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The Significance of the State of the Blood Coagulation System in Various Pathological Conditions in Children

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The review article describes the differences between children and adults in assessing the platelet component, an enzymatic link that allows one to judge the components of the hemostatic system and their interaction [7,15]

In the dissertation work, when studying the characteristics of hemostasis in children with inflammatory bowel diseases, a deterioration in the hemorheological properties of blood was revealed, which underlies microcirculation disorders and causes ischemic damage. Chronic inflammation and increased bleeding of the intestinal wall in inflammatory bowel diseases lead to activation of platelet and plasma hemostasis, hyperfibrinogenemia increases, hemostasis imbalance develops with a tendency to hypercoagulation, and the risk of thromboembolic complications and disseminated intravascular coagulation increases. [14,17]

All patients with congenital heart disease with cyanosis need to monitor the system of platelet and coagulation hemostasis, in the pre- and postoperative periods, according to a clinical blood test, an extended coagulogram by determining antithrombin and D-dimer. The criterion for the effectiveness of aspirin is determined by platelet aggregation [18,21].

Children with insulin-dependent diabetes mellitus develop disorders of the vascular, cellular and plasma-coagulation components of the hemostasis system, while the vascular-platelet component of hemostasis is disrupted earlier and to a greater extent than the coagulation component [23]

Large mild lymphoblastic leukemia requires diagnosis of hemostasis with determination of the levels of fibrinogen, proteins S and S, plasminogen, D-dimer, both before treatment and during program chemotherapy. [24]

When studying various parts of the hemostatic system in community-acquired pneumonia in children, the authors believe that in uncomplicated pneumonia the level of fibrin-monomeric complexes and D-dimer significantly exceeds the normative indicators, indicating activation of the coagulation unit. In case of complicated pneumonia in patients, hemostasis indicators manifested themselves in the form of hyperfibrinogenemia, hypocoagulation or hypercoagulation, thrombinemia, inhibition of fibrinolysis, which are a manifestation of intravascular coagulation and associated with the infectious process [28]

When studying coagulation hemostasis in children with uncomplicated pneumonia and pneumonia with pulmonary-pleural complications due to the activity of the inflammatory response of the disease, in uncomplicated pneumonia the coagulation link of hemostasis was activated and the level of D-dimer was higher than normal. In complicated pneumonia, the following were detected: hyperfibrinogenemia, hypo- or hypercoagulation by a PTT, increased D-dimer levels, suppression of fibrinolysis [8,16]

Vol. 2 No. 6 (2024)
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The authors believe that the characteristics of pneumonia in children can lead to activation of the platelet and plasma components of hemostasis, develop an imbalance with a tendency to hypercoagulation and increase the risk of disseminated intravascular coagulation. [20,27].

It was established that the tendency to hypercoagulation, an increase in the frequency of development of hemorrhagic manifestations as complications of infectious diseases and severe forms of pneumonia in children, in which indicators of hemostasis in the form of thrombocytosis, hyperfibrinogenemia, hypo- or hypercoagulation, inhibition of fibrinolysis corresponded to possible or current intravascular coagulation, which was associated with a complication of the infectious process [15,19]

The results of a study of hemostasis in children with pneumonia revealed an imbalance of the blood coagulation system with a tendency to activate the coagulation link and develop hypercoagulation during the period of the disease [8,16].

In the study, in the majority of children with pneumonia, the plasma component of hemostasis was activated, a shortening of clotting time, hyperfibrinogenemia, a decrease in platelets, prothrombin index, and fibrinogen occurred; in a minority (19.64%) of children with pneumonia, the fibrinolytic activity of the blood increased. The authors recommend correcting the detection of changes with hemostabilizing drugs [13,16].

In young children with severe, complicated pneumonia and bronchitis, compensatory hypercoagulation, subcompensatory and decompensatory hypercoagulation, the transition of hypercoagulation to hypocoagulation, intravascular coagulation, an increase in the amount of fibrinogen, thrombinemia, and a decrease in fibrinolysis are determined [2,18].

When studying hemostasis in premature infants against the background of pneumonia, a hypercoagulable orientation of the blood coagulation system was revealed, which, under conditions of hypoxia that occurs during the pneumonic process, leads to the development of hemorrhagic manifestations as complications of a severe course of the infectious process [19].

In work on premature newborns with congenital pneumonia, the study recorded increased fibrinolysis and hypocoagulation in the second and third phases of blood coagulation, the frequency of intraventricular hemorrhages was significantly more frequent (odds ratio - OR = 5.69 (4.15-7.80), OR = 23.91 (16.81–34.00) in this group than in the group of apparently healthy children. In this regard, the author recommends control of hemostasis and preventive antihemorrhagic therapy for patients with congenital pneumonia during the neonatal period [10].

