A Comparative Study of Clinical and Radiological Scoring Systems in the Early Prediction of Severity in Acute Pancreatitis

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Abstract:
Introduction: Acute pancreatitis is commonly caused by alcoholism and gallstone in our part of the world. The presentation varies from mild abdomen pain to septic shock with multi organ failure. Since there is no specific treatment for acute pancreatitis it is very important to predict its severity at the time of onset itself which may caution the medical professionals to give intensive care to the particular patient.

Aims and objectives: Aim of our study is to compare two different scoring systems namely BISAP scoring and MCTSI scoring in acute pancreatitis and to conclude as to which one is cheaper and better in predicting the severity of the disease.

Materials and methods: A prospective study done at Government Mohan Kumaramangalam Medical College Hospital for a time period of 1 year from November 2016 to November 2017 in 100 patients.

Inclusion criteria- All patients diagnosed as acute pancreatitis and satisfying at least 2 of the following three criteria
1. Epigastric pain with or without radiation to back
2. Serum amylase or lipase elevated at least 3 times the normal
3. Characteristic finding of Acute Pancreatitis on abdominal CT.

Exclusion criteria: Patients with pre existing CKD which may be associated with elevated BUN.

Conclusion: Individual response to pancreatic injury is highly variable. To classify patients with acute pancreatitis in to mild and severe groups BISAP is a reliable prognostic tool. It is easy to estimate also. All patients with BISAP scoring > 2 must undergo CT scan.

Keywords – Acute Pancreatitis, BISAP, CT SCAN, Epigastric pain, MCTS1.

I. Introduction:
Acute pancreatitis is an acute inflammatory process involving pancreas and peri pancreatic tissue with a range of severity as well as local and systemic complications. Usually its clinical course is mild and resolves without much of sequelae. However in certain groups 10-20% MODS may develop in whom the mortality rates may reach about 30%. Clinical biomarkers play a vital role in triage, management and in predicting the development of life threatening complications.

Patient with severe disease benefited from early detection of organ failure, antibiotic administration and treatment for the etiological factors. 80% of cases are due to alcohol or gallstones.

Severe acute pancreatitis is defined by reverse Atlanta classification of 2012 by the presence of organ failure that persists more than 48 hours. Organ failure is determined by cardiovascular, renal and respiratory systems. Different scoring systems used to predict the severity of pancreatitis include APACHE II score with 14 criteria and the Ranson’s score with 11 criteria. MOSS score with 12 criteria and BISAP score with 5 criteria are the new scoring systems. Baltazar described CT severity index which was modified into MCTSI – Modified CT Severity Index by Silverman et al in 2004. CTSI is calculated using CT scan features of acute pancreatitis and pancreatic necrosis. BISAP score is a 5 point bedside score. It is inexpensive and easy to perform. It uses BUN, mental status, SIRS, age, pleural effusion.

II. Aims And Objectives
To compare BISAP (BUN > 25 mg/dl, Impaired mental status, SIRS, Age > 60 and pleural effusion) with Modified CT severity index in predicting
1. Severity
2. Pancreatic necrosis

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III. Materials And Methods

The study was conducted in 100 cases of acute pancreatitis in Government Mohan Kumaramangalam Medical College Hospital admitted in the department of general surgery.

INCLUSION CRITERIA

All patients diagnosed as acute pancreatitis and satisfying at least 2 of the following three criteria
1. Epigastric pain with or without radiation to back
2. Serum amylase or lipase elevated at least 3 times the normal
3. Characteristic finding of Acute Pancreatitis on abdominal CT.

EXCLUSION CRITERIA

Patients with pre-existing CKD which may be associated with elevated BUN.

BISAP score is calculated for all cases using data collected within first 24 hours. A score of 1 is given for each criterion with a maximum score of 5.

CRITERIA FOR BISAP SCORE

1. BUN > 25 mg/dl
2. Abnormal mental status with GCS < 15
3. Evidence of SIRS
4. Age > 60 yrs
5. Presence of pleural effusion in x-rays

MODIFIED CT SEVERITY INDEX

It is calculated from CECT within 48 hours.
1. Normal pancreas - 0
2. Intrinsic pancreas abnormality with peripancreatic fat stranding - 2
3. Pancreatic fluid collection - 4
4. Pancreatic necrosis
   a. Absent - 0
   b. <30% - 2
   c. >=30% - 2
5. Extra pancreatic complications - 2

Patients were closely monitored for pancreatic necrosis and organ failure. Based on the organ failure patients were classified into mild and severe acute pancreatitis. Organ failure is defined by
- Shock - systolic BP < 90 mmHg
- Pulmonary insufficiency P02 < 60 mmHg at room air or need of mechanical ventilator.
- Renal failure serum creatinine > 2 mg/dl after rehydration or hemodialysis.

STATISTICAL ANALYSIS

The data collected were analysed with SPSS software version 21.0 and a value of < 0.05 was considered significant.

