A Comparative Study of Ranson’s Criteria and APACHE II Scoring System in Prediction of Severity in the Patients of Acute Pancreatitis

Ranveer P. Singh¹, Anil Negi², Sudesh K. Sagar²

ABSTRACT

Introduction: Acute pancreatitis (AP) is an inflammatory process due to auto-digestion of the gland by pancreatic digestive enzymes, leading to impairment of function or any morphologic changes. It can re-occur intermittently, contributing to ongoing insult, referred to as chronic pancreatitis (CP). Severe AP (SAP) develops in about 25.0% of patients with AP. The average mortality rate in SAP approaches 2.0–10.0%.

Materials and Methods: This prospective, comparative study was conducted in the Department of General Surgery in a Tertiary Care Hospital of North India from 01.02.2021 to 31.07.2022 in SRMSIMS, Bareilly, U.P. A total of 105 patients were evaluated using RANSON’S and APACHE criteria when presented with a clinical history of pain in abdomen. After due consent from the patients, the demographic details, clinical examination, laboratory and radiological Investigations, and final diagnosis were noted during the hospital stay.

Results: In our study, which was reported for acute pancreatitis sensitivity, specificity and accuracy of Ranson’s score, it was found that 75.0, 67.01 and 67.6% and that for APACHE II is 92.31, 82.28 and 84.76% sensitivity, specificity and accuracy of APACHE II score, respectively.

Conclusion: According to our study, APACHE II scoring was found to be more sensitive and specific than RANSON’S score to predict better prognosis in patients of acute pancreatitis.

Keywords: Ranson’s criteria, APACHE II scoring system, Acute pancreatitis.


Source of support: Nil

Conflict of interest: None

INTRODUCTION

Acute pancreatitis (AP) is an inflammatory process due to auto-digestion of the gland by pancreatic digestive enzymes, leading to impairment of function or any morphologic changes. It can re-occur intermittently, contributing to ongoing insult, referred to as chronic pancreatitis (CP). Severe AP (SAP) develops in about 25.0% of patients with AP. The average mortality rate in SAP approaches 2.0–10.0%. Very few diseases on the surgical floor have as vast a spectrum of clinical presentations as acute pancreatitis. Acute pancreatitis is considered the most terrible of all the calamities that occur in connection to the abdominal viscera. Sudden onset, severe agony accompanying it, and mortality attendant upon it render it the most formidable of catastrophes. Most cases of acute pancreatitis are mild.

The ideal scoring system should be simple, non-invasive, accurate and quantitative, with the criteria readily available at the time of diagnosis. The most well-known scoring systems are the Ranson score, APACHE II Scoring system (Acute Physiology and Chronic Health Evaluation II), Glasgow scales, SAPS II, MPM II, SOFA, MODS, LODS, MODS and POPL. In recent years, to predict the severity of AP, Balthazar described a computed tomography severity index (CTSI) as an alternative method.

MATERIALS AND METHODS

This prospective, comparative study was conducted in the Department of General Surgery in a Tertiary Care Hospital of North India from 01.02.2021 to 31.07.2022 in SRMSIMS, Bareilly, U.P after taking ethical clearance from the Institution to evaluate the patient records. All patients admitted to the surgery ward with acute pancreatitis were included in this study based on predefined inclusion and exclusion criteria. The study was done after obtaining clearance from the Institutional Ethical Committee. Detailed and informed written consent was obtained from them.

A total of 105 patients were evaluated using RANSON’S and APACHE criteria when presented with a clinical history of pain in the abdomen.

After due consent from the patients, the demographic details, clinical examination, laboratory and radiological investigations, and final diagnosis were noted during the hospital stay.
Microsoft Excel was used to create the database and produce graphs, while data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 23 for Windows.

**RESULTS**

Majority of patients were less than 44 years age (Table 1). On the basis of the clinical presentation of the patient, it was observed that tenderness was the most common presenting sign, which was found in the majority of the cases. Tenderness (94.3%) was followed by signs of dehydration (4.8%) and guarding (4.8%), which were seen in equal number of patients (Table 2).

