



Original Article

New Atlanta Classification of acute pancreatitis in intensive care unit: Complications and prognosis[☆]



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ARTICLE INFO

Article history:

Received 26 September 2015

Received in revised form 4 January 2016

Accepted 6 January 2016

Available online 21 January 2016

Keywords:

Pancreatitis

Intensive care unit

Complications

Outcomes assessment

ABSTRACT

Background: The updated Atlanta Classification of acute pancreatitis (AP) in adults defined three levels of severity according to the presence of local and/or systemic complications and presence and length of organ failure. No study focused on complications and mortality of patients with moderately severe AP admitted to intensive care unit (ICU). The main aim of this study is to describe the complications developed and outcomes of these patients and compare them to those with severe AP.

Methods: Prospective, observational study. We included patients with acute moderately severe or severe AP admitted in a medical–surgical ICU during 5 years. We collected demographic data, admission criteria, pancreatitis etiology, severity of illness, presence of organ failure, local and systemic complications, ICU length of stay, and mortality. **Results:** Fifty-six patients were included: 12 with moderately severe AP and 44 with severe. All patients developed some kind of complications without differences on complications rate between moderately severe or severe AP. All the patients present non-infectious systemic complications, mainly acute respiratory failure and hemodynamic failure. 82.1% had an infectious complication, mainly non-pancreatic infection (66.7% on moderately severe AP vs. 79.5% on severe, $p = 0.0443$). None of the patients with moderately severe AP died during their intensive care unit stay vs. 29.5% with severe AP ($p = 0.049$).

Conclusions: Moderately severe AP has a high rate of complications with similar rates to patients with severe AP admitted to ICU. However, their ICU mortality remains very low, which supports the existence of this new group of pancreatitis according to their severity.

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1. Introduction

The estimated incidence of acute pancreatitis (AP) is about 15–40 episodes/100,000 inhabitants/year, with an increasing trend according recent studies [1–6]. Approximately 2.9% of patients with AP will require admission to the intensive care unit (ICU) due to development of severe complications [7].

The treatment of severe acute pancreatitis admitted to ICU has changed in recent years, evolving into a conservative manner [8–11]. Some studies have demonstrated that this change on treatment

guidelines is associated with lower mortality [6,7,12,13]; however, other studies report that mortality of these patients remains unchanged [2,14]. Mortality has been associated to more severe illness, early surgical treatment, infected necrosis, and increasing age [2,14–18].

In 2012, the Atlanta Classification of acute pancreatitis in adults (> 18 years) [19] was updated to include modern concepts of the disease, addressing areas of confusion, improving the clinical assessment of severity, standardized data report, assisting the objective evaluation of new treatments, and facilitating the communication among treating physicians and between institutions [20]. It has defined three levels of severity according to the presence of local or systemic complications, and the presence and length of organ failure: mild, moderately severe, and severe.

Some studies focused on complications and mortality of patients with severe AP admitted to ICU [12,14,15,21–25], showing that these patients have an elevated mortality and a high rate of systemic complications, especially infections and respiratory complications, requiring respiratory support in more than half of the patients [12,18,23].

None of these studies have classified severe AP according to the new Atlanta Classification [20]. Moreover, there are many uncertainties

[☆] Grant or other financial support used in the study: This work was not supported.

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about complications and mortality of patients with moderate AP admitted in ICU [23].

The main aim of this study is to describe the complications of patients with moderately severe acute pancreatitis, developed during their stay in the ICU according to the new Atlanta Classification [20]. In second place, to describe ICU mortality and compared with severe AP.

2. Material and methods

We conducted a prospective observational study in a 14-bed medical and surgical ICU in Spain, during 5 years (2010–2014). We included all patients consecutively admitted to the ICU diagnosed with moderately severe or severe acute pancreatitis according to the Atlanta revised classification of AP [20].

The diagnosis of AP was based on the presence of at least two of the following three criteria: acute onset abdominal pain consistent with acute pancreatitis (acute onset of a persistent, severe, epigastric pain often radiating to the back), elevation of serum amylase and/or lipase activity at least 3 times greater than the upper limit of normal, and an imaging method with characteristic findings of AP (abdominal ultrasound and/or contrast-enhanced computed tomography (CT)) [20].

The Atlanta revised classification of AP divided the severity of AP into three groups according to the presence of local or systemic complications and the presence and length of organ failure: a) mild, in which patients did not develop organ failure, no local or systemic complications; b) moderately severe, in which patients developed transient (resolves in less than 48 h of duration) organ failure or local or other systemic complications; and c) severe, in which patients developed persistent organ failure (persistent organ failure more than 48 h, local or systemic complications usually present) [20]. We used SOFA score > 3 as criteria of organ failure because this score is preferred in critical care patients [20].

