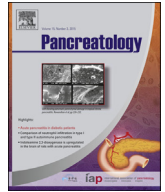




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Original article

Determinant-based classification and revision of the Atlanta classification, which one should we choose to categorize acute pancreatitis?

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ABSTRACT

Background: Two new systems of acute pancreatitis (AP) severity classification, namely, the determinant-based classification (DBC) and the revision of the Atlanta classification (RAC), were recently published. Information is lacking on the differences between the two systems.

Methods: We analyzed data from adult patients with AP (973 episodes), admitted to West China Hospital from July 2012 through March 2013. We validated and compared the DBC and RAC systems by investigating the discordances between the RAC and DBC.

Results: Using the RAC system, 66%, 27%, and 7% of the patients were categorized as mild, moderately severe, and severe, respectively. Using the DBC system, 83%, 7%, 7%, and 2% patients were determined to have mild, moderate, severe, and critical AP, respectively. The mortality and ICU admission rates were similar between the subgroups of the severe category under the RAC system. The severe and critical categories had similar mortality rates [35% (7/20) vs. 29% (20/70), $P = 0.59$] based on DBC. A subgroup of severe category of DBC (IPN and no persistent OF) had significantly lower mortality rate than the other two subgroups of severe category of DBC (SPN and persistent OF; persistent OF and no PN) [0% (0/18) vs. 29% (10/34) vs. 56% (10/18), $P < 0.05$].

Conclusion: Some subgroups of severe categories under the DBC system did not accurately reflected clinical outcomes. RAC seemed to be a better choice to guide the selection of patient populations for clinical research and provide a more accurate description of AP classification in the clinical setting than DBC.

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Acute pancreatitis (AP) is a common gastrointestinal disease with outcomes ranging in severity from mild to fatal [1,2]. Assessment of AP severity is important in clinical practice because patients with mild AP always have remarkably better outcomes than those with severe AP [3]. The widely-accepted Atlanta classification, which was proposed in 1992, was based on two categories of severity [4]. Definition of severe AP was based on clinical scoring system criteria or the presence of local or systemic complications. The Atlanta 1992 classification system was successfully applied in clinical studies for more than two decades. However, current understanding of the pathophysiology and subtypes of organ failure (OF) and local complications necessitated the revision of the Atlanta 1992 classification system [5–8].

Recently, two new classification systems have been published, the Determinant-Based Classification (DBC) and the Revision of the Atlanta Classification (RAC) [9,10]. Severity in DBC is stratified in four categories, whereas RAC includes three severity categories. RAC is based on local and/or systemic complications and transient/persistent OF. DBC mainly concerns the presence of (peri)pancreatic necrosis (PN), its status (sterile or infected) and the OF duration (transient or persistent). Both DBC and RAC systems characterized moderately severe acute pancreatitis as a “low mortality and high morbidity” category, which will enable physicians to confidently counsel patients about the low risk of mortality but requirement of long-term management [11,12].

These two classification systems seemed to show advances compared with the Atlanta 1992 classification, but choosing between the RAC and DBC systems is necessary because the terminology of AP requires standardization. Without a widely-accepted standardized classification, comparison among centers is impossible. The general differences between the two

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Table 1
Differences between RAC and DBC.

Differences	RAC	DBC
Number of categories	3	4
Status (sterile or infected) of PN	Not classified	Classified
Exacerbation of pre-existing co-morbidity	Moderately severe category	Not classified
Acute peripancreatic fluid collection or pseudocyst	Moderately severe category	Not classified
Definition of OF	Modified Marshall scoring system ≥ 2	SOFA score ≥ 2 , or the relevant threshold is breached

PN, pancreatic necrosis; OF, organ failure.

classifications are listed in [Table 1 \[13,14\]](#). We aimed to validate and compare RAC and DBC systems and provide additional information to clinicians and researchers by investigating the discordances between the RAC and DBC.

Methods

We used a prospective database on AP to check the categories of the different classification systems. During the study period (July 2012 to March 2013), adult patients diagnosed with AP and hospitalized at West China Hospital were enrolled in the database. AP diagnosis was defined by the occurrence of at least two of the following criteria: (i) amylase level increased up to three times higher than the upper limit of the normal level; (ii) abdominal pain suggestive of AP; and (iii) imaging results compatible with AP. This study was approved by the ethics review board of West China Hospital.

