Validation of the Determinant-based Classification and Revision of the Atlanta Classification Systems for Acute Pancreatitis

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BACKGROUND & AIMS: Two new classification systems for the severity of acute pancreatitis (AP) have been proposed, the determinant-based classification (DBC) and a revision of the Atlanta classification (RAC). Our aim was to validate and compare these classification systems.

METHODS: We analyzed data from adult patients with AP (543 episodes of AP in 459 patients) who were admitted to Hospital General Universitario de Alicante from December 2007–February 2013. Imaging results were reviewed, and the classification systems were validated and compared in terms of outcomes.

RESULTS: Pancreatic necrosis was present in 66 of the patients (12%), peripancreatic necrosis in 109 (20%), walled-off necrosis in 61 (11%), acute peripancreatic fluid collections in 98 (18%), and pseudocysts in 19 (4%). Transient and persistent organ failures were present in 31 patients (6%) and 21 patients (4%), respectively. Sixteen patients (3%) died. On the basis of the DBC, 386 (71%), 131 (24%), 23 (4%), and 3 (0.6%) patients were determined to have mild, moderate, severe, or critical AP, respectively. On the basis of the RAC, 363 patients (67%), 160 patients (30%), and 20 patients (4%) were determined to have mild, moderately severe, or severe AP, respectively. The different categories of severity for each classification system were associated with statistically significant and clinically relevant differences in length of hospital stay, need for admission to the intensive care unit, nutritional support, invasive treatment, and in-hospital mortality. In comparing similar categories between the classification systems, no significant differences were found.

CONCLUSION: The DBC and the RAC accurately classify the severity of AP in subgroups of patients. ClinicalTrials.gov, Number: NCT00855348.

Keywords: Pancreas; Inflammation; Management; Infection.

Acute pancreatitis (AP) is a heterogeneous disease, ranging from mild cases to patients with high morbidity or even mortality. To describe the complications and course of AP, definitions are needed regarding local and systemic complications as well as a general description of the severity of the disease. Without a widely accepted standardized classification, comparative studies and clinical investigation are not possible between different centers. The Marseille classification[1,2] and the Cambridge classification[3] were early attempts to describe AP, but confusion regarding definitions in AP continued until the Atlanta classification. In 1992 an international symposium was held in Atlanta. Forty multidisciplinary internationally recognized experts in AP proposed a clinically based (opposed to previous morphology based) classification.[4] Definitions were given regarding local (acute fluid collection, pancreatic necrosis, acute pseudocyst, pancreatic abscess) and systemic (shock, pulmonary insufficiency, renal failure, and gastrointestinal bleeding) complications.[4] Two categories of severity (mild and severe) were given (Table 1). The Atlanta classification was widely accepted, and in fact, the original publication is the most cited classic article in pancreatology.[5]

In the last decade, several authors have suggested the need for a revision of the Atlanta classification.[6–11] New concepts in local complications have been described (peripancreatic fat necrosis,[12–14] collections associated with pancreatic or peripancreatic necrosis[15,16]). The nature and subtypes of organ failure have been better

Table 1. Atlanta Classification, DBC, and RAC

Classification	Categories	Definition
Atlanta classification	Mild	No organ failure and no local complications
	Severe	Organ failure and/or local complications (pancreatic necrosis, abscess, or pseudocyst)
DBC	Mild	No (peri)pancreatic necrosis and no organ failure
	Moderate	Sterile (peri)pancreatic necrosis and/or transient organ failure
	Severe	Infected (peri)pancreatic necrosis or persistent organ failure
	Critical	Infected (peri)pancreatic necrosis and persistent organ failure
RAC	Mild	No organ failure and no local[a]/systemic complications[b]
	Moderately severe	Transient organ failure and/or local/systemic complications without persistent organ failure
	Severe	Persistent organ failure (single or multiple)