We examine demographic data (sex, age), reason for ICU admission, etiology of AP, severity scores of illness (Acute Physiology and Chronic Health Evaluation (APACHE) II score [26] on admission, Ranson [27] scores 48 h from admission, Balthazar criteria for severity [28,29], daily Sequential Organ Failure Assessment (SOFA) score [30], Atlanta revised classification of AP [20]), presence of organ failure (defined as a score of 3 or 4 on SOFA score [30]), need for mechanical ventilation and renal replacement therapy, local, “other complications which required the evaluation by a surgeon” (defined as those pathologies that according to the judgment of the attending physician, when the clinical course or imaging guide to the presence of complications that require surgical treatment, who decides the need for surgery or conservative treatment) and systemic complications, ICU length of stay, and mortality during hospital and ICU stay.

APACHE II score [26] provides an objective assessment of severity of illness in critically ill patients: the highest score, the highest probability of mortality. Ranges from 0 to 71 points. It is made up of 3 components: 1) Acute Physiology Score, which is derived from 12 clinical variables that are obtained within 24 h after admission in the ICU, the worst recorded value is taken. 2) Age Adjustment, from 1 to 6 points, which they are added for patients older than 44 years old. 3) Chronic Health Evaluation, an additional adjustment is made for patients with severe and chronic organ failure involving the heart, lungs, kidneys, liver, and immune system.

Ranson criteria [27] are assessed both at admission and at 48 h: a) On admission: age: >55 years, white blood count: >16,000/mm³, blood glucose level: >11.0 mmol/L, lactate dehydrogenase: >350 IU/L, aspartate aminotransferase: >250 U/L. b) At 48 h: packed cell volume: decrease >10% from admission, blood urea nitrogen: increase >1.8 mmol/l from admission, calcium: <2 mmol/l, arterial partial pressure of oxygen: <60 mm Hg, base deficit: >4 mmol/l, fluid sequestration: >6 L. The more of the score, the higher the mortality.

Balthazar criteria for severity [28,29] is used in computer tomography for grading of acute pancreatitis, being 5 grades: a) normal pancreas, b) focal or diffuse pancreatic enlargement, c) pancreatic alterations

associated with peri-pancreatic inflammation, d) single fluid collection, e) 2 or more fluid collections poorly defined or presence of gas within the pancreas or within the peri-pancreatic inflammation.

SOFA score [30] is designed to evaluate the function of 6 major organ systems (cardiovascular, respiratory, renal, hepatic, central nervous system, and coagulation) over time. The score is obtained on the day of admission and each of the following days in ICU, using the most abnormal value for each variable in a 24-h period on each organ system, that are assigned a cut-off value from 0 (normal) to 4 (high degree of dysfunction/failure), with a maximum punctuation of 24.

The study was approved by the Institutional Ethics and Clinical Trials Committee Principe de Asturias University Hospital.

2.1. Statistical analysis

Normal distribution of variables was assessed using the Kolmogorov–Smirnov test. Quantitative variables with normal distribution are expressed as mean ± standard deviation, non-normal distribution variables are shown as median and interquartile ranges. Qualitative variables are shown as number and percentages.

Comparisons between patients according to severity of AP were based on the Student's t test, Mann–Whitney test, and chi-square test (Holm method were applied to adjust p value in case of multiple comparisons), for quantitative variables with normal distribution, continuous variables with non-normal distribution, and qualitative variables, respectively.

Level of statistical significance was set to p values less than 0.05 and results are expressed with their 95% confidence intervals.

Statistical analysis was performed using SPSS 18.0 software (SPSS Inc., Chicago, Illinois).

3. Results

During the study period, 57 patients with AP were admitted to our ICU, of them 44 (77.2%) patients developed severe AP during the ICU stay according to revised Atlanta criteria [20] and 12 (21.1%) patients had moderately severe AP; 1 (1.8%) patient had mild AP and were excluded from study. During this study, no patient was diagnosed of chronic pancreatitis.

The main reasons for admission were hemodynamic instability (37.5%) and acute renal dysfunction (28.6%). On 48.2% of cases, the AP had a gallstone etiology. Median of days between the onset of acute pancreatitis and admission to ICU were 2.0 days (1.0–5.0): 3.0 days (1.2–4.7) on moderately severe pancreatitis and 2.0 days (1.0–5.7) on severe (p = 0.6). Baseline characteristics are shown in Table 1.

In this study, 67.9% of the patients required mechanical ventilation; 5.2% with moderately severe AP and 94.7% with severe AP (p < 0.001). Renal replacement therapy (RRT) were required in 26.8% of the patients, all of them with severe AP (p = 0.024). Vasoactive support was needed in 67.9% of the patients, in less proportion on patients with moderately severe AP (16.7% vs. 81.8% with severe AP, p < 0.001). And 26.8% of the patients had intra-abdominal hypertension, although only 3.6% developed abdominal compartment syndrome; all of them had severe AP.

The incidence of multiple organ failure was lower (8.3%) and less severe in patients with moderately severe AP than in patients with severe AP (Table 2).

All the patients had some kind of complications, being the most frequent the non-infectious systemic complications. There were no differences on systemic complications and non-pancreatic infectious complications according to severity of AP, although local and “other complications which required the evaluation by a surgeon” were more frequent on severe AP (Table 3).

Infectious complications were detected in 82.1% of the patients, 28.3% of these patients had intra-abdominal infections (mainly abdominal abscess), 19.6% had extra-abdominal infections (mainly pneumonia), and 52.2% had a combination of the two.

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