

# Monitoring Of Organ Failure Development In Patients With Acute Pancreatitis

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**Annotation.** *Systemic inflammatory response syndrome is a protective response of the body aimed at eliminating the agent that caused the inflammatory process (infection, trauma, burns and tissue necrosis, etc.). The severity of the response depends on the amount of damage inflicted. This study was conducted to assess the possibility of using the systemic inflammatory response syndrome as an independent predictor in the development of complications of acute pancreatitis. For this, the following clinical and laboratory parameters were studied: body temperature, pulse, respiratory rate and the number of leukocytes in the blood, which were obtained within the first 24 hours after hospitalization and before the development of organ failure. The relationship between the presence of systemic inflammatory response syndrome and the development of organ failure was investigated.*

**Key words:** *acute pancreatitis, systemic inflammatory response syndrome, organ failure.*

## 1. RELEVANCE

Despite the successes achieved by medicine in recent years, at the moment acute pancreatitis (OP) firmly continues to occupy the third place (12.5%) among all pathologies with which patients were hospitalized in emergency surgery, and in terms of the total number of bed-days and generally ranks second. According to the literature, OP is one of the five causes of in-hospital mortality, which once again shows the importance of comprehensive and at the same time reliable knowledge about this disease [2,6,8,9]. In most cases (75-80%) this disease is mild, but about 15-20% of patients have severe acute pancreatitis. The overall mortality rate in OP is from 3 to 5-6% [1,7,13], and in the severe form of the disease, these indicators are 20% -30% [4,5,9], even in clinics specialized for the treatment of this pathology indicators mortality not less than 15% [10,14].

Despite new diagnostic methods and new knowledge about the etiopathogenesis of AP, it is not always possible to timely and adequately assess the severity of the patient's condition. Underestimation of the severity of the condition can end up sadly for the patient, therefore, patients with severe acute pancreatitis (SAP) should be identified in the early stages of the disease. The Atlanta 2012 classification of acute pancreatitis indicates that the diagnosis of severe acute pancreatitis is made in the presence of persistent organ failure (lasting more than 48 hours) and / or detection of local or systemic complications [3].

Particularly acute is the problem of assessing the severity of the patient's clinical condition at an early stage of the disease, when there are still no symptoms of organ failure.

Consequently, the prognosis and timely detection of organ failure is one of the urgent problems in the diagnosis and treatment of severe acute pancreatitis. It is important to recall that in most cases of organ failure was preceded by a systemic inflammatory response syndrome (SIRS) and if symptoms of SIRS are detected, then the patient is at high risk of developing organ failure [11,12].

## **2. OBJECTIVE**

To study the relationship between the presence of Systemic Inflammatory Response Syndrome (SIRS) during the first 24 hours after admission and the development of organ failure in acute pancreatitis.

## **3. MATERIALS AND METHODS**

The study included 243 patients with acute pancreatitis who were hospitalized in the emergency surgery departments No. 1 and No. 2 of the Samarkand branch of the Republican Scientific Center for Emergency Medicine, for the period from 2017 to 2019.

We collected and studied data from clinical and laboratory research methods from the case histories only of patients who were hospitalized within the first 48 hours from the onset of the disease. The time of the onset of the disease was considered the moment when abdominal pain, typical for acute pancreatitis, appeared. For comparative factor analysis, the patients were divided into 2 groups, the first group consisted of patients with severe acute pancreatitis (n 36), and the control group consisted of all other patients with a mild form of the disease (n 207). The diagnosis was made in accordance with the classification system for acute pancreatitis - Atlanta 2012 (according to it, in order to diagnose AP, two of the following three features are required: 1) characteristic abdominal pain (severe persistent epigastric pain with an acute onset, often radiating to the back ); 2) blood plasma amylase (lipase) values are at least 3 times higher than the upper limit of the norm; 3) detection of characteristic features on ultrasound, CT with intravenous contrast enhancement or MRI. Severe acute pancreatitis was presented on the basis of the presence of organ failure (more than 2 points on the Marshall scale in one or more of the three systems, lasting more than 48 hours) and / or identification of local or systemic complications, as well as if there was death in the early period of the disease. Mild acute pancreatitis (MAP) was presented in the absence of all of the above. Exacerbation of pre-existing concomitant diseases, such as ischemic heart disease (IHD), chronic lung disease, chronic renal failure, etc., developed as a result of AP, was also defined as a systemic complication, and these patients were included in the group with severe acute pancreatitis. The study excluded patients who had organ failure at the time of admission.

To study the possibility of using the systemic inflammatory response syndrome as a prognostic marker for the development of complications of acute pancreatitis, we studied the clinical and laboratory parameters of SIRS (body temperature, pulse, respiratory rate and leukocyte count) obtained during the first 24 hours after admission and before the development of organ failure. The relationship between the presence of this syndrome on the first day after hospitalization and the development of organ failure in this pathology was investigated.

#### 4. RESEARCH RESULTS AND DISCUSSION.

In total, the study included 243 patients, women accounted for 57.2% (139) of all patients, and men, respectively, 42.8% (104). The average age of the patients was  $54.6 \pm 16.1$ . The most common reasons for the development of AP were: gallstone disease (53.9%) and the consumption of alcohol and fatty foods (29.2%). About 48.1% (117) of patients had at least one concomitant disease, mainly obesity (26.3%), ischemic heart disease (25.5%) and diabetes mellitus (13.9%).

To study the possibility of using the systemic inflammatory reaction syndrome as a prognostic marker for the development of complications, the data of 36 patients with severe acute pancreatitis were studied. The results obtained were compared with the data obtained from all other studied patients, namely the results of studies of patients with a mild form of this disease.

