

**The structure of the intracranial veins and elastic-viscous properties of erythrocyte membranes in children with connective tissue dysplasia**

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**Goal.** To study the structure of intracranial veins and elastic-viscous properties of erythrocyte membranes in children with connective tissue dysplasia.

**Methods.** The study group (group 1) consisted of 80 children with signs of connective tissue dysplasia in age from 10 to 16 years. Symptoms of connective tissue dysplasia was evaluated by the criteria Loeys A., Beighton P. A control group (group 2) consisted of 50 healthy children.

Magnetic resonance angiography was performed on the apparatus Siemens Magnetom Symphony, equipped with a superconducting magnet system with field strength of 1.5 Tesla.

In order to examine the state of the cytoplasmic membrane of erythrocytes were manufactured dry preparations of erythrocytes. The product was carried out using an atomic force microscope of the company «NT-MDT» the model «SOLVER P47-Pro», equipped with non-contact silicon probe NSG10 series (NT-MDT). They used a semi-contact technique. Scanned area of the sample was 90 × 90 mm. Each specimen randomly selected 15 red blood cells on the membrane of each of the erythrocyte at 4 points studied elasticity in accordance with the maximum technical capabilities of the device model, with further calculation of the arithmetic mean value of Young's modulus for each scanned cell. Data were processed using a microscope attached to a computer program «Nova» for plotting the curves of power and quantifying the erythrocytes membrane elasticity. Quantification of membrane elasticity was carried out by calculating the Young's Modulus (E, MPa). The higher the value of Young's modulus, the less elastic cell membranes of erythrocytes and above its rigidity. When paired comparison groups of patients was used nonparametric Mann-Whitney U-test. Results are expressed as median, quartiles 25 and 75, M (25%; 75%). Differences were considered significant at the achieved level of significance  $p < 0.05$ .

**Results.** During the magnetic resonance angiography in group 1 patients hypoplasia of the right transverse sinus occurred in 5% of cases, arteriovenous malformations - in 5% of cases, hypoplasia of the left transverse sinus - in 10.5% of cases, hypoplasia of the left sigmoid sinus - in 5% of cases, hypoplasia of the left internal jugular vein - in 10.5% of cases. In group 2 the development of intracranial venous anomalies have been identified.

Patients of group 1 Young's modulus was equal to 182,68 (132,43; 232,94) MPa, in the comparison group - 111,48 (38,35; 184,61) MPa. The value of the Young's modulus was significantly higher in children with connective tissue dysplasia ( $p < 0,05$ ).

**Conclusions.** For children with severe dysplasia of the connective tissue characterized by congenital malformations of intracranial veins, which in itself can be a predictor of cerebrovascular pathology. In children with connective tissue dysplasia a higher Young's modulus erythrocyte membrane in infants than control group, suggesting decreased erythrocyte deformability when passing through the microvasculature.