

Balthazar Score and Neutrophil-Lymphocytes Ratio in Acute Pancreatitis

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ABSTRACT: Acute pancreatitis is a pathological entity that poses numerous diagnostic and treatment problems. Severe form is a real challenge for a physician because it has multiple obscure causes, as well as a complex pathophysiology. Thus, the diagnosis is difficult and the choice of the right time for surgical treatment is controversial, the treatment being more frequently nonspecific, supportive for the various affected systems and organs. On a group of 337 patients, laboratory and imaging investigations were performed to diagnose and determine the severity score of acute pancreatitis and the correlation level between the neutrophil-lymphocytes ratio values and the Balthazar score, as a valid assessment method for local and systemic inflammatory changes. The distribution's study of acute pancreatitis by gender according to etiology confirms the predominance of the acute ethanolic pancreatitis in male, but also the higher proportion (54%) of male pancreatitis (181 man vs. 156 women) with gender ratio male/female 1.16/1. The neutrophil-lymphocytes ratio mean value varied according with the Balthazar severity score, that got higher as acute pancreatitis got more advanced and with a certain cut-off value can be considered a simple indicator to determine the severity of acute pancreatitis.

KEYWORDS: Acute pancreatitis, neutrophil-lymphocytes ratio, Balthazar score.

Introduction

Acute pancreatitis (AP) is a pathological disease of the pancreatic gland that is characterized by a systemic inflammatory response.

Acute pancreatitis is one of the most important gastrointestinal disease throughout the world, with incidence and etiology that varies across all countries and regions.

The incidence of acute pancreatitis that was reported in 17 countries from Europe ranged from 4.6 to 100 per 100000 population, with the highest incidence in Eastern and Northern European countries [1].

Acute pancreatitis is the most common gastrointestinal diagnosis for hospitalization, with hospitalization costs that reach to approximately 2.6 billion dollars annually.

The most common risk factors associated are alcohol and gallstones, which are associated with a significant mortality rate from 1% to 5%.

In Western countries the incidence of acute pancreatitis has increased steadily [2].

The diagnosis was established based on the classical syndrome: abdominal pain, high pancreatic amylase serum levels (over 3 times the normal value) [3-5] and specific computer

tomography morphological and pathological changes [6-8].

Diagnosis of acute pancreatitis can be expensive due to imaging investigations [9-11].

Instead, the determination of the neutrophil-lymphocytes ratio (NLR) is simple and cheap parameter [12,13].

This is a reason why biological investigations can be an important factor in the evaluation of inflammatory process in a patient suspected of acute pancreatitis [14-16].

Early determination of severity is an important factor in the treatment of acute pancreatitis.

Approximately 20% of patients with AP will develop a severe form of AP with a prolonged clinical course, that often will result in pancreatic infection, parenchymal necrosis in the pancreas, chronic pancreatitis, bile obstruction [17,18].

Material and methods

A retrospective analysis was made for all patients diagnosed with acute pancreatitis, admitted in the Ist Surgical Department of the Emergency County Hospital of Craiova, between January 2013 and December 2017.

Relevant information was extracted from patients' clinical files, as well as from the

hospital's digital database (DB) after obtaining clearance from the Ethics Committee of the University of Medicine and Pharmacy of Craiova, Romania.

A positive diagnosis of acute pancreatitis was considered whenever the clinical elements of history, laboratory tests and laboratory radiological examinations concluded to the above-mentioned diagnosis. Multiparameter score used to assess the severity was represented in our study by the Balthazar score [19,20].

The data collected from the charts and the DB included: year of admission, gender, age, area of residence, Balthazar score, lymphocytes, neutrophils, comorbidities.

The following cases were excluded from our study: patients with anticoagulant or antiaggregant treatment, patients discharged at their own request, patient leaving the hospital without medical consent, and patients with known hematologic pathology.

The relevant data on the patients with a confirmed diagnosis of acute pancreatitis was included into a Microsoft Excel database. Statistical analysis of the results was performed using GraphPad Prism v8.0.

The statistical analysis took into consideration relevant data concerning of the demographics, complications, the degree of severity, comorbidities, the Balthazar score, neutrophil-lymphocytes ratio using independent samples t test.

We considered p-values of <0.05 to be statistically significant.

Results

In our study, acute pancreatitis accounted for 16% of patients (10,402) admitted in Ist Surgical Department of the Emergency County Hospital of Craiova in the 5 years retrospective study. In year 2013 from 1942 patients that were admitted, 91 (4,7%) were diagnosed with acute pancreatitis.