Table # 1. Frequency of SIRS symptoms in the first 24 hours after hospitalization.

№	SIRS symptom	Patients with TOP (n 36)	Patients with LRP (n 207)
1	body temperature $\geq 38^{\circ}\text{C}$ or $\leq 36^{\circ}\text{C}$	n 17 (47,2%)	n 38 (18,4%)
2	heart rate $\geq 90$ / min	n 11 (30,6%)	n 46 (22,2%)
3	respiratory rate $\geq 20$ / min	n 4 (11,1%)	n 7 (3,4%)
4	the number of peripheral blood leukocytes $\geq 12 \times 10^9 / \text{l}$ or $\leq 4 \times 10^9 / \text{l}$ , or the presence of more than 10% of immature forms.	n 26 (72,2%)	n 41 (19,8%)

Note: SIRS is diagnosed when at least two of the listed symptoms are present.

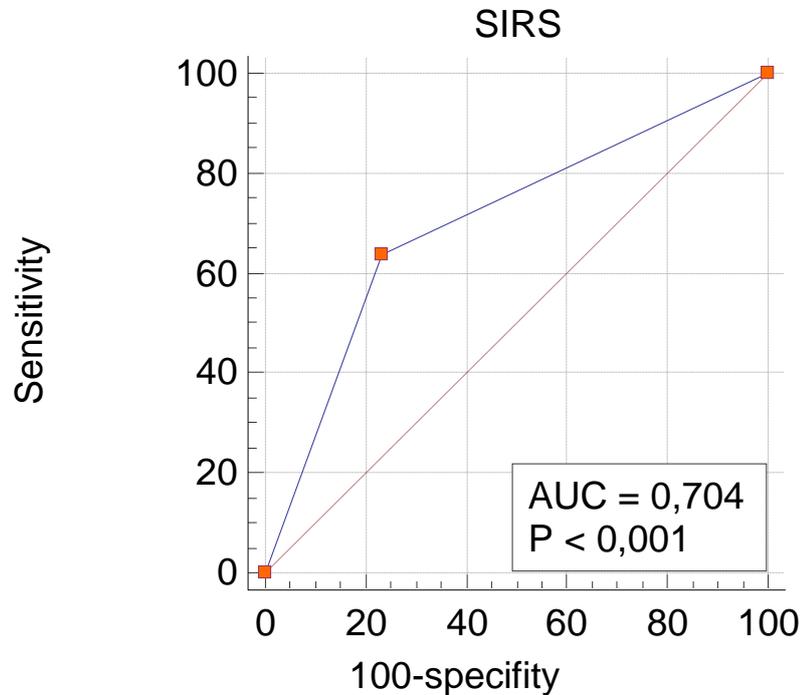
Comparative analysis of the results obtained revealed that systemic inflammatory response syndrome (SIRS) was observed in 71 (29.2%) patients with acute pancreatitis, in 23 (63.9%) patients in the first group and in 48 (23.2%) patients in the second. In 13 (36%) patients from the group of patients with ALR, there were no symptoms of SIRS, while in 48 (23.2%) patients from the group with ALR, false-positive results were observed.

Table 2. The frequency of SIRS detection in the study groups of patients.

	Patients with TOP (n 36)	Patients with LNP (n 207)
SIRS (+)	n 23 <i>True positives (TP)</i>	n 48 <i>False positives (FP)</i>
SIRS (-)	n 13 <i>False negatives (FN)</i>	n 159 <i>True negatives (TN)</i>

Statistical analysis of the data obtained showed that the sensitivity of the systemic inflammatory response syndrome for early diagnosis of complications of acute pancreatitis is 0.639 (Sensitivity =  $TP / TP + FN$ ), and the specificity is 0.768 (Specificity =  $TN / FP + TN$ ). Further, the positive predictive value (PPV - positive prevalence value) was calculated, which was 0.324 (PPV =  $TP / TP + FP$ ) and the negative predictive value (NPV - negative prevalence value), which was 0.924.

**Figure: # 1.** ROC-curve and area under the ROC-curve, relationship between the presence of SIRS symptoms on the first day after hospitalization, with the development of complications of acute pancreatitis (calculated using the MedCalc software).



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Note: ROC-curve - (Receiver Operating Characteristic curve) - is a graphical method for evaluating the effectiveness of the parameter under study. The quantitative interpretation of ROC is provided by the AUC (Area Under ROC curve) indicator - the area bounded by the ROC curve and the axis of the proportion of false positives is an accurate digital criterion for the information content of the diagnostic method.

In the first 24 hours after admission, SIRS symptoms were observed in 63.9% of patients with acute pancreatitis, who subsequently developed complications of this disease. However, guided only by the presence or absence of this syndrome in the specified time period, it is impossible to predict the development of complications, since the positive predictive value of SIRS is only 32.4%. But SIRS can still be used as a prognostic marker for the development of complications in combination with other indicators.

According to the data obtained, the negative predictive value of SIRS is 0.924, which means that 92.4% of patients who did not have this syndrome did not develop complications. Therefore, the absence of this syndrome can be used to predict a mild course of acute pancreatitis.

## 5. CONCLUSION

The presence or absence of systemic inflammatory response syndrome in patients with acute pancreatitis on the first day after hospitalization is undesirable to predict complications of this disease, since the positive predictive value of SIRS is only 32.4%.

The absence of this syndrome can be used to predict a mild course of acute pancreatitis, because the negative predictive value of SIRS is 92.4%.

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