Computed NLS-graphy in combined clinical-instrumental evaluation of dyscirculary encephalopathy progressing

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Chronic forms of brain vascular pathology have become weightier in structure of cerebrovascular morbidity recently. Dyscirculary encephalopathy (DE) has the biggest specific weigh among them. Clinical presentation of the disease is well studied, but at the same time problems of structural changes in brain detection, identifying of clinical and instrumental parallels and early defining of treatment optimal tactics became more and more urgent from the point of view of case-based medicine. Objective of the present study is research of clinical and instrumental presentation of dyscirculary encephalopathy in patients suffering from various stages of the disease.

Material and methods of study

We carried out combined clinical-instrumental and radiation examination of 87 patients suffering from DE, aged from 31 to 86 (average age is 54.5). Majority of patients were male (70%). All patients were administered to laboratory examination (general clinical and biochemical), electrocardiography, ultrasonic Doppler research of head and neck vessels, roentgenography of cervical spine, electroencephalography, rheoencephalography, and according to indications – ultrasound examination of abdominal cavity organs, echocardiography and computed NLS-graphy.

Computed three-dimensional NLS-graphy was carried out with “Metatron”-4025 system (the IPP, Clinic Tech Inc.) with 4.9 GHz generator frequency, with digital trigger sensors and unit of continuous spiral scanning according to standard methods.

Peculiarities of acquired three-dimensional pictures of brain analysis are fulfillment of not only quantitative, but also qualitative evaluation of size, shape, number of leukoaraiosis nidi, chromogeneity of signal taken from detected nidi. To fulfill these goals we used “Metapathia GR Clinical” computer software, which make possible to visualize scanned object in three-dimensional mode.

Results and discussion

According to results of combined examination al patients were divided into three groups depending on DE stage. The first group consisted of 25 patients (28.7%) suffering from DE of 1st stage, the second – 45 patients (51.7%) with DE of 2nd stage and the third – 17 patients (19.6%) with 3rd stage of the disease.

Reasons of disease development we identified on the basis of testing and questioning of patients, study of disease history, detailed combined laboratory and instrumental examination.

We could not identify one leading factor in dyscirculary encephalopathy etiology; it confirms information about polyetiollogic character of DE. Atherosclerosis was the reason of dyscirculary encephalopathy in 9 patients (10.4%), arterial hypertension – in 23 patients (26.4%), in 44 cases (50.6%) we registered combination of these factors. In 11 cases (12.6%) we detected other etiological factors. Disorder of venous outflow was registered in 73.6% (64) of examined patients.
Cephalgia syndrome was detected in 54 patients (62.1%), and as the disease progressed we registered decreasing of headaches frequency and intensity. 58 patients (66.7%) complained of headache, generally patients with DE of second stage. Major part of patients (65) complained of asthenic problems, the most frequent among them were: concentration problems, emotional disorders and increased fatigability. It should be noted that these symptoms were more frequent during initial stages of the disease and in some cases held leading positions in clinical picture of disease. Memory disorders were registered in 5 patients (20%) suffering from DE of the first stage, in 22 (48.9%) of the second and in 12 (70.6%) patients of the third stage. The most frequent was worsening of fixation memory, at the same time long-term memory was not affected. Sleep disorders were detected more frequently in patients with initial stages of the disease, at the same time at DE of the third stage there were no such complaints. A number of patients mentioned subjective hearing symptoms: tinnitus, hearing impairment. But when tinnitus was registered in patients suffering from the second and the third stage of DE, complaints of hearing impairment were present even at the first stage of the disease.

Neurological examination detected cranial innervation disorders quite often even at early stages of DE in forms of pupillary light reaction worsening, weakness of convergence, central paresis of facial muscles, lesser deviation of tongue; intensity of these signs increased as the disease progressed. Reflexes of oral automatism and pathological hand reflexes were also detected more frequently as the disease progressed. Pathological reflexes of lower extremities we registered very seldom, generally in patients suffering from the second and the third stage of DE. Static disorders were detected in 60 patients (69%) and generally in those suffering from the second stage of DE (75.6%) and in all patients with DE of the third stage. Coordination disorders were registered not so often (51.7% of cases) and again in the second and the third groups mainly. Vegetative disorders were diagnosed in all examined groups with equal frequency. Intellectual-mnestic disorders were detected in majority of patients of the third group (70.6%) and according to NINDS-AIREN criteria they reached dementia stage.