When 105 patients were correlated between Ransons’s score at admission and APACHE II Score, it was found that Ranson and APACHE showed mild pancreatitis in 79 cases and 8 cases were severe according to APACHE and RANSON’s where there were 0 cases where the patient was diagnosed as mild on the basis of APACHE and severe according to RANSON. There were 18 such cases where the patient was diagnosed as severe on the basis of APACHE And was categorized as mild according to RANSON. Only 8 cases were found out to be following the severe category, according to ransons and APACHE II (Table 3).

When the patient underwent treatment, we found out that the complications which developed after acute pancreatitis was paralytic ileus in a majority of a patient (97.1%) followed by pancreatic necrosis (19.0%) and SIRS/MODS (10.5%) (Table 4).

When 105 patients were correlated between Ransons’s score at admission and APACHE II score, it was found that Ranson and APACHE showed mild pancreatitis in 79 cases and 8 cases were severe according to APACHE and Ranson’s whereas there were 0 cases where the patient was diagnosed as mild based on APACHE and severe according to RANSON. Only 8 cases were found out to be following the severe category, according to ransons and APACHE II (Table 5).

**DISCUSSION**

Acute pancreatitis is a relatively common condition that causes a significant risk of morbidity, and mortality.11

**Table 1:** Distribution of the studied patients on the basis of their age

<table>
<thead>
<tr>
<th>Age group (Years)</th>
<th>Frequency (n=105)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤44</td>
<td>66</td>
<td>62.9</td>
</tr>
<tr>
<td>45-54</td>
<td>39</td>
<td>37.1</td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>42.0 ± 9.41</td>
<td>(24–54 years)</td>
</tr>
</tbody>
</table>

Above table shows all cases were in the age group less than 44 years (62.9%) with mean age 42.0 ± 9.41 years

**Table 2: Abdominal examination**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency (n=105)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tenderness</td>
<td>99</td>
<td>94.3</td>
</tr>
<tr>
<td>Signs of dehydration</td>
<td>5</td>
<td>4.8</td>
</tr>
<tr>
<td>Guarding</td>
<td>5</td>
<td>4.8</td>
</tr>
<tr>
<td>Epigastric mass</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Retroperitoneal hemorrhage</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

**Table 3: Correlation between Ransons’s score at admission and APACHE II Score**

<table>
<thead>
<tr>
<th>Ransons’s Score</th>
<th>Total</th>
<th>APACHE II Score</th>
<th>Mild</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Count</td>
<td>97</td>
<td>8</td>
<td>105</td>
<td></td>
</tr>
<tr>
<td>p-value</td>
<td>&lt;0.001</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 4: Complications**

<table>
<thead>
<tr>
<th>Complications</th>
<th>Frequency (n=105)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pancreatic Necrosis</td>
<td>20</td>
<td>19.0</td>
</tr>
<tr>
<td>Paralytic ileus</td>
<td>102</td>
<td>97.1</td>
</tr>
<tr>
<td>Renal Failure</td>
<td>2</td>
<td>1.9</td>
</tr>
<tr>
<td>ARDS</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>SIRS/MODS</td>
<td>11</td>
<td>10.5</td>
</tr>
</tbody>
</table>

**Table 5: APACHE II v/s Ranson’s comparison**

<table>
<thead>
<tr>
<th>Complications</th>
<th>APACHE II (%)</th>
<th>RANSONS (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>92.31</td>
<td>75.0</td>
</tr>
<tr>
<td>Specificity</td>
<td>82.28</td>
<td>67.01</td>
</tr>
<tr>
<td>Positive predictive value</td>
<td>63.16</td>
<td>15.8</td>
</tr>
<tr>
<td>Negative predictive value</td>
<td>97.01</td>
<td>97.0</td>
</tr>
<tr>
<td>Accuracy</td>
<td>84.76</td>
<td>67.6</td>
</tr>
</tbody>
</table>

In the majority of the patients, acute pancreatitis has self-limiting course, but in approximately 20% of the patients, the disease could take a severe course with the development of pancreatic necrosis, and organ failure.12

In the present study, the majority of the studied cases were below 44 years of age (62.8%) with a mean age 42.0 ± 9.41 years and male predominance (50.5%) and females (49.5%). The duration of fever was between 3 to 5 days (55.2%) and vomiting for 1 to 2 days (70.5%). The most common clinical presentation were found to be tenderness (94.3%) followed by signs of dehydration (4.8%).

