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A Retrospective Study Of The Clinical Significance Of Hemoconcentration As An Early Prognostic Marker For The Development Of Severe Acute Pancreatitis

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ABSTRACT

Objective: to study the relationship between hematocrit indicators during the first 6 hours after the patient's hospitalization and the development of complications of acute pancreatitis.

Materials and methods. The study included 243 patients with acute pancreatitis. All patients were examined for hematocrit at admission. The multivariate analysis made it possible to determine whether there was a correlation between the presence of hemoconcentration in patients (hematocrit ≥ 43) at the time of admission with the development of complications of acute pancreatitis. The predictive effectiveness of this marker was estimated by the area under the ROC curve.

Results. Severe acute pancreatitis was observed in 36 (14.8%) patients. Average hematocrit values were $43.2 \pm 6.4\%$ ($P_{0,01}$). In the first 6 hours after admission, hemoconcentration was observed in 72.2% of patients with acute pancreatitis who later developed complications of this disease.

Statistical analysis of the data obtained showed that the sensitivity of hemoconcentration for early diagnosis of acute pancreatitis complications is 0.722, and the specificity is 0.802. The positive predictive value was 0.388 and the negative predictive value was 0.943.

Conclusions: the presence of hemoconcentration in patients with acute pancreatitis in the first 6 hours after hospitalization is undesirable to use for predicting complications of this pathology, since the independent positive prognostic significance of this marker is only 38.8%.

KEYWORDS

Acute pancreatitis; complications of the disease; hematocrit, hemoconcentration.

INTRODUCTION

Despite the success 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 departments, and in the total number of bed days and generally takes the second place. According to the literature, OP is one of the five causes of in-hospital mortality, which once again shows the importance of comprehensive and reliable knowledge about this disease [1-4]. In most cases (75-80%), this disease is mild, but about 15-20% of patients have severe acute pancreatitis. The total lethality in OP is from 3 to 5-6% [5-7], and in the severe form of the disease, these indicators are 20% -30% [4,8,9], even in clinics specialized for the treatment of this pathology, the lethality rates are not lower than 15% [10,11]. Despite new diagnostic methods and new knowledge about the etiopathogenesis of OP, it is not always possible to assess the severity of the patient's condition in a timely and adequate manner. Underestimating the severity of the condition can end up sad for the patient, so patients with severe acute pancreatitis (TOP) should be identified at the early stages of the disease.

Due to repeated vomiting, as well as increased vascular permeability and the transition of intravascular fluid to the intercellular space,

hypovolemia and hemoconcentration develop, clinically this is expressed in exicosis syndrome. That is, the higher the hematocrit, the more pronounced hypovolemia. This indicator also makes it possible to assess the degree of microcirculation disorders, so the hematocrit \geq 44% at admission or the preservation of indicators close to this during the first 24 hours after hospitalization is considered an independent risk factor for pancreatic necrosis and organ failure [4, 12-14,]. According to Veit Philip et al. in patients with hematocrit values below 44%, organ failure and pancreonecrosis were observed only in 7% of patients with OP [15].

Despite the results obtained, the value of hemoconcentration for predicting the severe course of acute pancreatitis remains controversial.

Objective: to study the relationship between the presence of hemoconcentration, during the first 6 hours after admission, and the development of complications in acute pancreatitis.

MATERIALS AND METHODS

The study included 243 patients with acute pancreatitis who were hospitalized in the departments of emergency surgery No. 1 and No. 2 of the Samarkand branch of the

Republican Scientific center for Emergency Medical Care, for the period from 2017 to 2019.