In 2014 have been admitted 2222 patients and 78 (3,5%) were diagnosed with acute pancreatitis. In year 2015 from 2486 patients that were admitted, 76 (3,1%) were diagnosed with acute pancreatitis. From 1810 patients that were admitted in 2016, 57 (3%) were diagnosed with acute pancreatitis. In year 2017 from 1942 patients that were admitted, 35 (1,9%) were diagnosed with acute pancreatitis.

Age distribution was in our study of 5 patients aged less than 30 years (1%, youngest patient 19 years of age, female), 29 patients aged

30-39 years (9%), 50 patients with ages aged between 40 and 49 (15%), 65 patients aged 50 to 59 (19%), 68 patients aged 60 to 69 (20%), 74 patients aged between 70 and 79 years (22%), 46 patients over 80 years old (14%, the eldest patient 98 years of age, male, who later died during admission).

Thus, a maximum number of patients in the age range of 70-79 years (74 patients) was observed, followed by the interval of 60-69 years (68 patients)

The disease has no age limit, but according to the literature the highest incidence is seen in decades 6 and 7, which is also confirmed by our study, which shows the average onset of acute pancreatitis of 61.88 years.

The average age of male patients was 60.03 years, the youngest patient was 22 years old, and the eldest was 98 years old.

The average age of female patients was 64.01 years, the youngest patient was 19 years old, and the eldest was 93 years old.

It is noticed that in male patients the disease started earlier by one and a half years compared to the average age of the study group and by 4 years compared to female.

The distribution of acute pancreatitis by gender was 1.16/1 male/female, 54% patients being males (181 males vs. 156 females).

The incidence of rural patients was slightly higher 171 compared to 166 in favor of the rural environment than urban.

The percentage was only 51% for the rural area compared to the urban environment of 49%, and it cannot claim a very high incidence, with large differences between rural and urban areas.

This incidence has a rural/urban average of only 1.03 rural patient per 1 urban patient.

The Balthazar A, B, and C grades clinically reflecting an acute mild form of pancreatitis represented 19% (55 Balthazar A patients), 24% (70 Balthazar B patients) and 22% (65 Balthazar C patients) of cases, while grade D and E indicating severe acute pancreatitis consisted of 15% (45 Balthazar D patients) and 20% (58 Balthazar E patients) of cases, respectively.

Concerning relevant comorbidities, the most common pathology was the cardiovascular disease, affecting 35% of patients, followed by diabetes, affecting 15%, gastrointestinal cancer, pancreatic fistula.

The most frequently encountered cardiovascular disease was hypertension, followed by atrial fibrillation and chronic heart failure.

Patients with Balthazar A acute pancreatitis had a NLR mean of 6.06 and standard deviation (SD) 4.79 compared with patients with Balthazar B acute pancreatitis had a NLR mean 6.38 and SD 7.23.

However, the difference between NLR values in Balthazar A and Balthazar B group was statistically significant (p=0.002).

NLR mean for patients with Balthazar C acute pancreatitis was 8.65 with SD 7.78, while patients with Balthazar B acute pancreatitis had a NLR mean 6.38 and SD 7.23.

The difference between NLR values in Balthazar B and Balthazar C group displayed no statistical significance (p=0.552).

NLR mean for patients with Balthazar D acute pancreatitis was 9.27 with SD 9.56 and NLR mean for patients with Balthazar C acute pancreatitis was 8.65 with SD 7.78.

The difference between NLR values in Balthazar C and Balthazar D group was not significant (p=0.1).

The NLR mean for patients with Balthazar E acute pancreatitis was 10.33 with SD 8.95, compared with NLR mean for patients with Balthazar D acute pancreatitis was 9.27 with SD 9.56.

There was no statistical difference between NLR values in Balthazar D and Balthazar E groups (p=0.6); (Table 1).

Table 1. NLR in relation to Balthazar score

NLR	Balthazar A	Balthazar B	Balthazar C	Balthazar D	Balthazar E
Patient No	55	70	62	49	58
Arithmetic mean	6,0637	6,3877	8,6514	9,2775	10,3334
95% CI for the mean	4,7683 to 7,3591	4,6628 to 8,1126	6,6744 to 10,6284	6,5298 to 12,0253	7,9800 to 12,6867
Variance	22,9620	52,3321	60,6058	91,5143	80,1060
Standard deviation	4,7919	7,2341	7,7850	9,5663	8,9502
Standard error of the mean	0,6461	0,8646	0,9887	1,3666	1,1752

The NLR mean value varied proportionally with the extension of the local inflammation process, as acute pancreatitis progressed in according with the Balthazar severity score, the

NLR value increased, so the highest value was at the Balthazar score E and the smallest value for Balthazar score A (Fig.1)

