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Ranson criteria for the diagnosis of acute pancreatitis, useful or in disuse?

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Abstract

Acute pancreatitis is one of the high-mortality gastrointestinal disorders that requires hospitalization, in this pathology there are various degrees of severity, and it is important to define and stratify them to identify dangerous patients who require aggressive treatment on admission, to identify patients worthy of referral for specialized care and to assign these patients to stratification into subgroups with persistent organ failure and local or systemic complications, the use of scales and criteria is implemented to determine the degree of severity of this and the possible management, among them we find the Ranson criteria, which contribute to the determination of severity, conduct to follow and possible complications, which is usually very useful for the patient's prognosis, but although it is true, the Ranson criteria are simple, easy to remember and very available in any laboratory to carry out ar tests, but they are also limited since they present greater specificity after the first 48 hours of the patient's admission and, in addition, they can be inconclusive because they vary according to the presence or not of a biliary pathology, thus increasing the parameters to be evaluated.

Keywords: Ranson Criteria; Pancreatitis; Acute Pancreatitis; Criteria for Pancreatitis

1. Introduction

Acute pancreatitis was first described in 1889 by Reginald Heber Fitz; this is a group of reversible lesions that contribute to the inflammation of the pancreas, whose severity varies from the clinical presentation of edema and fat necrosis, to necrosis of the parenchyma with significant hemorrhage. The incidence of the disease fluctuates according to the countries, and depends on the cause that generates it. In England, it is 5.4 per 100,000 inhabitants per year; in the United States it is 79.8 per 100,000; and in Spain, an incidence of between 300 and 500 cases per million inhabitants is calculated. The most important associated risk factors for pancreatitis in adults are the presentation of lithiasis and excessive alcohol consumption as a long-term factor. Other less common causes, but which are of importance, are the obstruction of the pancreatic duct system by periampullary tumors, the pancreas divisum and parasites. Drugs capable of producing acute pancreatitis have also been described, among which we can find: thiazide diuretics, azathioprine,

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estrogens, furosemide, sulfonamides, methyldopa, pentanamide and procainamide. The incidence of gallstone pancreatitis is higher among white women over 60 years of age, and much higher in patients with small stones [1,2].

Acute pancreatitis is known as one of the most common gastrointestinal disorders requiring immediate hospitalization. Its annual incidence is 13-45/100,000 people. Most are mild and self-limited, 30% are moderately severe, and 10% are severe. Organ failure is the main determinant of severity and cause of early death; Overall mortality is 3-6% and increases to 30% in severe acute pancreatitis, with secondary infections, including infected acute necrotizing pancreatitis and sepsis, responsible for more deaths in recent years [3].

As mentioned above, gallstones occupy the first cause (40%), more prevalent in women; Prolonged alcohol consumption is the second cause (30%), by lowering the trypsin activation threshold causing cell necrosis. More frequent in men, probably due to differences in intake or genetics. The causative mechanisms of acute or chronic pancreatitis include direct toxicity and immunological mechanisms; In addition, there are other important etiological factors such as hypertriglyceridemia, being the third cause (2-5%) in the absence of other etiological factors, with a risk of 1.5% and when its levels are >1000 mg/dL it rises to 20.2%. . The most associated dyslipidemias are type I, IV and V; Smoking is associated with 50% of cases of this pathology, active smokers have a 20% higher risk of suffering from pancreatic disease when compared to patients who report being ex-smokers. Due to the harmful and carcinogenic effects of its consumption and its high worldwide prevalence, it is considered the most important modifiable risk factor [4].