After admission, all components of the Acute Physiology and Chronic Health Examination (APACHE) II scoring system and the modified Marshall scoring system were recorded. Presence of OF was assessed daily for the duration of the hospital stay. All patients initially received non-interventional treatment. During the non-interventional treatment, contrast-enhanced computed tomography (CECT) was performed about 7 days after onset. CECT results were evaluated by a professional radiologist and experienced surgeons. When abdominal pain, severe clinical deterioration, or development of clinical signs of sepsis persisted or recurred, a second CECT was performed. Patients with confirmed or suspected infected necrosis were advised to undergo surgical

Table 2
Characteristics of patients with AP.

Characteristics	
Age, median (range), years	49 (18–82)
Male, No. (%)	593 (61)
Etiology, No. (%)	
Biliary	477 (49)
Alcohol abuse	126 (13)
Others	370 (38)
Body mass index on admission, median (range)	24 (18–34)
Transfers from other hospitals, No. (%)	291 (30)
Modified Marshall score at admission, median (range)	1 (0–12)
APACHE II score at admission, median (range)	6 (0–32)
Organ failure	
Multiple organ failure, No. (%)	35 (4)
Transient organ failure, No. (%)	20 (2)
Persistent organ failure, No. (%)	72 (7)
Computed tomography	
Pancreatic necrosis, No. (%)	92 (9)
Peripancreatic necrosis alone, No. (%)	39 (4)
Infected necrosis, No. (%)	38 (4)

APACHE indicates Acute Physiology and Chronic Health Examination.

intervention. Routine fine-needle aspiration was not performed on patients to confirm the PN status.

The two AP severity classification systems (RAC and DBC) were applied to this prospectively-enrolled cohort of patients. For each patient, the peak severity category during the hospitalization was selected for each classification system. We investigated the clinical outcome according to the different categories of the two classification systems. Outcome variables were as follows: intensive care unit (ICU) admission, interventional treatment (open pancreatic necrosectomy, retroperitoneal pancreatic necrosectomy, or primary percutaneous catheter drainage), length of ICU stay, length of hospital stay, and in-hospital mortality.

As described in [Table 1](#), the main differences between the two classifications are as follows: patients with infected pancreatic necrosis (IPN) and no persistent OF were defined as severe under the DBC system but moderate under the RAC system; and patients with IPN and persistent OF were defined as critical in DBC but severe in RAC. Furthermore, DBC fails to mention systemic or local complications other than PN. We also compared the differences of RAC and DBC by dividing different categories into subgroups. IPN And persistent OF represented the critical category of DBC. The severe category of RAC was divided into three subgroups (IPN And persistent OF group, SPN And persistent OF group, and persistent OF No PN group). The severe category of DBC was divided into three subgroups (IPN No persistent OF group, SPN And persistent OF group, persistent OF No PN group). The moderately severe category of RAC was divided into five groups, as follows: IPN No persistent OF group, SPN No persistent OF group, other local complications No OF group, systemic complications No OF group, and transient OF No PN group. The moderate category of DBC was divided into two groups (SPN No persistent OF group and transient OF No PN group). No complications No OF group represented the mild category of RAC. Mild category of DBC was divided into three groups (No complications No OF group, other local complications No OF group, and Systemic complications No OF group). We investigated the clinical outcomes of the discordances of subgroups in the different categories of RAC and DBC. The RAC definition of OF was used in all the subgroups.

The following data were collected from the prospective database: patient demographics, etiology, APACHE II score on admission, modified Marshall score on admission, computed tomography (CT) findings, presence of infectious complications, and organ failure. Continuous variables were summarized using median and range. The Mann–Whitney test was performed to determine differences. Categorical variables were described using frequencies and percentages. Proportions were compared by chi-square analysis, Fisher's exact test, or linear-by-linear association test. A two-sided $P < 0.05$ was considered statistically significant. All statistical analyses were performed using SPSS for Windows version 16.0.2 (SPSS, Chicago, IL, USA).

Results

This study included 973 episodes of AP from 867 patients (61% males; median age, 49 years old). Among the given number of participants, 291 cases were transferred from other centers. The most common AP etiology was biliary (447/973, 49%). A total of 131 cases were found to have (peri)PN, and 38 of these cases were confirmed as IPN. Of the total cases, 7% (72/973) developed persistent OF. The median length of hospital stay was 11 d and the overall mortality rate was 3% (27/973). Sixty cases received invasive intervention, 11 of which received primary percutaneous catheter drainage. Eighty-one cases (8%) were admitted to the ICU. A summary of data for demographics, etiologies, local, systemic complications, and clinical outcomes of the 973 cases is presented in [Table 2](#) and [Table 3](#).

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