The study on 60 patients by Lankisch PG, and Burchard RS showed the maximum incidence of acute pancreatitis in age group of 31 to 40 years, which was comparable to our study.13

Most common clinical presentation was found to be tenderness (94.3%) followed by signs of dehydration (4.8%). In the study of Thandassery RB, Yadav TD, Dutta
Comparing Ranson’s & Apache II for Pancreatitis Severity

U, et al., the majority of a patient suffering from acute pancreatitis presented with sign of tenderness in the whole abdomen.14

Surati K, Suthar K, Shah J, et al. also reported the average hospital stay for 50 patients in their study was approximately 7 days.15

In the present study all the patients survived, and no one expired. Zhu AJ, Shi JS, Sun XJ also found the majority of patients survived in their study.16

Shaheen MA and Akhtar AJ reported 14.0% mortality, which was in contrast to our study. This may be because of the sample size as they have recruited 760 patients in their study,17 whereas compared to Barreto SG and Rodrigues J study, the overall mortality was 12.0 and 14.0%.18

Surati K, Suthar K, Shah J, et al. reported no mortality among 50 studied patients.15

In their study, Negi N, Mokta J, and Sharma B depict overall mortality as 5.7%.19 Out of 7 patients who died, 5 had severe pancreatitis and 2 had moderate pancreatitis which was in accordance the present study. It correlates with a study by Bota S, where the overall mortality rate was 4.6%.20

Modi JV and Sheth J reported that out of these BISAP, Ranson’s and APACHE II scores, the mortality among the patients with severe pancreatitis were 75.0, 50.0 and 100.0%, respectively.21

The incidence of acute severe pancreatitis in this study was 24.8% (26 cases), the APACHE II score showed 75.2% mild (79 cases) and Ranson score showed 76.6% (8 cases) mild and 92.4% (97 cases) severe. These results were probably due to APACHE II system having more variables and also including the chronic health status of the patient than the Ranson scoring system, resulting in APACHE II being more accurate in predicting the severity of pancreatitis (APACHE II score >8 was considered severe, and ranson score>3 was severe).

After studying all the 105 cases which were reported for acute pancreatitis sensitivity, specificity, and accuracy of Ranson’s score, it was found that 75.0, 67.01 and 67.6%.and that for APACHE II is 92.31, 82.28 and 84.76% sensitivity, specificity and accuracy of APACHE II score, respectively.

CONCLUSION

This study concluded that an APACHE II score of ≥8 on admission was a better predictor of complicated outcome and mortality rate in patients with acute pancreatitis than RANSON’S.

Most common complication in such patients was found to be paralytic ileus followed by pancreatic necrosis that, too in the majority of male population.

In our study, the most common presenting sign was abdominal tenderness followed by signs of dehydration and guarding in patients of acute pancreatitis. Scores below 8 predicted an uncomplicated outcome.

According to our study, APACHE II scoring was found to be more sensitive and specific than ranson’s score to predict better prognosis in patients of acute pancreatitis. Patients with APACHE II scores >8 benefitted from initial ICU care with aggressive therapy aimed at disease cure and dealing with the complications. Hence APACHE II scoring can be used as a reliable tool in predicting the severity and prognosis than ranson scoring in patients with acute pancreatitis as APACHE II system is the only system that takes into account all the major risk factors that influence outcome from disease, including the acute physiological derangements as well as patient ability to recover which may be diminished by advancing age or chronic disease.

REFERENCES

13. Lankisch PG, Burchard RS, Petersen M. Etiology and age have only a limited influence on the course of acute pancreatitis. Pancreas. 1996;13(4):329-473