The inclusion in therapy of children with severe pneumonia of anticoagulant drugs, replacement drugs and antiprotease effect, including heparin, made it possible to achieve a balance of the hemostatic system at an earlier time with a significant improvement in the clinical manifestations of the disease [12,13]

In work in children with chronic heart failure complicated by respiratory failure, an increase in the level of CRP and fibrinogen was revealed, which has a diagnostic development of myocardial dysfunction [11].

When determining the role of the infectious factor in the development of hemorrhagic stroke in children in 145 children, it was revealed that there are a number of risk factors for the development of the disease, indicating the significance of the infectious-inflammatory process that is associated with DIC syndrome and is manifested by hypocoagulation, an increase in anticoagulant and fibrinolytic potentials. [30].

The analysis of the study of homeostasis in patients with juvenile rheumatoid arthritis revealed the relationship between the activity of the inflammatory process and the state of the vascular-platelet hemostasis, which was characterized by a violation of the coagulation link, in the form of hypercoagulation and inhibition of fibrinolysis. [27].

Vol. 2 No. 6 (2024)
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The review article describes data on troponins: functions, biosynthesis, release from the myocardium, circulation and elimination of troponins from the bloodstream. An important section of the work is a discussion of the clinical significance and pathological conditions with an increase in troponins in the blood [7,9]

When studying the effectiveness of troponin in diagnosing myocardial infarction, high sensitivity and specificity with early (from 3 to 12 hours) and long-term (up to 7-8 days) changes were revealed. Troponin I can be recommended for acute coronary syndrome, the increase of which is regarded as a sign of myocardial ischemia with possible necrosis. [29].

It is generally accepted that the concentration of troponins is one of the main laboratory criteria for diagnosing myocardial infarction, in which there is a typical increase and gradual decrease in the indicator, which allows optimizing the management of patients in the acute and long-term periods of the disease [25]

The author believes that cardiac troponins T and I, regulating the contractile function of the heart, are the most specific markers in myocardial infarction [1,16].

The work indicates that troponins I and T are markers for the diagnosis and treatment of cardiovascular diseases, allowing to improve diagnostic and prognostic capabilities for identifying myocardial damage in endocarditis, myocarditis and myocardial infarction, which allows for optimal treatment methods [6].

In recent years, reports have begun to appear of increased concentrations of cardiac troponins during exercise, pulmonary embolism, sepsis, renal failure and those not associated with ischemic myocardial damage. [4].

The continuation of the study is a review of the literature assessing the values of cardiac troponins in patients with sepsis, which also analyzes the causes and mechanisms and clinical diagnostic significance of increased troponins in sepsis [6].

There are clinical diagnostic studies devoted to the pathogenesis of increased cardiac troponins during inflammatory processes involving myocardial tissue (myocarditis, autoimmune myocardial lesions, cardiomyopathies), heart failure, tachyarrhythmias, dissecting aortic aneurysm, brain lesions (stroke, subarachnoid hemorrhage) [5].

It is believed that troponin T and troponin I, having high specificity and sensitivity to the myocardium, make it possible to diagnose even microscopic areas of necrosis. The author believes that the indicator of cardiac troponins are indicators of myocardial damage and are indicators of myocardial damage in childhood, when a heart attack is unlikely [22].

The diagnostic value of troponin I and T is similar, however, troponin I is considered more suitable, since it is independent of the manifestations of renal failure and has a single-phase release into the bloodstream, unlike troponin T, which has a higher level of the cytoplasmic fraction [26].

In a study of 90 children with COVID-19, 1/3 of the children had an increase in troponin I levels (up to 5N). EchoCG data showed a decrease in myocardial contractility (10%), left ventricular dilatation (in 16.7%), pericardial effusion (in 5%) and cardiomegaly (in 2.2%) of patients. In 1/5 children, inflammatory markers and hypercoagulability increased. All children had acute myocardial injury, 3 had classic myocarditis [3].

Conclusion. Thus, modern foreign and literary data allow us to state that the determination of troponin I in pathological conditions is one of the important differential diagnostic methods for assessing the severity of cardiovascular pathology in children.

Literature:

