MODERN TREATMENT EFFICIENCY MARKER FOR ACUTE PANCREATITIS

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Objective. To study vascular changes in acute pancreatitis, as well as indicators of endothelial dysfunction by determining the number of circulating endotheliocytes in peripheral blood, with the possibility of further use of this method both for the diagnosis of the disease itself, acute pancreatitis, and for monitoring the effectiveness of treatment measures in patients with acute pancreatitis.

Materials and Methods. A prospective study of endothelial dysfunction parameters was conducted. Plasma was obtained by centrifugation at 1500 rpm for 15 minutes. The plasma was subsequently stained with methylene blue in saline. The study was conducted using the most common method for determining the total cell count in 1 ml of suspension: endothelial cell counting under a microscope using a Goryaev counting chamber.

Results. A peripheral blood study revealed that patients with acute pancreatitis had an increased number of circulating endothelial cells compared to the control group. In the peripheral blood of patients, 1111–6111 endothelial cells (control group: 0–5 endothelial cells) per 1 ml of plasma were detected; these data are outside the reference range.

Conclusion. The study showed that acute pancreatitis has a significant negative impact on vascular changes, causing necrosis, inflammation of the vascular walls, and thrombosis, which can subsequently lead to both persistent bleeding and the development of multiple organ failure.

Keywords: *pancreatitis, endothelial dysfunction, marker, endothelial cells, thrombosis, necrosis*

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Relevance. Acute pancreatitis is a widely studied problem in the modern world [1–4]. However, despite the variety of diagnostic methods, diagnosing patients with acute pancreatitis remains a complex and unresolved surgical problem. In recent years, the field of endothelial function has seen significant advances [4–6]. Consequently, vascular changes and endothelial dysfunction in the context of acute pancreatic pathology represent a pressing scientific challenge.

Our hypothesis is that an increase in the level of circulating endothelial cells in the peripheral blood may be an informative marker of endothelial dysfunction in the diagnosis of acute pancreatitis, and a decrease in the same level of circulating endothelial cells in the peripheral blood against the background of therapeutic measures may be an effective marker of the visibility of patient treatment in acute pancreatitis.

Purpose of the study: study of vascular changes in acute pancreatitis, as well as indicators of endothelial dysfunction by determining the number of circulating endothelial cells in the peripheral blood with the subsequent possibility of using this method both for diagnosing the disease itself, acute pancreatitis, and for monitoring the effectiveness of treatment measures in patients with acute pancreatitis.

Materials and methods. The Ethics Committee of the institution, Federal State Budgetary Educational Institution of Higher Education "Izhevsk State Medical Academy", approves and guarantees the compliance of the latter with the Helsinki Declaration of 1975.

A prospective study of endothelial dysfunction parameters was conducted. Plasma obtained by centrifugation at 1500 rpm for 15 minutes served as the material for the study. The plasma was subsequently stained with methylene blue in saline. Peripheral blood samples from healthy volunteers with no signs of acute pancreatitis served as controls. The study was conducted using the most common method for determining the total cell count in 1 ml of suspension: endothelial cell counting under a microscope using a Goryaev counting chamber.

Hematoxylin and eosin-stained biomaterials obtained during biopsy and autopsy were examined using microscopy at 400x magnification. The biomaterials consisted of vascular bed sections.

Results. A peripheral blood study revealed that patients with acute pancreatitis had an increased number of circulating endothelial cells compared to the control group. In the peripheral blood of