Mutations and polymorphisms of some genes are associated with acute and chronic pancreatitis, including those encoding cationic trypsinogen, serine protease inhibitor Kazal type 1, transmembrane conductance regulator in cystic fibrosis, chymotrypsin C, calcium-sensitive receptor, and claudin-2. ; they serve as cofactors interacting with other causes, for example the claudin-2 mutation in synergism with alcohol; We also have that idiopathic acute pancreatitis increases with age, with potential factors such as genetic polymorphisms, smoking and other environmental toxins, and the effects of associated comorbidities, for example obesity and DM2; Autoimmune causes occupy less than 1%. There are two types of these, type 1 that affects the pancreas, kidneys and salivary glands, in which there is obstructive jaundice with a slight elevation of Immunoglobulin G4; type 2 only has local involvement of the pancreas, occurs more frequently in young patients and does not raise Immunoglobulin G4; both respond to treatment with glucocorticoids. Penetrating abdominal traumas, particularly those of the spine, develop PA in 1% of cases, as do infectious causes such as cytomegalovirus, mumps virus, Epstein Barr virus, and parasites such as ascaris and taenia [5].

In acute pancreatitis we have different degrees of severity, it is important to define and stratify it to identify potentially severe patients who require aggressive treatment on admission, identify patients who merit referral for specialized care and stratify these patients into subgroups in the presence of persistent organ failure and local or systemic complications; according to the Atlanta classification they are [6].

Table 1 Atlanta classification of degrees of severity of acute pancreatitis

PA Mild	Absence of organ failure and local or systemic complications. It resolves during week 1, usually does not require imaging tests and mortality is very rare.
PA Moderately Severe	Presence of transient organ failure or local or systemic complications. It can resolve in the first 48 hours without intervention or require long specialized care (sterile PAN without FO), resolving in week 2 or 3, with morbidity and mortality <8%.
PA Severe	Presence of persistent organ failure and one or more local or systemic complications. Occurs early (36-50% mortality) or late

For the diagnosis of this pathology we have different diagnostic tools such as Ranson score, modified Glasgow score and acute physiology and chronic health assessment (APACHE) II are among many systems used to assess the severity of pancreatitis and have been more widely used in clinical practice since 1980. However, these methods have important limitations, for example, the Ranson score and modified Glasgow score contain data that are not routinely collected at the time of hospitalization and require 48 hours to complete. The Ranson score is accurate at the extreme scores (<3 predicts survival and >6 predicts death) but not at the intermediate scores [7].

2. Methodology

To carry out this article, a bibliographic search was carried out in databases such as Elsevier, Scielo, Medline, pubmed, ScienceDirect and Ovid, thus selecting original articles, case reports and bibliographic reviews from 2015 to 2022, in Spanish and English. , the articles used from previous years were considered due to their information and contribution to this document, likewise MeSH terms were used: ranson criteria, pancreatitis, acute pancreatitis and criteria for pancreatitis and Boolean operators and and or. Thus including all the documents that will deal with the Ranson criteria for the diagnosis of acute pancreatitis, the data found were between 10-40 records, thus using 25 articles to prepare this document.

3. Results

Ranson's criteria were created in 1974 with the description of 43 clinical and laboratory parameters; which in 1982 were modified consisting of 11 resulting parameters, of which 5 are evaluated both at the time of admission and 48 hours later.

We found that the presence of 3 or more criteria at 48 hours post admission stratifies pancreatitis as severe. It has a sensitivity of 75 to 87%, and a specificity of 68 to 77.5%, with a positive predictive value of 28.6% and a negative predictive value of 91% [8].

Table 2 Ranson criteria modified

Ranson (alcoholic)	Ranson (bile duct)
Admission	Admission
Age over 55 years old	Age over 70 years old
Leukocytes greater than 16000	Leukocytes greater than 18000
LDH greater than 350 U/l	LDH greater than 250 U/l
AST greater than 250 U/l	AST greater than 50 U/l
Glycemia greater than 200 mg/dl	Glycemia greater than 220 mg/dl
At 48 hrs	At 48 hrs
Hematocrit drop greater than 10%	Hematocrit drop greater than 10%
Increase in BUN greater than 5 mg/dl	Increase in BUN greater than 2 mg/dl
PO2 less than 60 mmHg	PO2 less than 60 mmHg
Calcium less than 8 mg/dl	Calcium less than 8 mg/dl
Base deficit greater than 4 mEq/l	Base deficit greater than 5 mEq/l
Greater fluid loss 6L	Greater fluid loss 4L

Fuente. Banday IA, Gatoo I, et al. 2015

These criteria have a sensitivity of 63%, specificity of 76%. When ≥ 3 points are obtained, it is classified as severe acute pancreatitis. Mortality varies by score from 0.9% (0-2 points), 16% (3-4 points), 40% (5-6 points), and 100% (7-8 points).

