CLINICAL DIAGNOSTICS OF SYMPTOMATIC EPILEPSY IN CHILDREN

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The aim of the study was to determine the features of informativnes of MRI and EEG studies in children with symptomatic epilepsy after meningoencephalitis. MRI and EEG studies were performed in 35 children with symptomatic epilepsy after meningoencephalitis. Symptomatic epilepsy in children after meningoencephalitis developed in quite early periods (0,93 ± 0,25 years) and is characterized by multiple lesions, which are mainly bilateral and symmetrical, with a clear demarcation from the surrounding tissues in MRI studies. EEG studies identified diffuse character of brain changes which were observed in most of the children, at a reduced amplitude level with hypersynhronization and with signs of epiactivity.

Keywords: epilepsy, meningoencephalitis, electroencephalography, magnetic resonance imaging

Relevance. Epilepsy in children has its own periods which is unique to a certain age period – «fragmentation» of seizures, symptoms that mimic spontaneous locomotor activity or unconditioned reflexes of neonatal period, etc [7]. Therefore, in complicated cases of the diagnostics of epilepsy it is important to assess not only clinical manifestations of seizures, but also results of paraclinical investigations such as electroencephalography, magnetic resonance imaging and disorders of psychomotor retardation, organic neurological symptoms. However neuroimaging methods provide only views about the structural changes of the brain without the possibility of evaluating its functional state. Developmental disorders of motor and mental function often accompany with seizures in children, but it is not always the necessary condition for their occurrence [3]. Moreover, a number of pathological conditions of childhood epilepsy, such as Landau-Kleffner syndrome, status epilepticus in slow wave sleep phase may not have seizures in their structure. Their diagnosis is usually based on the EEG data [2]. Meningoencephalitis – a serious disease of the brain and its meninges. In any case, such complication is a serious pathology, which has a poor prognosis and residual neurologic deficit. Severity of residual effects depends on the degree of damage to the central nervous system. Symptomatic epilepsy after meningoencephalitis in this group of children is 27,8 % of cases [5]. Some authors suggest about arachnoiditis, meningoencephalitis measles and influenza etiology in the origin of epilepsy [4]. The inflammatory changes of the brain are not a rare finding in neuroradiological examination of children with symptomatic epilepsy after meningoencephalitis [1]. In the analysis of the literature we have found that among many aspects of this problem is less studied the nature and mechanisms of epileptic seizures. Great interest in symptomatic epilepsy has importance of association between the rudeness of organic brain damage and the severity of the epileptic process.

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Materials and methods of research

MRI studies were performed in 35 children with symptomatic epilepsy after meningoencephalitis. Children ages ranged from 1 to 12 years (mean age was 5,7 ± 0,55 years). The patients were examined and treated at the Department of Neurology in Tashkent Paediatric Medical Institute for the period from 2010 to 2012.

Debut of epileptic seizures was observed after underwent disease which developed in stages of clinical manifestations of meningoencephalitis with high fever, headache, repeated vomiting, lethargy, or, conversely, of excitement. The average age of onset ranged from birth to 1,5 years. Disease duration was 4,8 ± 0,51 years.

MRI studies were performed on standard technology (axial, coronal and sagittal planes). The studies were conducted in three planes – axial, coronal and sagittal – using standard axial debut with a basic overview orbito-meatal plane.

The proposed method of MRI scan for epilepsy is an advanced MRI technique which has been first applied in Uzbekistan.

EEG – a method based on the recording of electrical activity (biopotentials) of the brain, gives an indication of its functional status, severity of disorder the child's nervous system, to monitor the dynamics of the process, and to identify the presence of convulsive changes and the functional state of deep structures of brain. [3]

EEG was performed using a 16-channel electroencephalograph «Neyrocartograf MBN-1» with a spectral mapping of scientific medical company «MBN» (2008 edition).

The data obtained were subjected to statistical analysis on a PC Pentium-4 program package developed in EXCEL using a library of statistical functions to the calculation of the arithmetic mean (M), standard deviation (σ), standard error (m), relative values (frequency, %) , t-test (t) with the computation of the probability of error (*P*). Differences of mean values was considered significant at a significance level of $P < 0,05$. At the same time adhere to the existing guidelines for statistical analysis of data from clinical and laboratory studies.

Results of research and their discussion

Data analysis of neurological status in children with symptomatic epilepsy after meningoencephalitis indicated severe symptoms of organic lesions revealed not only in large areas of the cortex but also in subcortical structures

of brain (prevalence of spastic hemiparesis, hyperkinesis, gemigipestezii). Less harsh symptoms of organic brain damage in children with symptomatic epilepsy after meningoencephalitis, were observed in children with less disease duration from the time of exposure of the pathological factors. In a study of 35 children with the consequence of meningoencephalitis with symptomatic epilepsy in 5 (14,3 %) children found midline shift of the brain, in 12 (34,3 %) children found asymmetry of the lateral ventricles. Subarachnoid perivascular space enlarged in 22 (62,9 %) of children, which in the majority of cases in the fronto-temporal region of the brain. Expansion of the subarachnoid space was recorded in 19 (54,3 %) of the children mainly due to cortical atrophy of the cerebral hemispheres. In the white matter of the brain in 6 (17,1 %) patients revealed multiple foci and areas of cystic degeneration.

