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Hereditary Deficiency of Blood Coagulation Factor Vii – Hypoproconvertinamia Republican Specialized Scientific and Practical Medical Center of Hematology of the Ministry of Health of the Republic of Uzbekistan

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Abstract: ***Hypoproconvertinemia is a familial form of hemorrhagic diathesis caused by a deficiency of proconvertin (factor VII). Factor VII is a protein that migrates during electrophoresis between alpha and beta globulins. It is stable during storage, is not utilized in the process of blood coagulation, and therefore is found in both plasma and serum. Synthesized in the liver. The half-life in vivo is 4-6 hours. The disease is associated with a pathological gene located on the autosome and responsible for insufficient synthesis of proconvertin. Inheritance of proconvertin deficiency is recessive and not related to gender. Hemorrhagic diathesis caused by the presence of pathological factor VII, with structural changes in its molecule, is described. With hypoproconvertinemia of any etiology, the second phase of blood coagulation, the formation of thrombin, is disrupted, since factor VII takes part in the external mechanism of blood coagulation, contributing (together with tissue thromboplastin, factor V and calcium ions) to the activation of factor X, which converts prothrombin into thrombin.***

Keywords: Hypoproconvertinemia, Hemarthrosis, Coagulopathy, Hemorrhage, Blood Coagulation.

1. INTRODUCTION

With hypoproconvertinemia of any etiology, the second phase of blood coagulation, the formation of thrombin, is disrupted, since factor VII takes part in the external mechanism of blood coagulation, contributing (together with tissue thromboplastin, factor V and calcium ions) to the activation of factor X, which converts prothrombin into thrombin. The clinical

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picture manifests itself only in homozygous carriers of the pathological gene; in heterozygous carriers, hypoproconvertinemia is detected only in a laboratory blood test (prolongation of prothrombin time and a decrease in the content of factor VII). The disease usually begins in the first days or weeks of life, less often in adolescence. P. Chevallier and J. Bernard distinguish, respectively, two forms of hypoproconvertinemia - early and late. Early hypoproconvertinemia is characterized by a more severe course, starting with umbilical bleeding, late hypoproconvertinemia proceeds more calmly, often manifesting itself at the onset of the first menstruation, turning into profuse uterine bleeding. When patients reach adulthood hypoproconvertinemia, bleeding disappears (but factor VII deficiency persists).

Clinically, hypoproconvertinemia is expressed by symptoms of increased bleeding: hemorrhages in the skin, mucous membranes, joints, muscles, nasal and gastrointestinal bleeding, menorrhagia. With very low levels of factor VII in the blood, fatal cerebral hemorrhages have been described. However, manifestations of bleeding are not always adequate to the content of proconvertin in the blood. In some patients with severe hypoproconvertinemia, even major surgical interventions are not complicated by bleeding in the postoperative period.

The clinic of secondary hypoproconvertinemia is characterized by the appearance of bleeding against the background of manifestations of the underlying disease; hypoproconvertinemia in the treatment of indirect anticoagulants is manifested by the occurrence of hemorrhages, the first sign of which may be hematuria.

Complications are associated with hemorrhages in the joints. Emerging hemarthroses contribute to the deformation of the joints and the development of tight mobility in them. In some cases, extensive hematomas are formed with compression of the nerve trunks and large vessels. Sometimes hematomas suppurate with the development of symptoms of intoxication and sepsis. With extensive hemorrhages in the abdominal cavity, a picture of an acute abdomen may develop. With secondary hypoproconvertinemia, deficiency of other coagulation factors is simultaneously detected.

Severity of rare coagulopathy.

clotting factor	Form of the disease (according to the activity of blood coagulation factors, %)		
	severe	moderate	mild form
FII	not defined	< 10%	>10%
FV	< 10%	10 – 20%	>10%
FVII	< 10%	10 – 20%	>10%
FX	< 10%	10 – 40%	>40%

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Severe deficiency of factors, as a rule, is associated with the occurrence of severe spontaneous bleeding, hemorrhage. Moderate factor deficiencies are usually associated with mild/moderate spontaneous and post-traumatic bleeding episodes.

Mild forms of factor deficiency in most cases are asymptomatic.