In the study carried out by Ambaraya Jeevangi B et al., they report that the use of classifications such as RANSON and APACHE II are adequate for the analysis of patients with pancreatitis, but while the RANSON scale cannot be used in the first 48 hours, but the APACHE scale allows the analysis adequately. Through tomographic analysis, it is possible to assess, graph and quantify the area of necrosis that occurs in the periphery of the pancreas, these lesions increase, increasing morbidity in all patients who suffer from it and in some cases mortality. For this reason, instruments have been created to assess severity, such as the tomographic severity index or also called Baltazar, a scale that allows analyzing the pancreatic anatomy, the amount of peripancreatic fluid and the area of necrosis.

It is documented that there are no clinical trials or formal reports in the literature on the matter, but based on the opinions of national experts we can say that Ranson's criteria are categorized as simple, easy to remember and easily available tests to perform at any time. Laboratory, these are uncertain, uncomfortable and confusing since they vary according to biliary or non-biliary etiology, and instead of evaluating 11 factors they become 22.

All scoring systems have their usefulness over time, but with the limitation that most are evaluated upon admission and then up to 48 hours after admission, leaving a blind period that is critical in the management and detection of complications. Patients with suggestions of acute pancreatitis. The APACHE II Score, on the other hand, has the advantage of being able to be calculated upon admission and at any time during the hospital stay according to the evolution and conditions of the patient, thus being very effective for the accuracy of the prediction of severity and prognosis in the short, medium and long term, and together with the TCC Severity Index, they are superior to the countless systems mentioned, since it also assesses extension and necrosis.

Ranson's severity criteria are the most widely used score worldwide (by clinicians, emergency physicians and surgeons), which was described by JH Ranson derived from a multivariate analysis of humoral parameters. I assess 11 criteria of which the first 5 are in the initial 24 hours of the clinical picture, which assess the acute inflammatory response and the other 6 during the subsequent 48 hours that determine the systemic effect of circulating enzymes and toxins. He also showed that patients with less than 3 criteria had a good prognosis and that mortality increased substantially when the number of criteria was within the range of 3 or more. This list of 11 numerical parameters was part of a small discussion. With the exception of the first criterion (patient age), these criteria are the result of a statistical analysis of 43 parameters collected retrospectively from three series that have a total of 450 patients with AP in common. This should be noted, however, that only 94 patients (21%) had irrefutably confirmed AP suggested by post-mortem examination, and 13 parameters retained in the essential statistical studies of 1977 were available in only 113 of the 300 patients studied (38%) [9].

One drawback to Ranson's criteria is that they can only be determined after 48 hours, a fact that limits their usefulness as a predictive system. Another limitation in a study with 25 patients is that the Ranson system could only be performed 11 times due to the impossibility of having LDH and GPT measurements on admission [10].

Therefore, the Ranson Criteria are useful when approaching the patient in the Emergency Room or upon admission, but the APACHE II Score is definitely the basis for constant clinical-laboratory monitoring combined with the CBT Severity Index to provide an exact predictive and prognostic value, detection of complications, presence of SIRS and OF, so its use is currently not as well evidenced.

A meta-analysis of 12 published series using the Ranson criteria and comprising 1,307 patients reported an overall sensitivity for predicting severe acute pancreatitis of 75%, a specificity of 77%, a PPV of 49%, and a NPV of 91%. 35 these data highlight a very high rate of false positives for the Ranson criteria; many patients with a Ranson score > 3 will not develop clinically severe pancreatitis.

According to De las Heras G. and Castro S., based on the Ranson criteria, they determined that most of the patients presented the mild form of the disease, representing 71.43% of the cases, while the severe form was 28, 57%, statistics that agree with the consulted literature.

In a study conducted by Gomez, M., et al. They compared the most used scales such as the Ranson and APACHE II, finding that in the sensitivity analysis that the post-test probability of the Ranson scale was 88% and that of the APACHE 95% [11,12].