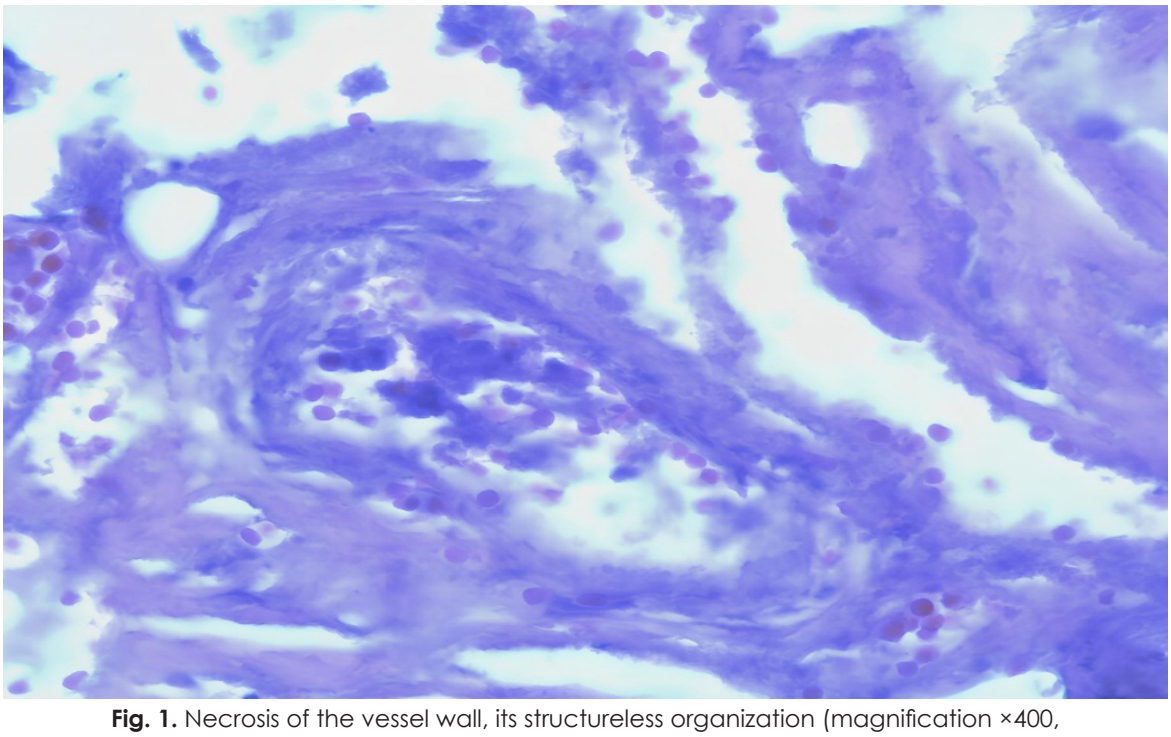

Fig. 1. Necrosis of the vessel wall, its structureless organization (magnification ×400, hematoxylin and eosin staining)

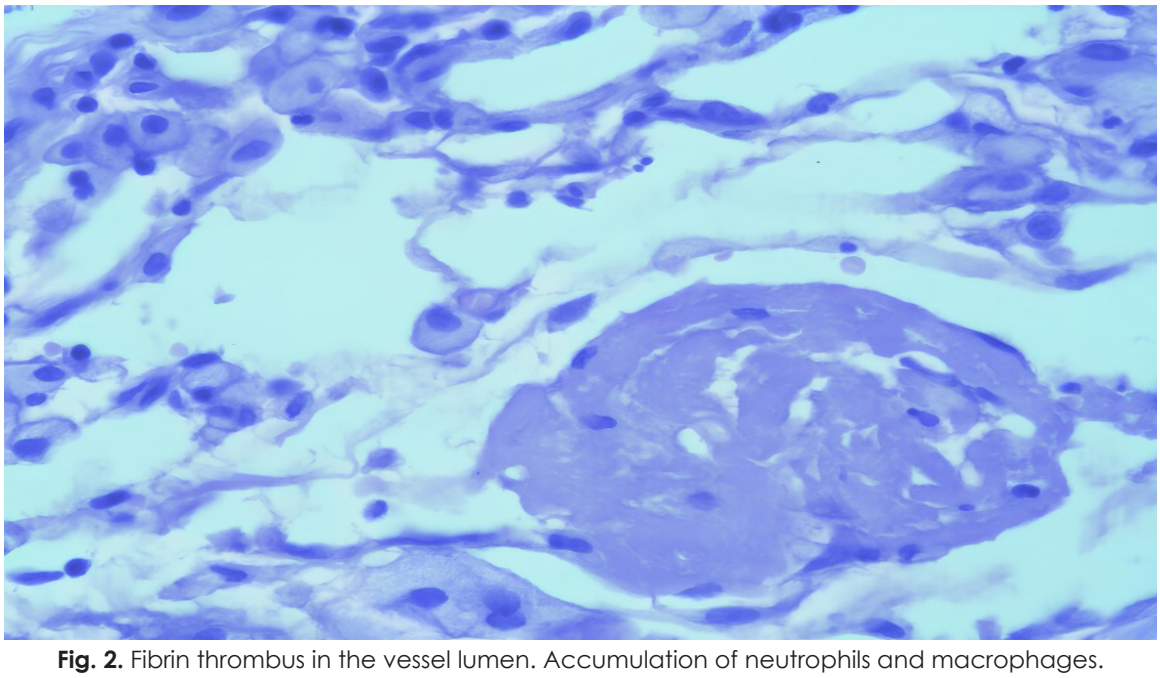

Fig. 2. Fibrin thrombus in the vessel lumen. Accumulation of neutrophils and macrophages. (400× magnification, hematoxylin and eosin staining)

patients, 1111–6111 (control group: 0–5 endothelial cells) endothelial cells per 1 ml of plasma were detected, these data are not within the reference range [8–10]. The obtained blood test results indicate that patients have grades 2–4 endothelial dysfunction, as well as critical endothelial dysfunction with a high risk of cardiovascular complications [11].