2. MATERIALS AND RESEARCH METHODS.

The diagnosis is based on the data of the anamnesis: signs of increased bleeding in other family members (both male and female); clinical signs of the disease and laboratory data. To identify a deficient factor, the following is carried out: determination of prothrombin time according to Quick; determination of prothrombin time by adding 0.1 volume of "old" plasma or serum; determination of prothrombin consumption; study of partial thromboplastin time. With hypoproconvertinemia, prothrombin time is prolonged, which normalizes after the addition of "old" plasma and serum. Prothrombin consumption and partial thromboplastin time are normal. If hypoproconvertinemia is suspected due to the presence of factor VII pathology, it is necessary to additionally investigate the content of factor VII by the coagulation method.
Patient B., aged 15, first applied to the RSSPMCG for hematology. The clinical picture of the patient is bleeding into the skin, mucous membranes, nasal and gingival bleeding. Consanguineous marriage of parents denies. There was no family history of bleeding. At the age of 1 year, he received a lip injury, severe bleeding was noted, he was hospitalized, electrocoagulation was performed for hemostatic purposes.

3. RESULTS. LABORATORY DATA BEFORE TREATMENT:

APTT 31 sec, fibrinogen 4.0 g/l, Prothrombin 48%, FVII 12%, FII 98%, FV 100%; FVIII 84%, FIX 98%, FX 96%, FXI 79.9%, FW 130%, FXII 101%, XIIa-dependent fibrinolysis 6 min, platelet aggregation with ristomycin 85%, platelet aggregation with collagen 73%, platelet aggregation with ADP 69%. The absence of an FVII inhibitor made it possible to exclude acquired FVII deficiency. In the general blood test, the patient's hemoglobin was 92 g/l, erythrocytes 3.4 x 10*12/l, platelets 180 x 10*9/l; leukocytes 6 x 10*9/l; in a biochemical blood test - total protein 69 g/l, albumin 40 g/l, alanine aminotransferase 42 U/l, aspartate aminotransferase 29 U/l, creatinine 85 μmol/l.

Laboratory data after treatment:

APTT 28 sec., fibrinogen 3.4 g/l, Prothrombin 92%, FVII 75%, FII 103%, FV 100%; FVIII 104%, FIX 98%, FX 106%, FXI 91.0%, FW 150%, FXII 101%, XIIa-dependent fibrinolysis 6 min, platelet aggregation with ristomycin 85%, platelet aggregation with collagen 73%, platelet aggregation with ADP 69%. In the general analysis of blood in a patient, hemoglobin rose by 112 g/l, erythrocytes 3.8 x 10*12/l, platelets 202 x 10*9/l; leukocytes 7 x 10*9/l;
Taking into account the anamnestic, clinical and laboratory data, the patient was diagnosed with a hereditary deficiency of F FVII. FFP transfusions were continued at a dose of 700 ml/day (15 ml/kg of body weight), after stabilization of the patient's condition, the daily dose of FFP was reduced, and he was discharged from the RSSPMCG of Hematology 10 days later.

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4. CONCLUSION.

Thus, the treatment is reduced to stopping the bleeding that has arisen by transfusion of media containing factor VII (plasma, serum, recombinant blood coagulation factors VII, etc.) to increase the level of factor VII to 5-15% of the norm. Transfusions, given the short half-life of the deficient factor, should be given every 4 to 8 hours. until the bleeding stops. The clinical effect of the transfusion usually lasts for three weeks, although laboratory deficiency of the factor is again detected after a few hours. Fibrinolysis inhibitors can increase the effect of transfused media, especially when used after surgical interventions.

Treatment of secondary hypoproconvertinemia is reduced to the use of agents that positively affect the main process, and in the case of hemorrhages, to active transfusion therapy. Since hypoproconvertinemia is hereditary, complete recovery does not occur. The working capacity of patients largely depends on the frequency, duration and localization of hemorrhages. The prognosis worsens with cerebral hemorrhages with severe neurological symptoms. Prevention is reduced to the creation of a protective regime with the maximum exclusion of external influences (sharp physical stress, bruises and other injuries). Prophylactic transfusions are advisable, which are indicated for severe hypoproconvertinemia with frequent and intense cases of bleeding or exacerbation.

Medicogenetic consultations are of great importance, guiding spouses from families with hereditary factor VII deficiency regarding the possibility of having a child with hypoproconvertinemia.

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