1. Agewall S., Giannitsis E., Jernberg T., Katus H. Troponin elevation in coronary vs. non-coronary disease // European Heart Journal. 2011. Vol. 32, No. 4. P. 404-411. doi: 10.1093/eurheartj/ehq456.
2. Bekchanova B. B. Features of the hemostasis system in children with acute bronchopulmonary diseases // Young scientist. – 2020. – No. 22. – pp. 438-441.
3. Balykova L. A. et al. Methods of functional diagnostics in identifying heart damage in children with new coronavirus infection // Russian Journal of Cardiology. – 2021. – No. S5. – pp. 15-16.
4. Chaulin A. M. Clinical and diagnostic value of determining cardiac troponins in the blood during sepsis (literature review) // The scientific heritage. – 2020. – No. 46-3 (46).
5. Chaulin A. M., Duplyakov D. V. Highly sensitive cardiac troponins: circadian rhythms // Cardiovascular therapy and prevention. – 2021. – T. 20. – No. 1.
6. Chaulin A. M., Duplyakov D. V. Increased cardiac troponins not associated with acute coronary syndrome. Part 1-2 //Cardiology: News. Opinions. Education. – 2019. – No. 2 (21).
7. Dorokhov N. A. et al. Thrombogenic risk factors in children with community-acquired pneumonia // Thrombosis, hemostasis and rheology scientific and practical journal ISSN 2078–1008 (Print); ISSN 2687-1483 (online). – 2018. – pp. 36-40.
8. Dorokhov N. A., Skudarnov E. V., Antropov D. A. Features of the reaction of the coagulation system of hemostasis in children with pneumonia //ActaBiomedicaScientifica. – 2016. – T. 1. – No. 1 (107).
9. Dorokhov N. A., Skudarnov E. V., Antropov D. A. Features of the reaction of the coagulation system of hemostasis in children with pneumonia //ActaBiomedicaScientifica. – 2016. – T. 1. – No. 1 (107).
10. Goryachko A. N., Sukalo A. V. Features of hemostasis in premature newborns with congenital pneumonia in the neonatal period // Child Health. – 2020. – T. 15. – No. 7.
11. Grosu V.V. C-reactive protein and other markers of inflammation in predicting chronic heart failure in children //Ulyanovsk Journal of Medical Biology. – 2016. – No. Application.
12. Ismoilov K. I., Davlatov S. T., Ismoilova M. A. Features of clinical and hemostatic manifestations and corrective therapy for pneumonia in children of the first year of life // Avicenna Bulletin. – 2015. – No. 3. – pp. 111-116.
13. Ismoilov K.I., Davlatov S.T., Ismoilova M.A. Features of various parts of hemostasis in pneumonia in infants //Health of Tajikistan. – 2015. – No. 4. – pp. 16-20.
14. Kanshina A.A. Impaired hemostasis in children with inflammatory bowel diseases. Abstract of Ph.D. 2020. P.25.
15. Kardjavova G.A. Acute myocarditis in children in the background of community-acquired pneumonia: clinical features Multidisciplinary Scientific Journal Scholar ISSN: 2181-4147 Volume 2 | Issue 3 | January, 2024 p.15-21.
16. Kardjavova G.A. Acute myocarditis in children on the background of broncho-pulmonary disease Multidisciplinary Scientific Journal January, 2024 Golden brain ISSN: 2181-4120 volume 2 | issue 3 | 2024 p.70-75.
17. Kardzhavova G.A. Acute myocarditis in children with a background of community-acquired pneumonia: features of the clinical picture Scientific journal ERUS ISSN: 2181-3515 Volume 3 | Special Issue 3 | January 2024. P-395-400.

Vol. 2 No. 6 (2024)
ISSN: 2995-5483

18. Karzhavova G.A. New approaches for the etiological aspects of community-acquired pneumonia in children Scientific journal ERUS ISSN: 2181-3515 Volume 3 | Special Issue 3 | January 2024. P-389-394.
19. Katyukina A.V. Hemostasis in premature newborns against the background of intrauterine pneumonia and hemorrhagic syndrome //Eurasian Union of Scientists. – 2018. – No. 3-1 (48).
20. Khakimova L., Lapasov S. Features of the course of pneumonia in young children //Inter Conf. – 2020.
21. Kotova A. N. Hemostasis system and features of antithrombotic therapy in children of the first year of life with “cyanotic” congenital heart defects // Cardiology. – 2011. – T. 14. – P. 05.
22. Letenkova N. M. Problems of diagnosing myocarditis in children // Pediatrician. – 2012. – T. 3. – No. 3.
23. Nitsa N. A. Disturbances in the hemostasis system in children with insulin-dependent diabetes mellitus: dis. – State Educational Institution "St. Petersburg Medical Academy of Postgraduate Education", 2008.
24. Roshchik A. S. The state of the hemostasis system in children with acute lymphoblastic leukemia on program chemotherapy: dis. – Altai State Medical University, 2010.
25. Saprygin D. B. Troponins //Emergency Medicine. – 2013. – No. 1 (48).
26. Sobki SH, Saadeddin SM, Habbab MA. Cardiac markers used in the detection of myocardial injury. Saudi Med. J. 2000; 21 (9): 843–846.
27. Skudarnov E.V. Basic mechanisms of hemostatic system disorders in children with juvenile rheumatoid arthritis // Novosibirsk State University. 2004.
28. Skudarnov E.V. et al. Thrombogenic risk factors in children with community-acquired pneumonia // Thrombosis, hemostasis and rheology. – 2018. – No. 2. – pp. 36-40.
29. Skvortsov V.V., Tumarenko A.V. Troponins in the diagnosis of myocardial infarction //Policlinic. – 2015. – No. 2-1. – pp. 15-16.
30. Zhurkabaeva B. D., Askarova A. E., Berdina O. D. The role of infection in the development of hemorrhagic stroke in children // Journal of Neurology and Psychiatry named after. SS Korsakov. Special issues. – 2018. – T. 118. – No. 5. – pp. 31-37.