

Original Research Article


A comparative study between APACHE II and Ranson scoring systems in predicting the severity of acute pancreatitis

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Abstract

Background: Acute pancreatitis is a common disease with wide clinical variation and its incidence is increasing. Acute pancreatitis may vary in severity, from mild self-limiting pancreatic inflammation to pancreatic necrosis with life-threatening sequelae. The severity of acute pancreatitis is linked to the presence of systemic organ dysfunctions and/or necrotizing pancreatitis.

Aim of the study: To compare the efficacy of Ranson scoring with APACHE II scoring system in predicting the severity of acute pancreatitis.

Materials and methods: The present study was a prospective study of 33 cases of Acute pancreatitis admitted in Rajiv Gandhi Government General Hospital, Chennai, during the study period of July 2014 to September 2014. 33 cases for the purpose of the study were selected on the basis of the nonprobability (purposive) sampling method. multiple clinical and laboratory variables of both Ranson and APACHE II scoring system and the final score of the patient from both the scoring systems are assessed to know their efficacy in predicting the severity of the disease (higher the score more severe the disease).

Results: Overall, 8(24.2%) patients suffered from severe pancreatitis and 25(75.7%) had mild acute pancreatitis of which all 8 had severe attack as per APACHE II score (>8) and only 3 of these were considered severe by Ranson score (>3). The systemic complications were a multiorgan failure in 2(6.06%), respiratory 1(3.03%) and renal 1(3.03%) all seen in patients with the severe score as per APACHE II.

Conclusion: The early diagnosis and precise scoring of disease severity are important goals in the initial evaluation and management of pancreatitis. Pancreatitis not only must be differentiated from a myriad of other potential diagnoses, but patients must also be stratified to identify those with severe disease and to guide appropriate therapy.

Key words

Acute physiology and chronic health evaluation (APACHE II), Ranson Scoring, Acute Pancreatitis, Multi-Organ Failure.

Introduction

Acute pancreatitis is a common disease with wide clinical variation and its incidence is increasing. The average mortality rate in severe acute pancreatitis approaches 2–10%. Severe acute pancreatitis (SAP) develops in about 25% of patients with acute pancreatitis. Severe acute pancreatitis is a two-phase systemic disease [1]. The first phase is characterized by extensive pancreatic inflammation and/or necrosis and is followed by a systemic inflammatory response syndrome (SIRS) that may lead to multiple organ dysfunction syndromes (MODS) within the first week. About 50% of deaths occur within the first week of the attack, mostly from MODS [2]. The formation of infected pancreatic necrosis or fluid collection occurs usually in the second week. The factors which cause death in most patients with acute pancreatitis seem to be related specifically to multiple organ dysfunction syndromes and these deaths account for 40–60% of in-hospital deaths in all age groups. The mortality figures associated with MODS vary between 30–100% [3]. Infection is not a feature of the early phase. Pro-inflammatory cytokines contribute to respiratory, renal, and hepatic failure. The “second or late phase” which starts 14 days after the onset of the disease, is marked by infection of the gland, necrosis and systemic complications causing a significant increase in mortality [4]. The association between increasing age and death from acute pancreatitis is well documented. Respiratory failure is the most common type of organ failure in acute pancreatitis [5]. According to the severity, acute pancreatitis is divided into mild acute pancreatitis (absence of organ failure and local or systemic complications, moderately severe acute

pancreatitis (no organ failure or transient organ failure less than 48 hours with or without local complications) and severe acute pancreatitis (persistent organ failure more than 48 hours that may involve one or multiple organs) [6].

Materials and methods

The present study was a prospective study of 33 cases of Acute pancreatitis admitted in Rajiv Gandhi Government General Hospital, Chennai, during the study period of July 2014 to September 2014. 33 cases for the purpose of the study were selected on the basis of the nonprobability (purposive) sampling method. Multiple clinical and laboratory variables of both Ranson and APACHE II scoring system and the final score of the patient from both the scoring systems were assessed to know their efficacy in predicting the severity of the disease (higher the score more severe the disease).

Inclusion criteria

- All patients diagnosed with acute pancreatitis based on the clinical suspicion and elevated serum amylase.

Exclusion criteria

- Hyperamylasemia due to other causes
- Chronic pancreatitis.
- Acute on chronic pancreatitis.
- A previously diagnosed case of acute pancreatitis

Method of collection of data

All patients diagnosed with acute pancreatitis based on the clinical suspicion and increased serum amylase levels admitted in Rajiv Gandhi Government General Hospital, Chennai were assessed with multiple clinical and laboratory

variables of both Ranson and APACHE II scoring system and the final score of the patient from both the scoring systems are assessed to know their efficacy in predicting the severity of the disease (higher the score more severe the disease). The sensitivity, specificity, positive predictive value and negative predictive value of Ranson and APACHE II scoring system in relation to the raised serum amylase level were evaluated and compared with standard published literature.