Undoubtedly, mortality from severe acute pancreatitis has progressively decreased due to improvements in intensive care and management of acid-base and other disorders and infection. Today, the overall mortality rate from acute pancreatitis is around 2-3% vs 15% in the initial Ranson criteria report.

A greater number of Ranson criteria increases the probability of complications and mortality, so that patients who present six or more criteria have a mortality between 55 and 60% [13].

4. Discussion

In recent studies, 222 patients were analyzed, 60% were female, with an average age of 52 years, the tomography severity index was used, having a higher proportion of severe cases due to comorbidities of gastrointestinal bleeding, water kidney injury , infections and hypovolemic shock, when compared with the results of the Ranson scale, the

severity of the patients was reaffirmed, concluding that both instruments allow to adequately stage those affected by pancreatitis, results that when compared with those obtained in this investigation were similar, the average age was 39.03+16 years, the male gender was 38.6%, female 61.4%, by the Ranson criteria they were classified as mild in 93.8% and moderate in 6.3%, while with the tomographic index they were mild in the 58.5% and moderate in 31.8% [14].

A study conducted in Germany, 100 patients with suspected pancreatitis; therefore, they were analyzed by CT, using the Mortele tomographic index, which classified 48% of cases as mild, 37% moderate, and 15% severe. Hospital stay was 7.2 days, with a minimum of 0 to 35 days. 24% required surgical intervention, the related diagnoses were multiple organ failure in 15%, heart failure in 3%, respiratory failure in 5%, neurological disorders in 2% and renal in 3%, the rest had other diagnoses [15].

Among the four scoring systems, age contributed to scores (Ranson: +1 point for age >55; Glasgow: +1 point for age >55; APACHE II: +1 point for age 45-54, +2 points for ages between 55 and 64, + 3 points for ages between 65 and 74, + 4 points for ages ≥ 75; BISAP: + 1 point for ages > 60;). For severity prediction, Ranson for elderly patients is less useful than for younger patients. However, the Ranson scoring system was equally effective when applied to the assessment of pancreatic necrosis and death in both groups. Among the four systems, Ranson showed the best results for the prediction of pancreatic necrosis in elderly patients. When Ranson is used to predict PAS for the age group, the score should be ≥4, similar to the findings. For the youngest group, the score is ≥3, which is equal to the criterion [16].

In addition, it was reported that the use of scales is necessary for the classification of the severity of pancreatitis, such as the tomographic severity index of pancreatitis, APACHE, Ranson and Glasgow criteria, these have been validated and have a specificity of 70 to 90%, despite using totally different parameters, therefore, this research was done based on the tomographic index and Ranson's criteria [17]. Using Mortele's tomographic index and Ranson's criteria, they have proven to be efficient in assessing the severity of pancreatitis, reported by cabinet studies, which have the ability to observe the presence of liquid collection, reported in forms of cysts or pseudocysts. And it was also reported that the use of the Ranson scale is capable of providing a prognosis [18].

However, in one study, a poor agreement between the Ranson scale and those of APACHE II and Marshall was documented, while the agreement was slightly better between APACHE and Marshall [18].

5. Conclusion

Although it is true that the Ranson Criteria are very useful when approaching the patient in the emergency room or upon admission and present greater specificity after 48 hours, the APACHE II Score is definitely the basis for constant combined clinical-laboratory monitoring. with the TCC Severity Index to provide an exact predictive and prognostic value, detection of complications and likewise, we can say that the Ranson criteria, although they are simple, easy to remember and widely available in any laboratory to carry out tests, are inconclusive, uncomfortable and confusing because they vary according to biliary or non-biliary etiology, instead of evaluating 11 factors, they become 22 parameters to be evaluated, complicating their reading and analysis, however, their usefulness is emphasized, which indicates that for emergencies the Ranson criteria is usually useful, but for constant monitoring it is recommended to definitely use the APACHE II Score combined with the CBT Severity Index.

Compliance with ethical standards

Disclosure of conflict of interest

The authors declare no conflicts of interest.

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