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Scoring systems in acute pancreatitis: Which one to use in intensive care units?

Deven Juneja DNB*, Palepu B. Gopal MD, FRCA, Murthy Ravula

Department of Anesthesia and Critical Care Medicine, Global Hospital, Lakdi-ka-pul, Hyderabad–500004, India

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Abstract

Purpose: The aim of the study was to assess and compare the efficacy of various scoring systems in predicting the severity and outcome of patients with acute pancreatitis (AP) admitted in intensive care unit (ICU).

Methods: Prospective, single institution review of 55 consecutive AP patients admitted in ICU during a 2-year period. Disease severity scores and mortality predictions were calculated using the collected data in the first 48 hours of ICU admission for Ranson and Glasgow scores and in the first 24 hours for other scores.

Results: Forty-two patients (76.4%) developed severe pancreatitis. Intensive care unit and 30-day mortality was 18.2% and 27.3%, respectively. Use of mechanical ventilation (MV) was an independent predictor of outcome on multivariate analysis with lack of MV being protective (adjusted odds ratio, 0.003; 95% confidence interval [CI], 0.00001-0.67; $P = .04$). All scoring systems had comparable accuracy in predicting severity and 30-day mortality, but sequential organ failure assessment (SOFA) score had greater efficacy with its area under curve for predicting severity and 30-day mortality being 0.81 (95% CI, 0.69-0.92) and 0.93 (95% CI, 0.85-0.99), respectively. Sensitivity and specificity (SOFA score, >4) was 76.2% and 69.2%, respectively, for predicting severity, and sensitivity and specificity (SOFA score, >8) was 86.7% and 90%, respectively, for predicting 30-day mortality.

Conclusions: Use of MV is an independent predictor of outcome in AP patients admitted to ICU. Although all scoring systems had reliable accuracy in predicting severity and outcome, SOFA score performed better with additional advantages of easy applicability and timely assessment.

1. Introduction

Acute pancreatitis (AP) is a common disease with a varied outcome ranging from mild edematous to severe fulminant pancreatitis, with multiorgan failure and death. In spite of recent advances in management of AP, early prediction of severe complications still remains difficult. Although severe pancreatitis occurs in less than 30% of cases, it accounts for more than 90% of the mortality attributed to AP [1].

To avert the development of such complications and hence, an adverse outcome, it is imperative to identify the patients at risk within 24 hours of presentation [2]. For this purpose, a number of clinical prognostic scores, biochemical markers, and computed tomographic parameters have been defined and tested [3-14]. Although a number of prognostic

* Corresponding author. Tel.: +91 9818290380 (mobile); fax: +91 040 66462315.
E-mail address: devenjuneja@gmail.com (D. Juneja).

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scores including intensive care unit (ICU) specific scores (Acute Physiology and Chronic Health Assessment [APACHE] II [15] and III [16], and simplified acute physiology score [SAPS] II [17], and mortality probability models [MPM] II [18,19]), scores to identify organ failure (Sequential Organ Failure Assessment [SOFA] score [20], Logistic Organ Dysfunction System [LODS] [21], Multiple Organ Dysfunction Score [MODS] [22]), and scores specific to AP (Ranson [23], modified Glasgow [24], Pancreatitis Outcome Prediction [POP] [10]) have been tried to predict outcome in these patients, with varied success rates [3-11], the search for an ideal score is far from complete. In addition, most of these scores have been tested in studies having a mixed population of patients from general wards and ICU. Because of the presence of major differences related to patient demographics, disease severity, comorbidity, existing resources, and therapies applied between the ICU and other wards, there is a need to assess the use of these scores in ICU patients. Although a few studies have assessed the efficacy of these scoring systems in AP patients admitted to ICUs, these studies have compared only a few scores at a time [3-6,8,11]. Thus, the objective of this prospective review was to assess and compare the use of these clinical prognostic scoring systems for predicting severity and outcome in AP patients admitted to ICU.

