

SUMMARY

Aim. In our study we focused on the ultrasound diagnostics of intracranial hypertension in neonates with diagnosis of posthemorrhagic hydrocephalus (PHH). We wanted to try and verify the method of „pressure provocation test“. When performing this test, the great fonticulus is compressed by ultrasound probe and simultaneously systolic and diastolic velocities are being measured in the internal genu of the anterior cerebral artery with resistive index calculation. Pressure on fonticulus during examination shows us the reserve capacity of liquor spaces and the response in cerebral arteries blood flow. The primary objective was to verify, if the basic and compressive resistive index correlates with the presence and eventually with the severity of intracranial hypertension. The secondary objective was to find relationship between the degree of intracranial hypertension and the diameter of cerebral ventricles, to assess the rapidity of PHH development and to find out, in which period is PHH the most common.

Method. In years 1999 – 2008, 52 children with diagnosis of posthemorrhagic hydrocephalus were examined in our department. The average birth weight in children with PHH was 1436 g (550 – 4090 g, median 1150 g). The average age was 29,6 weeks (24 – 41 weeks, median 28 weeks). Totally, 73 % of children had very low birth weight (VLBW). From the total count of 445 examinations, 162 values were chosen for the next statistic processing. The criterium for choice was simultaneous measurement of ventricle diameters, basic resistive index (IR), compressive resistance index (IRc) and direct intracranial pressure measurement (ICPm). The value of intracranial pressure (ICP) measured during lateral ventricle or subgaleal space puncture was set as a „gold standard“.

Results. Posthemorrhagic hydrocephalus developed on average in 16 days after the childbirth, till day 19 after the birth intracranial hypertension was proved in 95 % of children. From the total count of measurements (n = 162), 7 IRc were false negative and 4 false positive, in ICP > 11 cm there was 1 false negative outcome. The IR values in children with proved intracranial hypertension were in 71,3 % (107 measurements) false negative and didn't correlate to the value of ICP (p < 0,5). There was no correlation found between the ventricle diameter and the measured value of ICPm. The total accuracy of the method achieved 93,2 % with high sensitivity (95,5 %) and low specificity (36,4 %).

Conclusion. Doppler ultrasonography is the method of first choice when clinical suspicion on hydrocephalus is present. It is a safe, non-invasive examination and can be performed also in heavily immatured and instable neonates directly in cuvesis. In the most of cases, the method is able to determine etiology of hydrocephalus, to follow the effect of one-step punctures and to monitor the function of ventricular shunts. Compressive doppler ultrasonography is able with high accuracy to determine the presence of intracranial hypertension even before development of clinical signs.