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# Electroencephalographic Signs Characteristic for Without Several Epileptic Encephalopathy in Preschool Children

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**Annotation.** Epileptic encephalopathy is a condition when a pathological altered brain electrogenesis is the cause of impaired brain function [5,6]. The epileptic process leads to progressive impairment of brain functions. According to the literature, these disorders depend on the form of 5 to 40% of behavioral, mental and neuropsychological disorders [2,4,8,9]. Currently, some researchers consider interictal epileptic psychoses as a manifestation of epileptic encephalopathy. Epileptic encephalopathy is a condition where pathologically altered brain electrogenesis is the cause of brain dysfunctions. In which the epileptic process as such leads to progressive dysfunctions of the brain.

**Keywords:** epileptic encephalopathy, epilepsy, West syndrome, Lennox-Gastaut syndrome, Otahara syndrome

**Purpose of the study:** To study the characteristic electroencephalographic signs without the convulsive form of epileptic encephalopathy.

**Materials and research methods.** The study included 25 children with a diagnosis without a convulsive form of epileptic encephalopathy. Most of them were sent for examination by a neuropsychiatrist for behavioral, cognitive disorders and delays in psychomotor, psychoverbal or general mental development. The average age of the observed children with no convulsive form of epileptic encephalopathy was 5.1±0.6 years. The onset of the disease was 3.5±0.54 years and varied from 3 to 7 years. In this work, general clinical, neurological, and instrumental research methods (EEG) were used.

**Results and discussion.** During EEG monitoring, pattern-diffuse slow peak-wave activity was observed in 60.0% of patients, bilateral and synchronous with a frequency of 1–2.5 Hz, with an emphasis on the frontal and temporal lobes. In 56.0% of children, diffuse slow acute waves were recorded during the wakefulness phase in the interictal period.

This pattern consisted of a sequence of irregular and generalized spikes or sharp waves followed by sinusoidal slow waves of 35-400 duration with an amplitude of 200-800 microvolts, which were 68.0% symmetrical and 32.0% asymmetric. The amplitude of the waves is higher in the frontal - in 80.0% and fronto-central areas - 16%.

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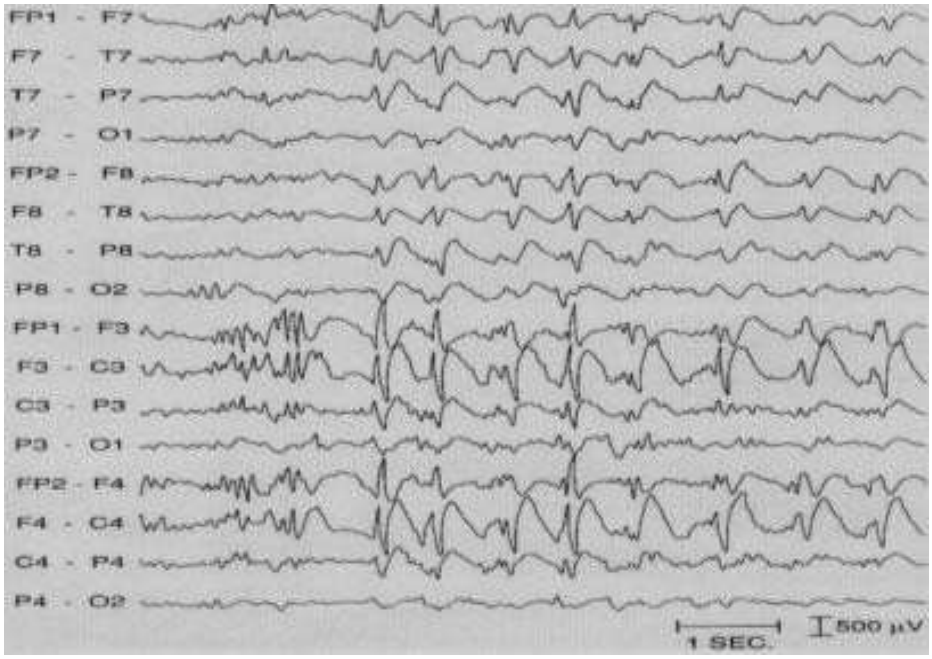
In 20.0% of patients, the EEG revealed hypsarrhythmia of one form or another. In 20.0% with this pathology, EEG anomalies were observed, including paroxysmal discharges that affect both hemispheres. The defining characteristic in this category of children was pathological changes in bilateral spike waves, which were maximal in the posterior temporal regions of both hemispheres and continued during sleep.




**Diffuse slow sharp waves in Lennox-Gastaut syndrome (Patient M., 5 years old)**

An EEG study revealed bursts of α-, β-, and λ-activity with an amplitude of 200-1000 μV (598±21.3 μV). In our observations, the main EEG phenomenon, along with high-amplitude activity, was a gross rhythm disturbance. High-amplitude activity was slow in nature, often combined with epileptiform activity, which made it possible to classify this phenomenon as epileptic dysrhythmia. Such a gross violation of bioelectric rhythms indicates a severe disorder of the functions of the noted structures, which, as a rule, are pacemakers of epileptic activity in partial forms of epilepsy.