IV. Results

Out of 100 patients 41% were in the third decade of age. 97% were males. The most common etiology for acute pancreatitis was alcohol contributing 46% followed by gallstones at 27%. Clinically guarding was present in 88% patients. Length of hospital stay was directly related to BISAP score and MCTSI score for discharged patients. Mean serum amylase level for the patients was 563 IU. 29 cases fulfilled the criteria for acute severe pancreatitis. This was taken as the standard to compare BISAP score and MCTSI.

<table>
<thead>
<tr>
<th>BISAP</th>
<th>NO. OF PATIENTS</th>
<th>PERCENTAGE</th>
<th>SAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>40</td>
<td>40</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>20</td>
<td>20</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>16</td>
<td>16</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>15</td>
<td>15</td>
<td>11</td>
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<tr>
<td>4</td>
<td>9</td>
<td>9</td>
<td>8</td>
</tr>
</tbody>
</table>

Table 1 BISAP SCORE
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![BISAP Score Stratification](image1)

**FIG BISAP SCORE STRATIFICATION**

### TABLE 2 MODIFIED CT SEVERITY INDEX

<table>
<thead>
<tr>
<th>MCTSI SCORE</th>
<th>NO OF PATIENTS</th>
<th>PERCENTAGE</th>
<th>SAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>31</td>
<td>31</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>38</td>
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<tr>
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<td>15</td>
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<tr>
<td>3</td>
<td>11</td>
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<td>7</td>
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<tr>
<td>4</td>
<td>5</td>
<td>10</td>
<td>5</td>
</tr>
</tbody>
</table>

![MCTSI](image2)

**FIG 2 MCTSI**
BISAP score is an ideal tool for predicting severity of acute pancreatitis. Value for BISAP is very high. All patients with BISAP scoring > 2 must undergo CT scan.

In conclusion, to mild and severe groups BISAP is a reliable prognostic tool. It is easy to estimate also negative predictive value for BISAP is very high. All patients with BISAP scoring > 2 must undergo CT scan. In conclusion BISAP score is an ideal tool for predicting severity of acute pancreatitis.

TABLE 3 PREDICTION OF SEVERITY OF DISEASE WITH BISAP SCORE

<table>
<thead>
<tr>
<th>BISAP Score</th>
<th>Severe</th>
<th>Mild</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;=3</td>
<td>19</td>
<td>5</td>
</tr>
<tr>
<td>&lt;3</td>
<td>10</td>
<td>66</td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>71</td>
</tr>
</tbody>
</table>

TABLE 4 PREDICTION OF SEVERITY WITH MCTSI

<table>
<thead>
<tr>
<th>MCTSI</th>
<th>Severe</th>
<th>Mild</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;=4</td>
<td>20</td>
<td>11</td>
</tr>
<tr>
<td>&lt;4</td>
<td>9</td>
<td>60</td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>71</td>
</tr>
</tbody>
</table>

TABLE 5 COMPARISON OF BISAP AND MCTSI IN PREDICTING SEVERITY

<table>
<thead>
<tr>
<th>Scoring System</th>
<th>BISAP</th>
<th>MCTSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>65.52</td>
<td>68.97</td>
</tr>
<tr>
<td>Specificity</td>
<td>92.96</td>
<td>84.51</td>
</tr>
<tr>
<td>Positive Predictive Value</td>
<td>79.17</td>
<td>64.52</td>
</tr>
<tr>
<td>Negative Predictive Value</td>
<td>86.84</td>
<td>86.96</td>
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</table>

TABLE 6 COMPARISON OF BISAP AND MCTSI IN PREDICTING NECROSIS

<table>
<thead>
<tr>
<th>Scoring System</th>
<th>BISAP</th>
<th>MCTSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>85.31</td>
<td>100</td>
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<tr>
<td>Specificity</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td>Positive Predictive Value</td>
<td>66.67</td>
<td>83.75</td>
</tr>
<tr>
<td>Negative Predictive Value</td>
<td>90</td>
<td>100</td>
</tr>
<tr>
<td>Odds Ratio</td>
<td>3.96</td>
<td>23</td>
</tr>
</tbody>
</table>

V. Discussion

Acute pancreatitis is a condition with high incidence of severity and mortality associated with it. Therefore determining the severity of the disease of utmost importance. In this study we had 97% males. Alcohol was the commonest cause. 29% developed acute severe pancreatitis, the in-hospital mortality rate was 8%. All the 8 patients who died had BISAP score > 3 and MCTSI > 4. Singh et al studied 397 patients in Harvard medical school. They observed that patients with BISAP score >= 3 were 4 times more likely to develop pancreatic necrosis than those with score < 3. MCTSI >= 4 were 18 times more likely to develop pancreatic necrosis. Our study also shows that MCTSI predicts pancreatic necrosis better than BISAP. Also patients with BISAP > 3 had thirty eight times more chance of ending up in death compared to those with less scores.

VI. Conclusion

Individual response to pancreatic injury is highly variable. To classify patients with acute pancreatitis into mild and severe groups BISAP is a reliable prognostic tool. It is easy to estimate also negative predictive value for BISAP is very high. All patients with BISAP scoring > 2 must undergo CT scan. In conclusion BISAP score is an ideal tool for predicting severity of acute pancreatitis.

References

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