Piaarahnoidal peculiar type of contrast enhancement of vessels in the area of inflammation may be considered typical of debuts viral encephalitis (Fig. 1).

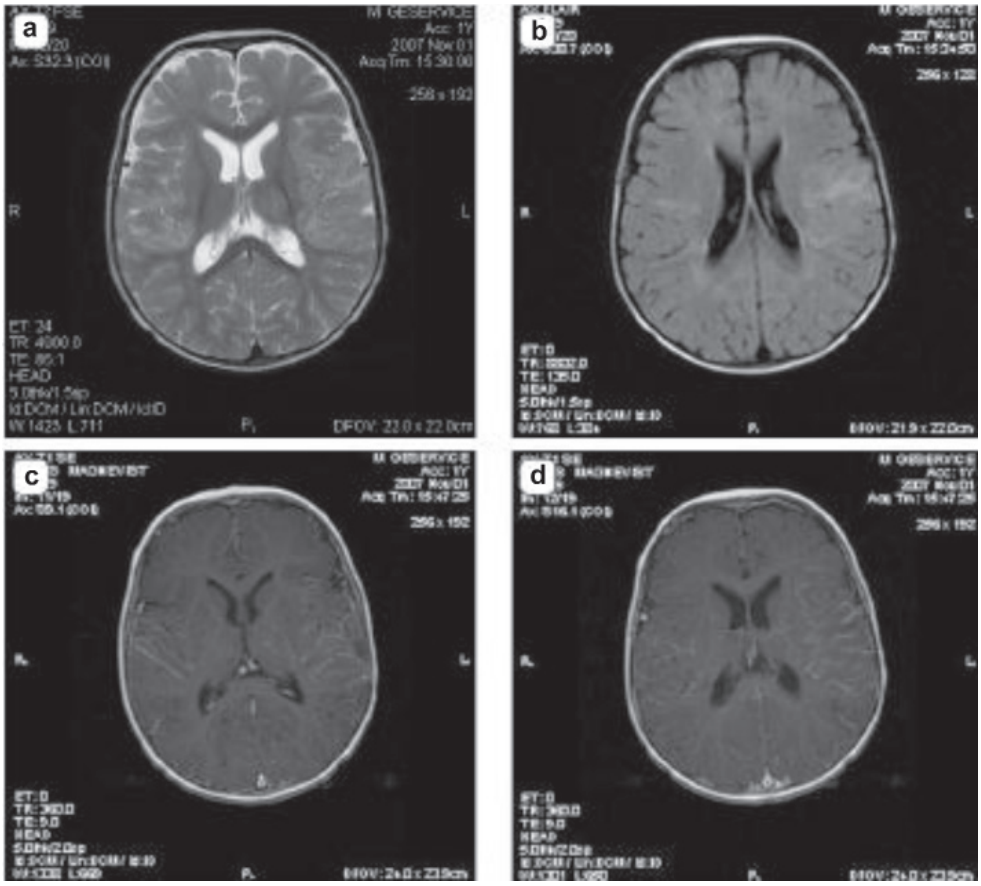

Fig. 1. Patient Z., 6 years. Acute viral encephalitis:
a – T2-FSE (TRR4900/TEE86; 1 – axial plane: bilateral unexpressed zoneof temperate increase T2 signal intensity without clear contours, localized mainly in the opercular regions of both hemispheres, mostly on the left; b – FLAIR (TRR8890/TEE136). Axial plain: linear transmantin zone in opercular regions extending from the crust down to the contours of the lateral bodies of lateral ventricles; c, d – T1 SE (TRR300/TEE90). Axial plane, intravascular contrast enhancement (Magnevist 10 ml). In the presented MRI images clearly demonstrated phenomenon of «vascular gain» or piaaarahnoidal contrast enhancement (Fig. 2), which is character to regional or diffuse inflammatory processes associated with increased vascular permeability and impaired blood-brain barrier

In the future, it is possible calcification of foci, in particular, after cytomegalovirus encephalitis. Since calcification is generally nonspecific response of brain tissue to the impact of various damaging factors, then to make definite conclusions about the genesis of the underlying occurrence of cerebral calcification phenomena in the absence of clear clinical and anamnestic data must be retained (Fig. 2).