This actually determines the absence of epileptic seizures in patients with the above gross mental disorders, which is especially important, since at present the concept of the genetic mechanism of behavioral disorders and developmental disorders in such a contingent of patients, as well as dysfunction of the brain transmitter systems (dopaminergic, etc.) finds confirmation only in isolated cases.

During EEG monitoring during wakefulness, a posterior dominant rhythm of 6-7 Hz and 8-9 Hz was recorded with spread to the posterior regions of the brain (10%), frontal regions (20%) and temporal regions (60%), the background recording is represented by diffuse waves slow range (30%). RFS without significant changes (50%). HB at 3 minutes of HB BS, a flash of high-

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amplitude slow-wave activity in the theta and delta range with a period of up to 2 seconds (30%) is recorded and 20% have no significant changes.

EEG of sleep: from stage 1 nREM - BS sleep, slow complexes are periodically recorded within the brain - an acute slow wave, with periods of up to 10 seconds - there are no synchronous movements on the video (32%), as well as a slowdown of the ZDR with the appearance of rhythmic theta activity in the central region (28 %). Vertex potentials are symmetrical and localized in the anterior regions of the brain (28%).

Also on the EEG in the 2nd stage of slow-wave sleep, generalized "rapid activity" is recorded with a frequency of 20 Hz, an accent in the frontal regions of the brain and a period of up to 1 second (28%).

The stages of sleep are quite differentiated, however, the physiological patterns ("sleep spindles" and K-complexes, vertex potentials) of sleep are poorly represented on the EEG recording, due to the dominant epileptiform activity (28%). In some cases, "sleep spindles" are hypersynchronous with an amplitude of up to 120 μV and are present in the anterior sections (40%). K-complexes are high-amplitude with a pronounced negative phase (amplitude 180 kV) (40%).

According to the analysis of the conclusions of the video EEG monitoring, we established a pathological EEG in 80% of patients, characterized by prolonged epileptiform activity in the frontal parts of the brain (52%) and by the type of BEPD (20%), the EEG pattern of a subclinical atonic seizure was 8%.

Our further study was devoted to the analysis of the localization of epileptiform activity depending on the psychological development of children with BEE. Thus, the EEG pattern was characterized by frontal foci of epileptiform activity. In 10 patients, the treatment was associated with behavioral disorders, 3 had severe mental developmental disorders such as autism, and 1 patient had hallucinatory-catatonic disorders. Thus, in frontal epileptic foci, forms of behavioral, social, and psychotic pathology predominated. Behavioral disorders predominated in patients with left-sided foci. Especially characteristic is the high frequency of bilateral-synchronous frontal discharges (56.7%) and additionally (15%) secondary bilateral synchronization in the frontal regions with lateralized foci, which indicates the role of involvement of the medial limbic frontal structures (cingulate gyrus and orbitofrontal cortex).

In the course of studies in children with behavioral and mental disorders without epileptic seizures, temporal epileptic foci were detected in 31.8% of cases. The clinical picture in temporal discharges was divided into two main arrays: speech disorders in 3 patients with left-sided focus on the EEG; general, non-specific in relation to local neuropsychological functions of personality development disorders, emotional-affective neurotic disorders in 4 patients with right-sided foci. Lateralization was also revealed in the analysis of violations of speech and language functions: violations of the semantic and pragmatic aspects of speech and language memory were observed more often with left hemispheric foci, and such sound pronunciation and perception of intonational aspects of speech prevailed with right hemispheric foci.

Thus, with temporal foci, the clinical picture exactly corresponds to the functional specialization of the area of localization of epileptic disorders.

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Analysis of our own data from EEG studies shows that centrotemporal spikes can cause severe speech, cognitive, mental, and behavioral disorders in children without epileptic seizures, which implies that "the Rolland focus is not as benign as it was once thought."

Based on our observations, we can conclude that the main EEG phenomenon, along with high-amplitude activity, was a gross rhythm disturbance. High-amplitude activity was slow, often combined with epileptiform activity. Such a gross violation of bioelectric rhythms indicates a severe disorder in the function of brain structures, which, as a rule, are pacemakers of epileptic activity in partial forms of epilepsy. This actually determines the absence of epileptic seizures in patients with the above mental disorders, which is especially important, since at present the concept of the genetic mechanism of behavioral disorders and developmental disorders in such a contingent of patients, as well as dysfunction of the brain transmitter systems (dopaminergic, etc.) is confirmed only in isolated cases.

Thus, the described structural changes, which can persist even after the cessation of epileptic activity, are the cause of the persistence of clinical disorders.

**Conclusion.** Such a gross violation of bioelectric rhythms indicates a severe disorder of the functions of the noted structures, which, as a rule, are pacemakers of epileptic activity in partial forms of epilepsy. This, in fact, determines the absence of epileptic seizures in patients with the above gross mental disorders, which is especially important, since at present the concept of the genetic mechanism of behavioral disorders and developmental disorders in such a group of patients, as well as dysfunction of the brain transmitter systems (dopaminergic, etc.) finds confirmation only in isolated cases.

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