During the study, micrographs of sections revealed vascular changes: swelling of endothelial cells, dystrophic phenomena; pathological changes in endothelial cells; necrosis of the vascular wall, its structureless organization; fibrin thrombi are found in the lumen of the vessels; accumulations of neutrophils (their margination) and macrophages are detected (fig. 1–5).

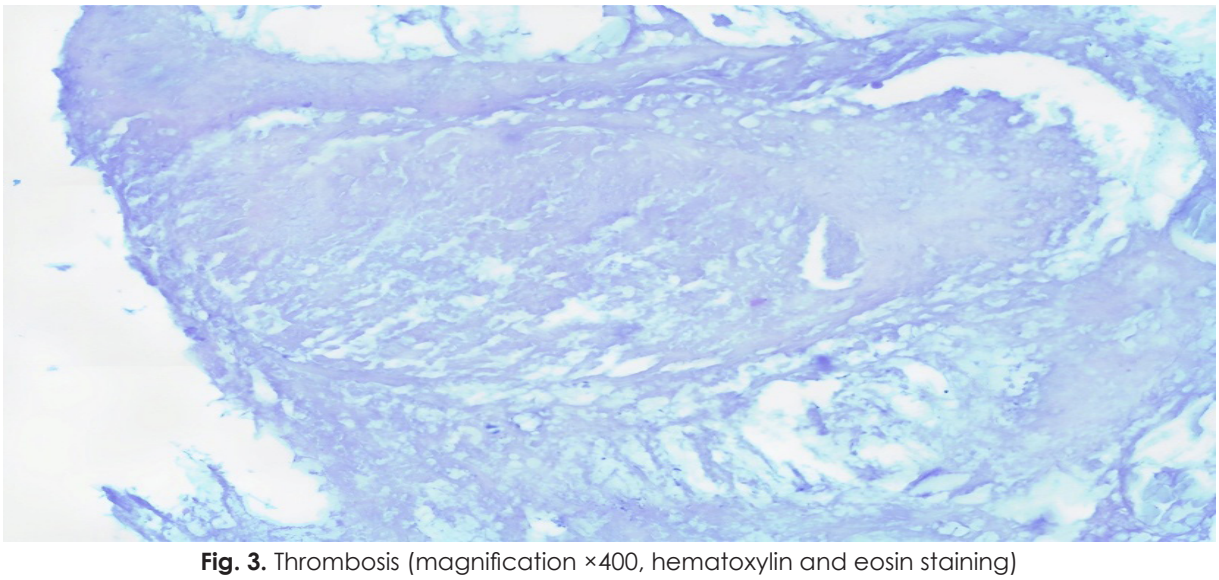

Fig. 3. Thrombosis (magnification ×400, hematoxylin and eosin staining)

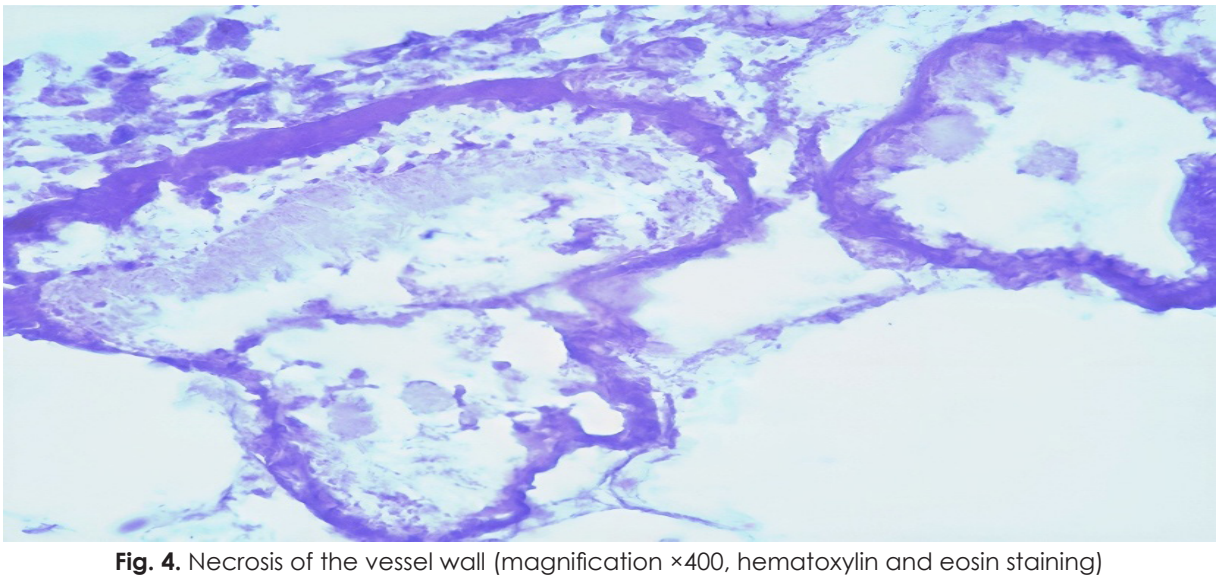

Fig. 4. Necrosis of the vessel wall (magnification ×400, hematoxylin and eosin staining)