2. Materials and methods

This prospective study was conducted in patients with AP admitted to the ICU of a tertiary care hospital between December 2006 and November 2008. Diagnosis of pancreatitis was based on clinical presentation (acute abdominal pain associated with nausea and vomiting), laboratory parameters (increase in serum amylase at least to 3 times normal), and radiographic evidence with ultrasonography or computed tomographic scan (inflamed edematous pancreas, cholelithiasis, choledocholithiasis, or biliary sludge). Patients with acute exacerbation of known chronic pancreatitis were excluded from the study.

Day 1 baseline patient characteristics, indication for ICU admission, and cause of pancreatitis were recorded. The severity of illness was assessed by the APACHE II, III, and SAPS II systems after the first 24 hours of ICU admission. Organ dysfunction was assessed using the SOFA, MODS, and LODS score. The predicted death rate was calculated based on the APACHE II, SAPS II, and LODS scores. Glasgow and Ranson score were calculated by obtaining data up to 48 hours after admission.

The diagnosis of biliary pancreatitis was based on the identification of gallstones by radiology. Alcohol-related disease was assumed if there was a clear history of alcohol consumption before the attack of pancreatitis and when no other identifiable factors could be identified. Postoperative and postendoscopic retrograde cholangiopancreatographic pancreatitis was diagnosed if the disease occurred within a week of the procedure. Pancreatitis was classified as idiopathic when an etiologic factor could not be identified.

The main outcomes measured in this study were severity and 30-day mortality. An outcome was defined as severe if it was associated with organ failure and/or local complications [25]. Organ failure was diagnosed according to the parameters included in Atlanta criteria [25] with presence of one or more of the following factors: shock (systolic blood pressure, <90 mm Hg), respiratory failure (Po_2, <60 mm Hg), and renal failure (creatinine levels, >2 mg/dL after rehydration). Local complications included the development of pancreatic necrosis, abscess, or pseudocyst. All patients were observed up to 30 days after discharge from ICU or less if death had occurred earlier. Nonsurvivors were defined as those who died either in ICU or within 30 days after discharge from ICU. Thirty-day mortality was defined as mortality during patient's ICU or hospital stay or within 30 days after hospital discharge.

During the ICU stay, use of inotropes, mechanical ventilation (MV), or renal replacement therapy (RRT) were recorded. Finally, the lengths of stay in the ICU as well as total hospital stay were also recorded. Complications were classified as local (pancreatic necrosis, pseudocysts, abscess, or fistula) and systemic (sepsis, and cardiovascular, respiratory, liver, or renal failure).

The patients were managed conservatively, unless a complication had arisen, as per standard ICU protocols, with respect to resuscitation with intravenous fluids, use of antimicrobials, if there were signs of infection (empiric on admission, and then guided by microbiologic results), inotropes (if mean arterial pressure was < 55 mm Hg, inspite of fluid resuscitation), need for RRT (if serum creatinine level was progressively increasing, with worsening of acidemia, with or without hyperkalemia), and MV (if there was impending respiratory failure). Enteral feeding through nasojejunal tube was preferred over parenteral feeding. Endoscopic retrograde cholangiopancreatography with sphincterotomy was performed, in cases of biliary pancreatitis, if the patient had severe pancreatitis or recurrent mild pancreatitis. Pancreatic necrosis, abscess, acute fluid collection, or pseudocyst were managed by either radiologically guided percutaneous fine-needle aspiration or surgery.

2.1. Statistical analysis

We used STATA version 9.0 (Stata Corp LP, College Station, Tex) for the statistical analysis. Potential factors associated with 30-day mortality were explored. We compared the means of continuous variables using Student *t* test and the medians using a K-sample test for equality of medians. Categorical variables were compared using χ^2 test or Fisher exact test as appropriate. Factors found significant in a univariate analysis were further explored in a multivariate model. A *P* value less than .05 was considered significant for the analysis. The ability of scores to discriminate severity of pancreatitis and 30-day mortality