated by using open epi software considering the proportion of acute pancreatitis patient in department of general surgery at present institute as 4% (p), with 95% level of inference (Z alpha/2) with allowable error as 5% (L).

$$N= (Z \text{ alpha}/2)^2 pq/L^2 = (1.96)^2(0.44)\ (1-0.04)\ (0.05)^2$$

$$N=50$$

Authors have taken 2N number of cases, that is:100. Study population: all the patients presenting with complain of abdominal pain were further investigated and all the patients following the inclusion criteria were taken as study participants.

Inclusion criteria

- Age >18years.

Exclusion criteria

- Age <18years.
- Patient with acute on chronic pancreatitis.
- Hereditary pancreatitis.

Table 1: BISAP score parameters.

Particulars	Score 0	Score 1
Bun	<25	>25
Age	<60	>60
Pleural effusion	Absent	Present
Systemic inflammatory response syndrome		
Temperature	36-38	<36/>38
Pulse	<90	>90
Respiratory rate	<24	>24
WBC	<12000	>12000

Table 2: Ranson's score parameters.

Particulars	Score 0	Score 1
On admission		
Age	<55	>55
WBC	<16000	>16000
Blood glucose	<200	>200
LDH	<350	>350
AST	<250	>250

Table 3: Ranson's score parameters.

Particulars	Score 0	Score 1
Within 24 hours		
Bun	≤5	>5
PO$_2$	>60	≤60
S. calcium	>8	≤8
Base deficit	≤4	>4
Fluid requirement	≤6	>6
Haematocrit	≤10	>10

Table 4: APACHE II score parameters.

Particulars	0	1	2	3	4
Mean arterial pressure	70-109		110-129/ 50-69	130-159	>160/<49
Heart rate	70-109		110-139/ 55-69	140-179/ 40-54	>180/<39
Respiratory Rate	12-24	25-34/ 10-11	6-9	35-49	>50/<5
PO$_2$	>70	61-70		55-60	<55
S. sodium	130-149	150-154	155-159/ 120-129	160-179/ 111-119	>180/<110
S. potassium	3.5-5.4	5.5-5.9/ 3-3.4	2.5-2.9	6-6.9	>7/<2.5
S. creatinine	0.6-1.4		1.5-1.9	2-3.4	>3.5
Hematocrit	30-45.9	46-49.9	50-59.9/ 20-20.9		>60/<20
WBC	3-14.9	15-19.9	20-39.9/ 1-2.9		>40/<1

In present study authors have compare all the scoring system on the basis of CT scan findings.

RESULTS

In BISAP score, score ≥3 indicates severe pancreatitis. So according to BISAP score, as described in Table 5, there are 7 patient having severe pancreatitis. According to more detailed description in Table 6, 6 of them (score ≥3 i.e. severe pancreatitis) having necrotic pancreatitis and organ failure also.

Table 5: BISAP score: distribution of patients in present study.

Score	No. of patients
0	84
1	6
2	3
3	7
4	0

Table 6: BISAP score of the patient and severity of pancreatitis in patients.

BISAP score	Mild	Moderate	Severe	Necrotic	Organ failure	Mortality	Total
		Pancreatitis					
0	78	2	0	4	0	0	84
1	2	2	2	0	0	0	6
2	0	0	3	0	2	2	3
3	0	0	1	6	6	6	7
4	0	0	0	0	0	0	0
Total	80	4	6	10	-	-	100

All 6 patients having mortality also. While patients with score <3, only 2 having organ failure and mortality. So, if the score is ≥3, then prognosis worsens. So, out of 8 mortality, 6 patients have score ≥3. And 2 patients have score <3.

In Ranson score, score >3 indicates severe pancreatitis. So according to Ranson score, as described in Table 7, there are 4 patients having severe pancreatitis.

Table 7: Ranson score: distribution of patient in present study.

Score	No. of patients
0	61
1	29
2	4
3	2
>3	4

Table 8: Ranson's score of the patients and severity of pancreatitis in patients.

Ranson score	Mild	Moderate	Severe	Necrotic	Organ failure	Mortality	Total
		Pancreatitis					
0	60	1	0	0	0	0	61
1	20	3	0	6	0	0	29
2	0	0	2	2	2	2	4
3	0	0	0	2	2	2	2
>3	0	0	4	0	4	4	4
TOTAL	80	4	6	10	-	-	100

According to Table 8, all 4 patients with score>3 having organ failure and mortality. But there are also 4 patients who have score≤3 and also having organ failure and mortality. So, out of 8 mortality, 4 patients have score >3. And 4 patients have score≤3. In APACHE II score, score≥8 suggestive of severe pancreatitis. So according to APACHE II score, as described in Table 9, in present study, there are 8 patient having severe pancreatitis. According to Table 10, Half of them (patient with score ≥8) having severe pancreatitis and half of them (patient with score ≥8) having necrotic pancreatitis while all of them (patient with score ≥8) having organ failure and mortality.

