Pathogenesis, Diagnostics and Treatment Effectiveness of Posthemorrhagic Iron Deficiency Anemia with Thrombocytopenia, (Werlhoff's Disease)

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ABSTRACT

With thrombocytopenic purpura, there is a violation of the formation of thromboplastin and serotonin, a decrease in contractility and an increase in the permeability of the capillary wall. This is associated with prolongation of bleeding time, violation of the processes of thrombosis and retraction of the blood clot. With hemorrhagic exacerbations, the number of platelets decreases down to single cells in the preparation, during the period of remission it is restored to a level below the norm.

Keywords: Thrombocytopenic purpura, Werlhof's disease, idiopathic thrombocytopenic purpura, B-12 deficiency, aplastic.

Introduction. Thrombocytopenic purpura (Werlhof's disease, benign thrombocytopenia is a hematological pathology characterized by a quantitative deficiency of platelets in the blood, accompanied by a tendency to bleeding, the development of hemorrhagic syndrome [2].

In 45% of cases, there is idiopathic thrombocytopenic purpura, which develops spontaneously, for no apparent reason [1]. In 40% of cases, thrombocytopenia is preceded by various infectious diseases (viral or bacterial) transferred approximately 2-3 weeks before.

Platelet deficiency in thrombocytopenic purpura may be associated with a functional lesion of megakaryocytes, a violation of the process of lacing of blood red platelets. For example, Verlhof's symptom complex is due to the ineffectiveness of hematopoiesis in anemia (B-12 deficient, aplastic), acute and chronic leukemia, systemic diseases of the hematopoietic organs (reticulosis), bone marrow metastases of malignant tumors [4].

Purpose of the study. To establish the diagnostic and clinical significance of vital (lifetime) indicators of the morphofunctional state of peripheral blood platelets in patients with primary immune thrombocytopenia.

Materials and research methods. To obtain the normative characteristics of computerized platelet morphometry of healthy adults, 30 donors were included in the control group - practically healthy individuals without signs of an autoimmune disease, thrombosis and not taking any medications at the time of the study, their average age was 36.1 ± 10.5 years.

Research results. When analyzing the morphofunctional and activation parameters of platelets, the heterogeneity of the circulating population of platelets is most clearly seen in patients with a high level of antiplatelet antibodies. In patients with ITP with an average and high level of antiplatelet antibodies (Table 9), it is clearly seen that with

an increase in the percentage of antiplatelet antibodies, morphometric parameters change: the percentage of active forms sharply increases due to a decrease in type I platelets. In the group with a low level of antibodies, the ratio of morphological types of platelets remains within the range of practically healthy individuals (61%, 25%, 10% and 4%, respectively).

In patients with ITP, with a low level of antiplatelet antibodies, cells with a small diameter, perimeter, and volume predominate. In the group with medium and high levels of antibodies, there is a more pronounced uneven distribution of platelets according to size parameters, which is apparently due to the predominance of forms of platelets with different levels of activity.

The results obtained allow us to conclude that computer morphometry within the framework of one method provides an opportunity to quickly assess individual changes in dimensional parameters and the level of functional usefulness of circulating platelets, and analyze the structure of their population composition in real time. This method can be effectively used in clinical practice, allowing you to quickly obtain the results of monitoring hemostasis in patients with ITP using various methods of therapy, as well as for differential diagnosis of thrombocytopenia, which is based on an autoimmune component and thrombocytopenia without autoimmune disorders.

The morphological composition of the circulating platelet population in patients with ITP compared with healthy individuals is characterized by an increase in the activation status of circulating platelets due to an increase in platelet types II–III by 9% and 5%, respectively ($p < 0.05$). The morphometric parameters of platelets are characterized by an increase in the geometric parameters of cells (diameter, perimeter and area) and a decrease in optical parameters (height), which indicates the appearance in the circulation of a higher percentage of young forms of platelets.

Thrombocytopenia against the background of APS is closest in terms of morphofunctional characteristics of platelets (ratio of shapes and geometric characteristics) to ITP, highly activated cells also predominate in this group of patients, but type II platelets (the initial stage of activation) predominate in ITP, and type III cells in APS , which may indirectly reflect the duration of the autoimmune process.

When assessing the effect of the applied methods of treatment on the morphofunctional state of platelets, it was found that the most effective method that causes complete quantitative and qualitative normalization of platelets in the early stages from the start of therapy (day 5) is intravenous immunoglobulin. With a longer dynamic observation (30 days), all types of therapy cause positive changes in the morphofunctional characteristics of platelets

The effect of antiplatelet antibodies on the morphofunctional state of platelets is manifested in a change in the morphometric parameters of circulating cells in the form of an increase in their functional activity in direct proportion to the growth of ATA. With a high titer of ATA (> 600%), there is a decrease in the forms of "rest" (type I platelets) by 21% and a 2-fold increase in activated platelets (types II and III) up to 60%, a decrease in height and an increase in geometric parameters, which indirectly indicates an increase in the rate of thrombopoiesis in this category of patients.

The express method of vital computer platelet morphometry has diagnostic and prognostic value, since a sharp increase in activated forms of platelets under conditions of normal / subnormal platelet levels indicates the possibility of a relapse of the disease (development of resistance to ongoing therapy) and thus dictates the need to change treatment tactics.

When comparing the morphometric characteristics of platelets in patients with ITP and APS, since in these diseases the autoimmune mechanism plays a leading role, thrombocytopenia is due to the production of antibodies (antiplatelet, antiphospholipid); in both cases, highly activated cells predominate, but in ITP more due to type II platelets (initial stage activation), while type III cells

predominate in APS, which may indirectly reflect the duration of the autoimmune process.

When analyzing the heterogeneity of the population of platelets in circulation in terms of their size parameters, the distribution of morphofunctional parameters of platelets in secondary thrombocytopenia in patients in groups with aplastic anemia and thrombocytopenia, due to cytostatic effects, we did not reveal significant changes in their cellular parameters. There is only a slight trend towards

decrease in phase height. The most striking changes in the morphological structure of the platelet population were registered in patients with hepatitis (Group 1) and APS (Group 3). The population average diameter, perimeter, area and volume of cells in APS were increased by 40-50%, in viral hepatitis - by 30-40%. As mentioned earlier, the phase height of cells and their volume are optical indicators that depend on the state of the platelet granulomere. The decrease in these parameters in these groups most likely indicates the predominance of "young" platelets in the circulating population - cells with a wide hyalomere and a narrow granulomere, due to an increase in the rate of thrombopoiesis in this category of patients.

Thus, when analyzing the morphological and functional parameters of live peripheral blood platelets in patients with secondary thrombocytopenia, it is obvious that the most pronounced changes in APS and viral liver damage with a significant increase in type III and IV platelets. In secondary thrombocytopenia of a different origin (aplastic anemia and thrombocytopenia, post-cytostatic nature), the ratio of morphological types of platelets is close to the normative values.

Conclusion. Improving the efficiency of diagnosing primary immune thrombocytopenia based on the use of vital computer phasometry allows timely detection of disorders, their adequate preventive or therapeutic correction, helps to reduce the number of patients with severe forms of the disease, shortens the period of temporary disability, as well as timely change of treatment tactics.

Thus, with an increase in the titer of ATA, platelet activation is observed: in direct proportion to the growth of ATA, the percentage of active forms of platelets (II and III types of platelets) increases, a decrease in height and an increase in geometric parameters, which indirectly indicates an increase in the rate of thrombopoiesis in this category of patients.

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