Results

Of the 33 patients, the age range was 28-60 years (mean-44 years), 20(60.6 %) were men and 13(39.39%) women. The causes of acute pancreatitis included biliary stone 14(42.4%), alcoholism 10(30.3%), idiopathic 9(27.2%), 6(18.1%) patients were chronic smokers and 8(24.2%) had at least one co-morbid disease. The common concomitant diseases were hypertension (37.5%), diabetes mellitus (25%), ischemic heart disease (5%). Overall, 8(24.2%) patients suffered from severe pancreatitis and 25(75.7%) had mild acute pancreatitis of which all 8 had severe attack as per APACHE II score (>8) and only 3 of these were considered severe by RANSON score (>3). The systemic complications were the multiorgan failure in 2(6.06%), respiratory 1(3.03%) and renal 1(3.03%) all seen in patients with the severe score as per APACHE II. No death occurred and mortality was nil. Local complications occurred in 2 patients (6.06%) and both had an acute fluid collection. All the complications were seen in patients with the severe score as per APACHE II and none as per Ranson score.

In our study, only 3 patients had a score of more than 3, suggesting that only 9.09 % of them were considered to be having severe pancreatitis as per Ranson's criteria (**Table – 1**).

In our study, 8 patients were diagnosed to have scored more than 8 of the 33 cases, suggesting that 24.24% had severe pancreatitis as per Apache II scoring criteria (**Table – 2**).

Table - 1: Ranson scoring system results.

| Score | Frequency | Percentage |
|--------------|-----------|------------|
| < 3 | 30 | 90.9% |
| 3 - 4 | 3 | 9.09% |
| 5 - 6 | Nil | - |
| > 6 | Nil | - |
| Total | 33 | 100% |

(Score >3 suggests severe pancreatitis)

Table - 2: APACHE II scoring system results.

| Score | Frequency | Percentage |
|--------------|-----------|------------|
| 0 – 5 | 24 | 72.7% |
| 6 – 10 | 6 | 18.18% |
| 11 - 15 | 3 | 9% |
| >15 | Nil | - |
| Total | 33 | 100% |

(Score > 8 suggest severe pancreatitis)

Discussion

The optimal management of acute pancreatitis includes accurate early prediction of the disease severity. The aims of this thesis were to investigate early severity classification, complications, and outcome in acute pancreatitis patients, with special regard to patients developing the severe form of the disease [7]. The results of the studies were: I) Two early risk factors for death were identified: increasing age and hypotension at admission. Deaths were to a high extent related to multiple organ dysfunction [8]. Early recurrence after biliary acute pancreatitis was common. II) A model for early prediction of severity in acute pancreatitis with artificial neural networks was developed, identifying 6 risk factors. Severe acute pancreatitis usually declares itself shortly after the onset of symptoms and delayed progression from mild to severe disease is uncommon. Assessment of the severity of acute pancreatitis is important for early identification of patients who may benefit from additional supportive and specific therapeutic procedures [9]. It is also important to standardize clinical data for comparison of results between centers. Ideal predicting criteria should, therefore, be simple, non-invasive, accurate and quantitative, and the assessment tests should be readily available at

the time of diagnosis. Amongst the multifactorial scoring systems, Ranson system is classical through the Apache II system appears to provide the best accuracy [10]. This study has demonstrated that the APACHE II scoring system is better than the Ranson system in predicting the severity of acute pancreatitis. The AUC of Apache II score was 0.717 and that of Ranson was 0.667, Sensitivity of APACHE II was 100% and that of Ranson 66.7%, Specificity of APACHE II was 80% and Ranson 86.7 %, PPV of APACHE II 62% and Ranson 33 %, NPV of APACHE II 100% and Ranson 96% respectively [11]. The incidence of acute severe pancreatitis in this study was 24.2% (8 cases), Apache II score showed 75.8% mild (23 cases) and 24.2% (8cases) severe pancreatitis and Ranson score showed 91.1% (30 cases) mild and 9.09% (3cases) severe [12]. These results were probably due to APACHE II system having more number of variables and also includes 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 [13, 14, 15].

Conclusion

The study included 33 patients (M:F = 20:13) with acute pancreatitis, peak incidence was in the fourth decade with alcohol accounting for 30.3% of the attacks while gall stones accounted for 40.4%. An APACHE II score of ≥ 10 on admission predicted a complicated outcome in patients with acute pancreatitis with a sensitivity of 100%, specificity of 80%, the positive predictive value of 62% and negative predictive value of 100%. Scores below 10 predicted an uncomplicated outcome. On admission, APACHE II score was a better predictor of systemic complications (sensitivity 100%) than Ranson score (sensitivity 66.7%). Patients with APACHE II scores >10 benefited 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.

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