These also correlate with present study because in present study also 8 patient die. So, out of 8 mortality, all patients have score ≥8.

As described in Table 11, BISAP score predict 1 severe pancreatitis out of 6, 6 necrotic pancreatitis out of 10 and predict 6 mortality out of 8.

Table 9: APACHE II score: distribution of patient in present study.

Score	No. of patients
0	88
<8	4
≥8	8

Table 10: APACHE II score of the patients and severity of pancreatitis in patients.

APACHE II score	Mild	Moderate	Severe	Necrotic	Organ failure	Mortality	Total
	Pancreatitis						
0	80	4	0	4	0	0	88
<8	0	0	2	2	0	0	4
≥8	0	0	4	4	8	8	8
Total	80	4	6	10	-	-	100

Table 11: Comparison of different scores to assess the severity and mortality in pancreatitis.

	Severe pancreatitis (total cases 6)	Necrotic pancreatitis (total cases 10)	Mortality (total mortality 8)
BISAP score≥3	1	6	6
Ranson score>3	4	0	4
APACHE II score≥8	4	4	8

While Ranson score predict 4 severe pancreatitis out of 6, 0 necrotic pancreatitis out of 10 and 4 mortality out of 8 mortality. APACHE II score predict 4 severe pancreatitis out of 6, 4 necrotic pancreatitis out of 10 and 8 mortality out of 8 mortality.

So, APACHE II score is accurate in assessing the mortality and severity in pancreatitis, but it requires more parameters for assessment. While BISAP score require less parameters for assessment but less accurate than APACHE II score in assessing severity and mortality. But BISAP score is better in assessment of necrotic pancreatitis and mortality than Ranson's score.

DISCUSSION

In present study, out of 100 cases mortality occur in 8 patients. Using different scoring system, authors can assess severity and prognosis of the disease. In BISAP score, out of these 8 mortality cases, 6 were predicted as severe pancreatitis. In Ranson score, out of 8 mortality cases, 4 were predicted as severe pancreatitis.

In APACHE II score, all 8 cases were predicted as severe pancreatitis. So, all scores predict the severity but the prediction by apache II is better.

But APACHE II score require more parameters for assessment and it also require more laboratory parameters for assessment. While BISAP score require less

parameters, which are more clinical than the laboratory parameters. So, assessment by BISAP score is relatively easier than the assessment by APACHE II score. On other side the accuracy of the assessment is little bit low by BISAP score than APACHE II score.

In a study done by Pednekar J et al, bedside index of severity in acute pancreatitis score for predicting prognosis in acute pancreatitis found that there were 8 patients in the study who had a BISAP score of 3 or 4 out of which everyone died. Out of 79 patient who had a score of 0, only 2 expired. This proves statistically significant correlation between BISAP score and outcome.[9]

In a study done by Gao W et al, the value of BISAP score for predicting mortality and severity in acute pancreatitis: a systematic review and meta-analysis found that nine cohorts from 8 studies were identified for the BISAP score at a cut-off of 3. Patient with a BISAP score 3 significantly had a higher likelihood of mortality.[10]

Wu BU et al, in their study the early prediction of mortality in acute pancreatitis: a large population-based study found that in the derivation cohort, there were 17922 cases of acute pancreatitis identified from 212 hospitals. Median age was 53 years, and 50.5% were men. In the validation cohort there were 18256 cases of acute pancreatitis identified from 177 hospitals. Median age was 53 years, and 49.4% were men.[8]

Table 12: Comparison of present study with other study.

Study	Sensitivity	Specificity	PPV	NPV
Korean study[11]	61	72	25	92
Indian study[12]	81	83	64	92
Present study	75	98	85	97

In Table 12, there is comparison of present study with one Korean study and one Indian study regarding the specificity, sensitivity, positive predictive value and negative predictive value of BISAP score in assessing severity and mortality in pancreatitis.

CONCLUSION

Out of these BISAP, Ranson's and APACHE II score, the mortality was among the patients having severe pancreatitis were 75%, 50% and 100% respectively. This indicates that the mortality can be measured by all the three scores, but APACHE II score can predict better than other scores.

All three-scoring system assess the prognosis of the patient, but the prognosis assessed by APACHE II score is better. As APACHE II has predicted mortality in 8 patient and all 8 patients were expired in present study. But APACHE II criteria require more parameters to assess the prognosis, instead BISAP score require less parameters to assess the prognosis. So, for quick and easy assessment, BISAP score is good for prognosis. In APACHE II score, there is more positive predictive value.

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COMMENTS:
1. Provide different titles for Table 2 and 3.
2. Reference no. 5 and 9 are same; kindly provide different references.