(Peri)pancreatic: peripancreatic fat necrosis and/or pancreatic necrosis; persistent organ failure: >48 h; transient organ failure: <48 h.
[a]Local complications: peripancreatic fluid collections, pancreatic and peripancreatic necrosis, pseudocyst, and walled-off necrosis.
[b]Systemic complications without persistent organ failure: exacerbation of preexisting comorbidity, such as coronary artery disease or chronic lung disease, precipitated by AP.

described because transient (<48 hours) and single (1 organ) organ failure have a much better prognosis than persistent (>48 hours)[11,17,18] or multiple organ failure.[9,11,19] Furthermore, the Atlanta classification system did not use a validated classification of organ failure. Mortality seems extremely high in the subgroup of patients associating organ failure and infected pancreatic necrosis.[20–23] Finally, it has been suggested that 2 categories of severity (mild and severe) may be inaccurate in describing subgroups of patients with different outcomes.[9,11,23] After 20 years from the Atlanta symposium, 2 new classifications have been very recently published, the determinant-based classification (DBC)[24] and the revision of the Atlanta classification (RAC)[25] (Table 1). Severity in DBC is stratified in 4 categories according to the presence or not of (1) pancreatic/peripancreatic necrosis, (2) infection of pancreatic/peripancreatic necrosis, and (3) transient/persistent organ failure (Table 1). RAC defines 3 categories according to (1) local and/or systemic complications and (2) transient/persistent organ failure (Table 1). These systems are based on published data but also on expert opinion to combine current knowledge and generate the different severity categories. Many publications come from referral centers, so referral biases are frequent (more severe cases, a higher proportion of late complications). Thus a validation of these classifications is needed to verify that (1) the different categories describe different subgroups of patients and (2) the new systems give more accurate information than the former Atlanta classification. Our aim was to validate and compare those classifications in a nonreferral consecutive cohort of patients with AP.

Methods

A post hoc analysis of a prospective cohort of patients (fluid therapy database[26]) was undertaken. The study was approved by the ethics committee of our center. The original purpose of the study was to investigate the relationship between fluid therapy and outcome.

Consecutive adult (≥18 years) patients with AP admitted in our center between December 2007 and February 2013 were included. This period corresponded to the episodes of AP available for analysis at the time we decided to perform the study and was not based on sample size calculation. Diagnosis of AP was defined by at least 2 of the following criteria: (1) amylase level increase up to 3 times higher than the upper limit of normal, (2) abdominal pain, and (3) imaging compatible with AP. We excluded from analysis patients with chronic pancreatitis diagnosed during hospital admission. Epidemiologic, clinical, and outcome variables were prospectively collected. An expert radiologist (S.G.) who was blinded for clinical outcomes retrospectively reviewed imaging (mainly computed tomography scans; magnetic resonance imaging is scarcely used in our center to study local complications) to describe the new local complications defined in both classifications. The radiologist had data about timing between imaging and presentation of disease to allow a correct classification of local complications (acute collections versus pseudocysts, acute necrotic collections versus walled-off pancreatic necrosis). Eighteen patients had peripancreatic acute fluid collections (n = 11) or acute necrotic collections (n = 7) but did not have follow-up imaging after 4 weeks of admission, so it was not possible to ascertain whether pseudocyst or walled-off necrosis was present (missing data). Thus, in the 1993 Atlanta classification 11 patients were not possible to classify as mild or severe. To avoid unnecessary radiation exposure,[27] only patients with predicted severe AP (Acute Physiology, Age, and Chronic Health Evaluation II score ≥8, C-reactive protein ≥150 mg/L at 48–72 hours, bedside index of severity in acute pancreatitis [BISAP] ≥3, presence of persistent systemic inflammatory response syndrome), or with clinical suspicion of local complications underwent computed tomography scan. Patients without criteria for cross-sectional imaging and mild course of disease were considered as not having local complications. We investigated the clinical outcome according to the different categories of Atlanta classification, DBC and RAC. Outcome variables were need for nutritional