A CASE OF RIGHT ATRIAL THROMBOSIS IN A NEWBORN INFANT

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The risk of neonatal thromboses consists in the development of severe complications (pulmonary artery thromboembolia) and a patient's death. The intensity of complications can vary from asymptomatic to fatal thromboses. With the implementation of ultrasound technique into diagnostics, thromboses in newborn infants are recorded more frequently. We described a case of the right atrial thrombosis in a newborn infant. Heparin therapy every 7 days under echocardiography and hemostasis indices control was chosen as the treatment modality. Heparin was administered for 11 days till complete thrombolysis.

Key words: newborn thrombosis; heparin therapy; thrombolysis.

Venous and arterial occlusions of the vessels in childhood are very rare events and occur spontaneously, mainly, in the neonatal period with the following increase of incidence at the beginning of the pubertal period. As a rule, a combination of a number of congenital and acquired factors is necessary for thrombosis to occur in children. Presently a variety of hereditary factors are certain or likely to lead to thrombosis development: inherited decrease of physiological anticoagulant activity — proteins C, S, antithrombin III and others [1].

A large number of gene polymorphisms of the hemostasis system has been studied. The role of the following polymorphisms has been proved: mutation of factor V (Leiden) (G1691A), factor II (2021A) [2]. Gene polymorphism of methylenetetrahydrofolate reductase (MTHFR) (C677T) synthase methionine reductase (MTRR) (A66G) involves homocysteine metabolism disorder and elevation of its concentration in the blood [3, 4]. High concentration of homocysteine damages endothelium and causes thrombosis. The role of procoagulant activity increase — factors VIII, Willebrand, fibrinogen — in the processes of pathological thrombus formation is being studied [2].

Besides, acquired factors such as heavy somatic and infectious diseases, malignant tumors, systemic inflammatory diseases of the connective tissue, hemolytic anemias, hyperhomocysteinemia, increase of lipoprotein level in the blood — contribute greatly to thrombus formation in children [5]. Lately, great attention in the pathogenesis of thrombosis in children is being paid to connective tissue (mesenchymal) dysplasias [6], and others.

No less important in the development of thrombosis are vascular catheters. Intravascular manipulations are certain to be a powerful stimulus of thrombus formation, the triggering mechanism, which in the absence of the sufficient limiting potential leads to the excessive thrombus growth, occlusion of the vessels, and disturbance of the organ blood flow [7]. Due to the commonly used catheterization of the umbilical and subclavian veins and implementation of diagnostic ultrasound examinations, thrombosis in the first weeks of life is registered more and more often.

The intensity of neonatal thrombotic disorders may vary considerably — from asymptomatic thrombosis to fatal ones. Diagnosis of thrombosis in newborns is rather difficult, since there are no reliable criteria in the clinical

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picture. An exception is syndrome of the superior vena cava, which has characteristic signs: edema of the upper part of the trunk.

Angiography is recognized to be a "gold standard" in the diagnosis of thrombosis in the adult patients, however in neonatal infants ultrasound examination techniques become more common.

On the basis of the department of pathology of newborns and premature babies of Children Municipal Clinical Hospital No.1 (Nyzhny Novgorod, Russia) a case of right atrium thrombosis has been diagnosed. Clinical observation of the case is given below.

As is known from the history, patient Stch. was born from his mother's first pregnancy, the course of which was accompanied by a threat of miscarriage at early terms, bacteriuria, edemas at the end of gestation. Mother suffered from varicose veins of the lower limbs. She did not have any hereditary blood diseases. Delivery was at term with head position of the fetus. Her condition in labor was satisfactory. Apgar scores were 8/8.

In 10 hours after birth a sudden worsening of the patient's condition occurred: there developed a syndrome of overexcitation, accompanied by skin cyanosis, acrocyanosis, petechiae in the area of the head, face, groin. In the somatic status breathlessness up to 70 breaths/min, tachycardia up to 170 beats/min, drop of the oxygen saturation up to 78% were noted. Catheterization of the umbilical vein was performed and infusion therapy was started.

In an hour after the beginning of the treatment the condition worsened again: breathlessness increased up to 100 breaths/min, oxygen saturation level decreased up to 79–82%. On auscultation, single moist rales in the lungs were heard, tachycardia reached 200 beats/min, a "gallop" rhythm. Because of the growing severity of his condition, artificial pulmonary ventilation was started.

On the 1-st day of life the infant was examined by the cardiosurgeon, echocardiographic investigation was also performed. Exudative pericarditis without tamponade signs was suggested. Open arterial flow with moderate left-to-right shunt and hypertrophy of the right ventricle myocardium were revealed. In the course of dynamic observation and investigations data on exudative pericarditis was not confirmed.

On the 6-th day the baby was transferred to the resuscitation and intensive care unit of the above mentioned hospital with the diagnosis: "respiratory distress-syndrome, heavy course. Antenatal infection of unknown etiology. Cardiopathy. Suspected exudative pericarditis. Functioning arterial duct. Cerebral ischemia of moderate degree, syndrome of overexcitation."

Umbilical catheter was removed on the 7-th day of life.