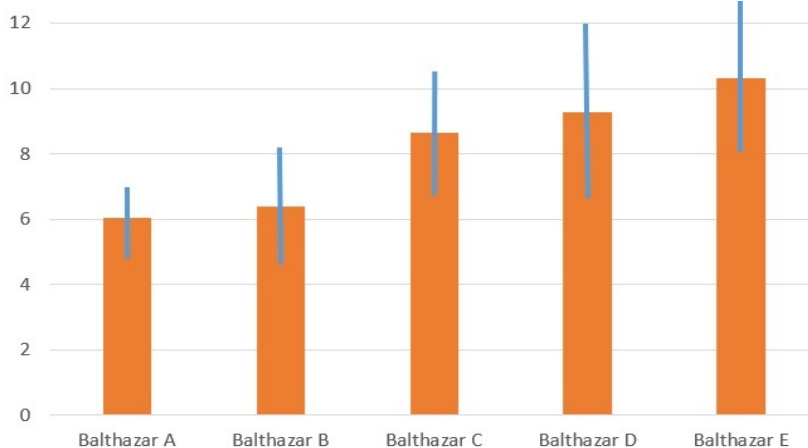


Fig. 1. NLR Balthazar A vs. B vs. C vs. D vs. E

The NLR mean displayed higher values in case of severe form of acute pancreatitis compared with mild acute pancreatitis (9.80 vs. 7.03, p <0,001); (Table 2).

Table 2. NLR Mild vs Severe Acute Pancreatitis

Severity score	NLR Mean	No	Std. Deviation
Mild acute pancreatitis	7,034	187	6,603
Severe acute pancreatitis	9,805	107	9,258

Discussion

In our 5-year retrospective study, acute pancreatitis accounted for 16% (337) of all hospitalized patients in Ist Surgical Department of the Emergency County Hospital of Craiova (10,402).

In our study the average onset of acute pancreatitis was 61.88 years. In Naik, et. al., the incidence was in 50-60 years group [21].

In male patients the disease started earlier by one and a half years compared to the average age of the study group and by 4 years compared to female.

Thus, a maximum number of patients in the age range of 70-79 years (74 patients) was observed, followed by the interval of 60-69 years (68 patients).

The distribution of acute pancreatitis by gender was in favor for male [22], 54% patients being males.

Concerning relevant comorbidities, the most common pathology was the cardiovascular disease, affecting 35% of patients, followed by diabetes with 15%.

Diagnosis of acute pancreatitis can be expensive due to imaging investigations. Instead, the determination of NLR is simple and cheap parameter.

This is a reason why biological investigations can be an important factor in the evaluation of inflammatory process in a patient suspected of acute pancreatitis.

With the help of imaging investigations and Balthazar severity score, we have found that mild form of acute pancreatitis was more common compared with severe acute pancreatitis.

The Balthazar A, B and C grades clinically reflecting an acute mild form of pancreatitis represented 19%, 24% and 22%, respectively, and Grade D and E indicating severe acute pancreatitis had 15% and 20%.

Patients with Balthazar E had a much higher NLR compared with patients with acute pancreatitis Balthazar D.

NLR mean value in patients with Balthazar D was much higher than that of Balthazar C.

The mean value for NLR for Balthazar C was much higher than that of Balthazar B patients.

Acute pancreatitis Balthazar B had a higher NLR mean value than that of Balthazar A acute pancreatitis patients.

Elevated NLR was also studied in colorectal cancer complications after surgery (surgical site infection, anastomotic leak, ileus, pulmonary

embolism, acute myocardial infarction, acute pancreatitis) [23].

An acute inflammation by the pancreas has been shown that can be associated with a high risk of developing pancreatic cancer [24,25].

The severity score Balthazar was according with the extension of the inflammation process in acute pancreatitis, while the NLR mean value got higher.

In the healthy population the NLR mean is between 0.78 and 3.53 [26].

Most patients also had other diseases, reason for which a higher NLR mean limit value could be taken in consideration.

Azab B et. al. [27] suggested that using a mean NLR cut-off value of 4.7 and above as an indicator for severity in patients with acute pancreatitis.

Patients with a NLR mean above 7 had more than one presentations in the ICU and, patients with NLR lower than 5 had a faster and better evolution course compared with the other [28-30].

Conclusion

Our study shows that NLR mean can be used as method for early identification of acute pancreatitis, by using biological investigations that are taken at admission.

The NLR mean was correlated with the Balthazar score.

Mild acute pancreatitis has a lower value for NLR mean than severe acute pancreatitis.

The mean NLR value varied according with the Balthazar severity score, that got higher as acute pancreatitis got more advanced.

The NLR can be considered a simple indicator of severity for acute pancreatitis.

Abbreviations

AP=acute pancreatitis NLR=neutrophil-lymphocyte ratio; SD=standard deviations; 95% CI=confidence intervals of 95%; DB=database.

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