Analysis of detected by NLS-research changes included evaluation of quantity, localization, size and chromogeneity of topical nidi and carrying out of resonance-entropy analysis (REA) for identifying of pathomorphological changes character.

According to results of computed NLS-scopy all patients were divided into five groups: 1) – 3 persons (3.5%) – in patients these patients no brain changes were detected; 2) – 32 examined persons (36.8%) – patients suffering from lesser changes of brain (single (up to 5) local small (up to 0.5 cm²) nidi); 3) – 26 patients (29.9%) – patients with 5 – 10 small local and/or less than 2 large local nidi; 4) – 20 persons (23%) – patients with more than 10 small and/or more than 2 large local of few merging nidi; 5) – 6 patients (6.8%) having nidi of merging character.

The first group consisted of 3 patients in which DE of the first stage was diagnosed after clinical examination. In clinical picture of these patients cephalic and astheno-neurotic syndromes prevailed; neurological examination detected vegetative disorders in form of changed dermographism, vasomotor lability, extremity coldness and acrocyanosis, excessive sweating or, on the contrary, xerodermia.

Main neurovisualization phenomena detected by NLS-research in patients of the second group, which consisted of 19 patients with the first stage of DE and 13 patients with diagnosed second stage of DE, were insignificant nidal changes if 3 – 4 points according to Fleindler’s scale. Besides in some examined patients (17 persons) we detected single local small hyperchromogenic nidi (4 – 5 points). It was three-dimensional image that turned out to be the most informative in revealing gliosis small nidi, character of which was updated by REA later on.
Using resonance-entropy analysis we also detected signs of initial (3 – 4 points) atherosclerotic changes of intracranial arteries.

The third group mainly consisted of patients suffering from dyscirculatory encephalopathy of the second stage (21 patients), three patients with DE of the first stage and 2 patients with diagnosed by preliminary examination DE of the third stage. Neurological examination of these patients detected, most often than in the previous group, reflexes of oral automatism and pathological hand reflexes. As a rule, nidi in these patients were localized in para- and supraventricular areas.

In patients of the fourth group (11 patients with DE of the second stage and 9 patients with DE of the third stage), NLS-research detected large merging hyperchromic nidi (4 – 5 points according to Fleindler’s scale) with the background of multiple lesser nidi. Patients of this group complained of giddiness, disorders of coordination and memory. Neurological examination detected various neurological syndromes – discoordination, pyramidal and amyostatic.

The fifth group consisted of 6 patients with DE of the third stage. In these patients NLS-research detected mainly merging nidi (5 – 6 points), REA detected internal and external cerebral hydrocephaly combined with brain tissue atrophy. In this group of patients we registered the most significant changes of intracranial arteries (5 – 6 point). In clinical picture of these patients static and coordination disorders prevailed, also intellectual-mnestic disorders reaching dementia stage were registered.

**Conclusion**

Clinical picture of DE has progressing course. As analysis of NLS-research results proven, there are no pathognomonic changes in brain at the first stage of the disease, apparent neurological syndromes are not formed; subjective disorders, accompanied by light neurological semeiotics, predominate. The second stage of DE allows us to single out certain prevailing neurological syndromes – discoordination, pyramidal and amyostatic, which are manifested by presence of single or multiple gliosis nidi without tendency to merging, and that is the reason of patients’ professional and social adaptation significant decreasing. During the third stage of DE number of complaints significantly decreases, however neurological disorders become more apparent, they are presented in form of quite distinct and significant neurological syndromes, combining with apparent structural changes of brain, according to data acquired by NLS-research with REA.

Thereby together with DE development, structural changes of brain tissue become more frequent: frequency and extent of atrophy, single cystic-nidal changes of brain become multiple.

Diagnostics of DE should be complex and include methods of neurovisualization, and one of the most informative and prospective of them we consider to be NLS-graphy with REA. Detection and evaluation of nidal and diffuse NLS-changes of brain tissue, in the context of clinical and sub-clinical neurological and neuropsychological data, create condition for early diagnostics of DE progredient forms and carrying out of active therapy targeted for prevention of further brain damage.