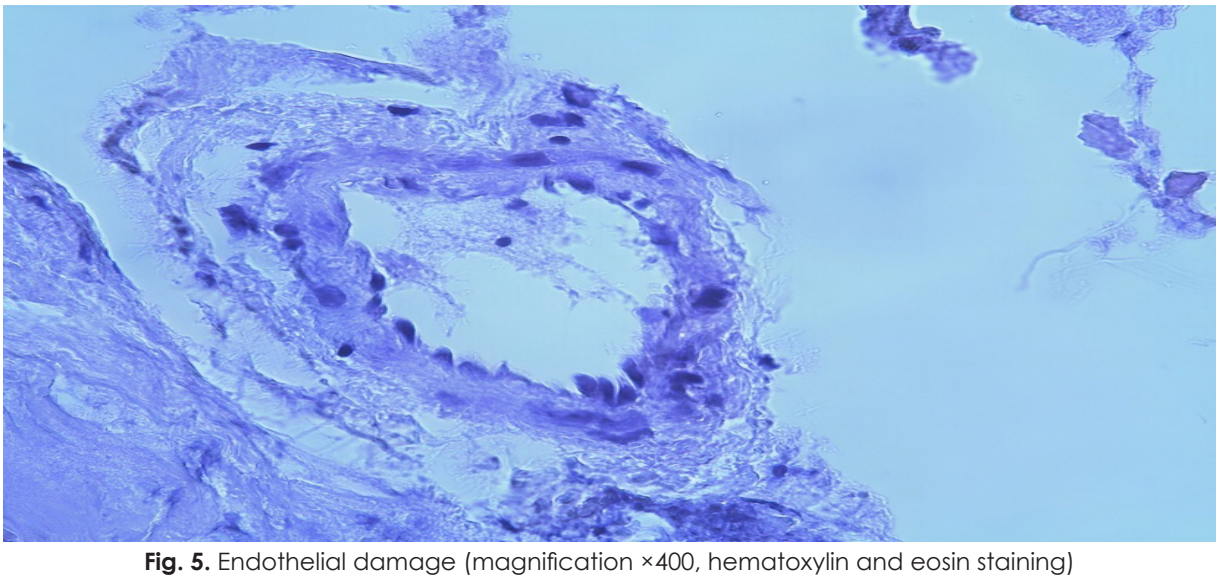

Fig. 5. Endothelial damage (magnification ×400, hematoxylin and eosin staining)

Following comprehensive treatment, repeat laboratory tests were performed on patients with acute pancreatitis at the time of discharge from the hospital. A decrease in the level of circulating endothelial cells in the patients' peripheral blood was revealed. 452–832 endothelial cells per 1 ml of plasma were detected. These values were 2,45–7,34 times lower than those before comprehensive treatment. These values indicate that patients have grades 1–2 endothelial dysfunction after treatment and indicate an improvement in their condition [11].

Discussion. As a result of the comprehensive treatment, the degree of endothelial dysfunction significantly decreased, compared with the indicators obtained before the comprehensive treatment in the hospital. The above indicates the potential of this method for use in clinical practice both for diagnosing the disease itself and its severity, and for monitoring the effectiveness of therapeutic measures in patients with acute pancreatitis [12–13]. Accordingly, our hypothesis was correct that an increase in the level of circulating endothelial cells in the peripheral blood can be an informative marker of endothelial dysfunction in the diagnosis of acute pancreatitis, and a decrease in the same level of circulating endothelial cells in the peripheral blood against the background of therapeutic measures can be an effective marker of the visibility of patient treatment for acute pancreatitis [14–15].

Conclusion. The study demonstrated that acute pancreatitis is significantly affected by vascular changes, causing necrosis, inflammation, and thrombosis of the vascular walls, which can subsequently lead to both persistent bleeding and the development of multiple organ failure. It was also demonstrated that endothelial dysfunction, measured by determining the number of circulating endothelial cells in the peripheral blood, is a predictor of the use of this method both for diagnosing acute pancreatitis itself and for monitoring the effectiveness of treatment in patients with acute pancreatitis [12–14].

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