On admission to the in-patient unit echocardiography was performed using US scanner Sim-7000 Chelenge (Russia), equipped with 5 MHz transducer. The investigation showed the prevalence of the right parts of the heart with a slight hypertrophy of the right ventricle walls, and the functioning arterial duct. Hydropericardium across the anterior wall of the right ventricle — up to 5.5 mm, up to 4 mm — at the top. In the right atrium cavity there was an echogenic formation sized 11x9x8 mm with irregular, clear contour near the upper third of the atrium, which did not float into the cavity.

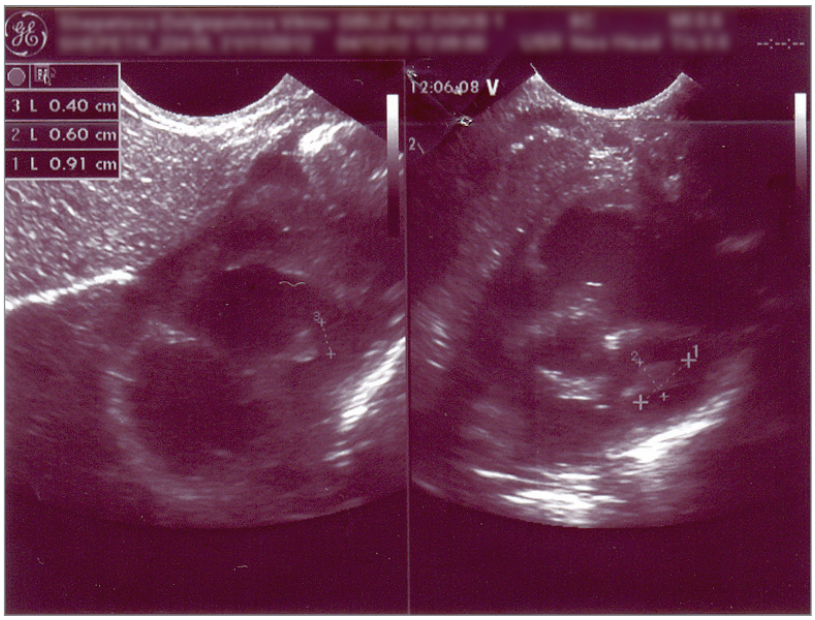
It was necessary to differentiate a thrombus from the tumor process in the right atrium. The following facts evidenced in favor of the thrombus: the changed rheological properties of blood in the patient (during 2 weeks it was impossible to make coagulogram due to the formation of the blood clot in the needle), long-term application of the umbilical catheter, and availability of ischemic damage of the brain as a high risk factor of thrombus formation, which may be accompanied by the changes in rheological blood indexes.

Thus, on the basis of the history-taking data (hypoxia, long-term application of the catheter), objective examination and investigations (changed rheological blood properties, echocardiography findings) the following diagnosis was made: "Cardiopathy. Right atrium thrombus. Closing arterial ligament. 0 degree of blood circulation insufficiency".

The danger of this situation is in the possibility of pulmonary embolism development, appearance of heart insufficiency signs and fatal outcome for the patient.

Because of the hypercoagulation hemostasis status, on the 12-th day of life it was decided to start heparinotherapy subcutaneously in the dose of 50 units/kg/day. Echocardiography and control of blood coagulation indexes were made every 7 days (See Figure).

Heparinotherapy was carried on for 11 days and completed by a full lysis of the thrombus and reduction of hydropericardium. Indexies of hemostasis system after heparinotherapy returned to normal values.



Echocadiogram of newborn Sch.: in the cavity of the right atrium an echogenic formation 9x6x4 mm in size with irregular, clear contours, without floating into the cavity, is visualized (at the 2-nd day of heparin treatment)

The infant was discharges from the in-patient unit at the age of 1 month in the satisfactory condition.

The study complies with the Declaration of Helsinki (the Declaration was passed in Helsinki, Finland, June, 1964, and revised in October, 2000, Edinburg, Scotland). Written informed consent was obtained from every patient.

The success in the treatment of this case was due to two factors: correctly and timely diagnosing thrombosis of the right atrium and performing the proper therapy for thrombus resolution.

The experience gained allows us to recommend the following tactics of examination, prevention and management of local thrombosis in newborns to avoid similar situations:

the condition of hemostasis system in newborns can be determined on the basis of the following informative minimum: blood clotting time and bleeding duration, thrombocyte count, active partial thromboplastin time, thrombin time, prothrombin time and prothrombin index, fibrinogen count;

taking into account a high occurrence of hereditary determined thrombosis it is necessary to examine close relatives (first of all, parents, sisters and brothers) for protein C, S activity, antithrombin activity, concentration of serum homosteine, and if needed, to carry on molecular genetic investigations;

after the introduction of any central catheter to add 3–5 units/kg/day of heparin into the infusion medium;

on the 3–5-th day after each catheterization to perform control US examination of the cardiovascular system and hepatic vessels;

in case of local thrombosis and absence of data on the syndrome of disseminated intravascular blood coagulation, heparin in the dose of 10–50 units/kg/day should be administered subcutaneously, if there is impaired microcirculation — in combination with pentoxifylline;

US control of the heart is to be made once in 5–7 days;

heparin should be discontinued gradually during 3 days after thrombus lysis;

average thrombolysis time in adequate heparin dose takes 7–10 days.

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