Data from clinical and laboratory research methods were collected and studied from the medical histories of only patients who were hospitalized within the first 48 hours after the onset of the disease. The time of onset of the disease was considered to be the moment when abdominal pain typical for acute pancreatitis appeared. For comparative factor analysis, 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, to make a diagnosis of OP, you need to have two of the following three signs: 1) characteristic abdominal pain (severe persistent pain in the epigastrium with acute onset, often radiating to the back); 2) plasma amylase (lipase) values are at least 3 times higher than the upper limit of normal; 3) detection of characteristic signs by ultrasound, CT with intravenous contrast enhancement or MRI. Severe acute pancreatitis was assessed based on the presence of organ failure (more than 2 points on the Marshall scale in one or more systems out of three, persisting for more than 48 hours) and/or the detection of local or systemic complications, as well as if there was mortality in the early period of the disease. Mild acute pancreatitis (LOP) was exhibited in the absence of all of the above. Exacerbation of pre-existing comorbidities, such as coronary heart disease (CHD), chronic lung diseases, chronic kidney failure, etc., developed as a result of OP, was also defined as a systemic complication and these patients were included in the group with severe acute pancreatitis. Patients who had

organ failure at the time of admission were excluded from the study.

To study the possibility of using hemoconcentration as a prognostic marker for the development of complications of acute pancreatitis, hematocrit indicators obtained during the first 6 hours after admission and before the development of organ failure were studied. The relationship between the presence of this marker at admission and the development of organ failure in this pathology was investigated.

THE RESULTS OF RESEARCH AND DISCUSSION

A total of 243 patients were included in the study, women accounted for 57.2% (139) of all patients, and men, respectively, 42.8% (104). The average age of patients was 54.6 ± 16.1 . The most common causes of OP were: cholelithiasis (53.9%) and alcohol and fatty foods (29.2%). About 48.1% (117) of patients had at least one concomitant disease, mainly obesity (26.3%), CHD (25.5%) and diabetes (13.9%).

To study the possibility of using the presence of hemoconcentration as a prognostic marker for the development of complications, data from 36 patients with severe acute pancreatitis were studied. The results obtained were compared with the data obtained from all other patients studied, namely, the results of studies of patients with a mild form of this disease. A comparative analysis of the results revealed that hemoconcentration was observed in 67 (27.6%) patients with acute pancreatitis, 26 (72.2%) in the first group and 41 (19.8%) in the second. In 10 (27.8%) patients from the group of patients with TOP, hemoconcentration was not detected, while in 41 (19.8%) patients from the group with LOP, false positive results were observed.

Table 1. Frequency of detection of hemocontraction in the studied groups of patients

| | Patientswith TOP (n 36) | Patientswith LOP (n 207) |
|----------|--|--|
| NST ≥ 44 | n 26 True positive results – True positives (TP) | n 41 False positive results - False positive (FP) |
| NST < 44 | n 10 False-negative results, False negatives (FN) | n 166 True negative results are True negatives (TN) |

Statistical analysis of the data obtained showed that the sensitivity of hemoconcentration for early diagnosis of acute pancreatitis complications is 0.722 (Sensitivity = TP / TP + FN), and the specificity is 0.802 (Specificity = TN / FP + TN). Next, we calculated the positive predictive value (PPV- positive prevalence value), which was 0.388 (PPV = TP / TP + FP) and the negative predictive value (NPV - negative prevalence value), which was 0.943 (NPV = TN / TN + FN).

In the first 6 hours after admission, hemoconcentration was observed in 72.2% of patients with acute pancreatitis who later developed complications of this disease. However, based only on the presence or absence of this marker in the specified time period, it is impossible to predict the development of complications, since the positive prognostic significance of hemoconcentration is only 38.8%. However, hemoconcentration can still be used as a

predictive marker of the development of complications in combination with other indicators.

According to the obtained data, the negative prognostic significance of hemoconcentration is 0.943, which means that 94.3% of patients who did not have this marker were not observed to develop complications. Therefore, the absence of this syndrome can be used to predict the mild course of acute pancreatitis.

CONCLUSION

The presence of hemoconcentration in patients with acute pancreatitis in the first 6 hours after hospitalization is undesirable to use for predicting complications of this disease, since the positive prognostic significance of hemoconcentration is only 38.8%.

The absence of hemoconcentration at the time of admission can be used to predict the mild course of acute pancreatitis, because the

negative prognostic significance of this marker is 94.3%.

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