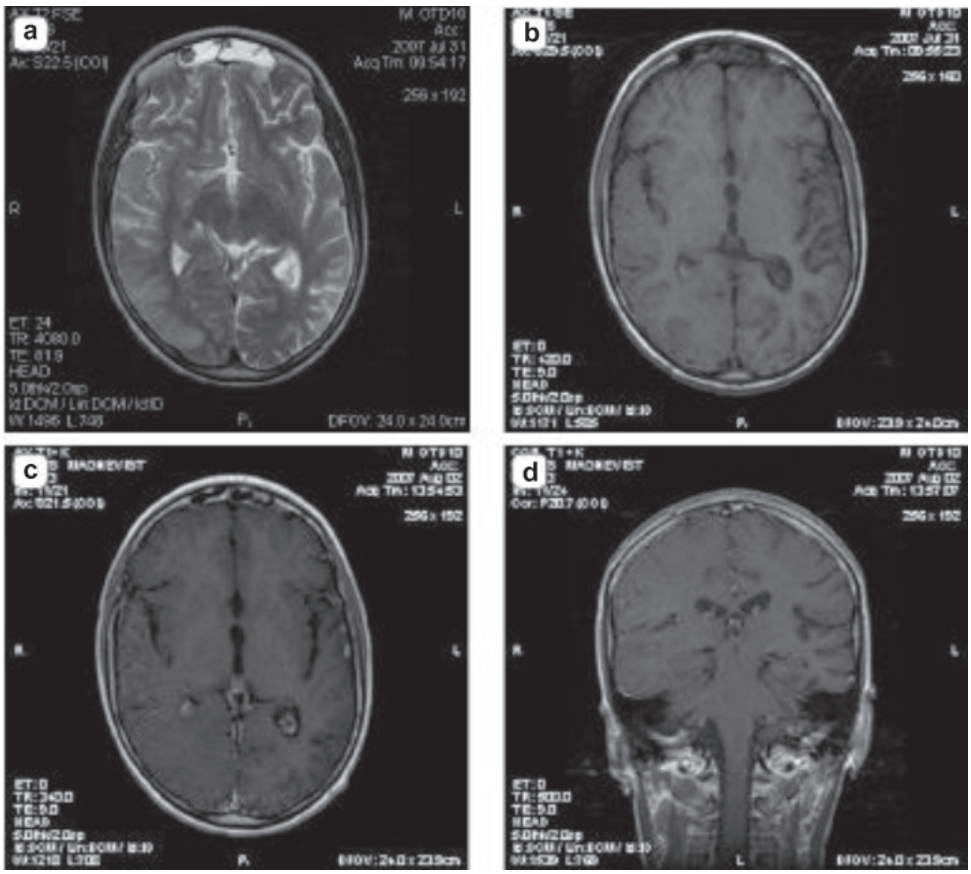

Fig. 2. Patient T., 14 years old. Acute viral encephalitis. 0,5 T MRI:
a – T2 FSE (TRR4080/TEE81, 9). Axial plane: unclearly restricted zone of slightly increased T2 signal and unclear differentiation of gray and white matter in the right occipital-parietal lobe; b – FLAIR (TRR8890/TEE136). Axial slice shows linear transmantinal zone in opercular regions extending from the crust down to the contours of the lateral bodies of lateral ventricles; c, d – T1 SE (TRR300/TEE90). Axial slices, intravascular contrast enhancement (Magnevist10 ml / jet)

In this case, it is important the role of diffuse weighted images that can visualize strictly localized nature of encephalitis and indicate about generalization of process. The main neuroradiological symptoms of viral encephalitis are primarily multiple lesions in white and gray matter, their predominant bilaterality and symmetry, a clear demarcation of the surrounding tissues. Naturally, it is a about post inflammatory process, when the process was through, and neuroimaging professionals have to deal with the case of brain where structural disorders were completed. The paraclinical and instrumental methods of examination are vital for the correct diagnosis, choice of treatment. EEG should be first mentioned which can definite the brain activity with symptomatic epilepsy after meningoencephalitis. The results of EEG studies are presented in Table.

When comparing the EEG parameters we have established that brain changes of a diffuse character were observed in most of the children, at a reduced amplitude level with gipersinhronization, signs of epiactivity, which did not exclude the involvment of deep brain structures.

Conclusion

Thus, symptomatic epilepsy develops quite early after meningoencephalitis (0,93 ± 0,25 years), and their causal role in the genesis of epilepsy was confirmed by frequently finding focal atrophic changes and arachnoidal cysts, which often cause the formation of the epileptic focus and development of seizures. EEG pattern characterized by diffuse character of brain changes which observed in most of the children, at a reduced amplitude level with gipersynhronization, signs of epiactivity, which did not exclude the involvment of deep brain structures.

EEG changes in symptomatic epilepsy after meningoencephalitis

Type of EEG changes	Number of patients with EEG abnormalities	
	Number	%
Cerebral disorders	14	40
Diffuse changes of brain	23	65,7
Involvment of stem structures	9	25,7
Focal changes	6	17,1
The disorganization of the cortical structures	4	11,4
Disrythmic EEG type	11	31,4

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