

FEATURES OF ELECTROENCEPHALOGRAPHIC DISORDERS IN PATIENTS WITH MENTAL DISORDERS DUE TO BRAIN DAMAGE OR DYSFUNCTION

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Abstract. According to statistics from recent years, 43.7% of mental pathologies in the structure are mental disorders caused by damage or dysfunction of the brain. Currently, neurofunctional research methods are widely used to diagnose this pathology. However, since most of them (CT, MRI, PET) are very complex and expensive to use, electroencephalography (EEG) is the most optimal, which allows you to identify large-scale disorders of bioelectric activity of the brain.

Keywords: electroencephalographic diseases, mental disorders, brain dysfunction.

Introduction. Cognitive impairments (CRs) are one of the most discussed problems nowadays, attracting the attention of researchers from different specialties. The presence of cognitive disorders in patients leads to increased severity of the disease, rapid onset of dementia and is accompanied by an increase in mortality rates [1-5]. The safety of cognitive functions is the key to the successful treatment of the disease, high patient compliance.

Cognitive disorders are one of the main and initial manifestations of brain damage of various etiologies. A number of cardiovascular diseases can contribute to a large number of small-focus, diffuse lesions of brain tissue with the development of cognitive disorders. According to the literature, cognitive disorders often occur against the background of coronary artery disease (CAD), Sir dek deficiency, arterial hypertension, and cardiac arrhythmias [6, 7].

Early diagnosis of cognitive disorders is a complex, now unresolved problem, since initially observed disorders are subclinical in nature and are only identified by neurophysiological examination [8].

Modern research methods such as multichannel computer electroencephalography (EEG) allow the identification and quantification of disorders in bioelectric brain activity that are accompanied by cognitive disorders. electroencephalography is a sensitive indicator of the state of the brain in the development of normal and pathology [9-12]. The use of computer processing methods (calculation of spectral power indicators and spatial synchronization of brain biopotentials) increases the informative content of electroencephalography.

For patients with dementia, an increase in slow wave activity compared to relatively healthy subjects of a similar age was previously indicated [13]. Electroencephalography-the picture of patients with moderate cognitive disturbances in dyscirculatory Encephalopathy has been

characterized by disorganization, hypersynchrony of electrical activity, increased slow wave activity (mainly the Theta range). The most obvious deviations in electroencephalography have been observed in the dominant hemisphere, mainly in parietal occipital hooks with reduced a-rhythm strength. At the same time, cognitive impairment of vascular Genesis was higher in patients with moderate Theta rhythm strength than in patients with "probable" Alzheimer's disease (AD) [14]. In the works of other authors, the change in electroencephalography in ad is diffuse, manifested by an increase in slow wave activity (Delta and theta ranges) and a decrease in the alpha range [15, 16].

Despite the information available in the literature on the state of electroencephalography-activity in patients with moderate cognitive impairment of various etiologies, there is very little data on their characteristics in cardiovascular pathology, in particular coronary artery disease.

Currently, there are many data on the unequal importance of the activity of the left and right hemispheres of the human brain. This applies not only to the structural functional organization of the brain, but also to psychopathological manifestations in focal organic diseases, including epilepsy [17-20].

Research in recent years has shown the ineffectiveness of the "left and right hand" indicator to predict the psychological and physio logical characteristics of an individual. At the same time, a connection between the complex of lateral signs in the emotional and motor areas was established (functional sensorimotor asymmetry profile) and personal characteristics, as well as the possibility of the occurrence of some neurotic and cardiovascular diseases [21-25].

It is clear that there is a continuation of the change of psychophysiological indicators from the group of absolute left-handed to the absolute right-handed through the group of mixed profiles. At the same time, the proportion of individuals with an "incorrect Profile" of functional asymmetry can reach 30-40% of the total number of patients in a psychiatric hospital [26-29], which assumes the need to study the problem separately.

In domestic and foreign special literature, there are data on schizophrenia and an increase in the number of left lateral signs in patients with epilepsy. Specifically, functional interhemispheric asymmetry of the brain has been shown to modulate the severity of depressive states in epilepsy [30-32], various signs of lateralization in focal epilepsy, and Greater left hemisphere vulnerability to epileptogenesis [33-36]. At the same time, there is still no clear and statistically confirmed data on the connection of the profile of functional sensorimotor asymmetry with specific psychopathological signs in epilepsy. A number of clinical data are interpreted in terms of interrelationships between the cerebral hemispheres, but they are treated ambiguously by various researchers, making it difficult to integrate literature data [37-41].

In this regard, the participation of interhemispheric functional asymmetry in the pathogenesis of paroxysmal syndrome and the issue of the development of psychopathological diseases in epilepsy are of both theoretical and practical interest, which predetermined the purpose of this study [42].

The purpose of the study: was to analyze the characteristics identified using electroencephalography in patients with mental disorders due to brain damage or dysfunction, taking into account the above.

Materials and methods. The study involved 95 patients (65 men and 30 women, with an average age of 58,5+9,2 years). The leading methods of research were clinopsychopathological, neurofunctional and clinical-archival analysis of medical documents.

Psychiatric diagnosis was carried out according to the ICD-10 criteria. Mental disorders have been classified as "mental disorders due to brain damage or dysfunction" and their individual clinical variants are represented by affective, cognitive, and personality disorders. 38 (45,2%) patients had Affective Disorders. In such cases, ICD-10 has been diagnosed with "organic affective disorder" (F. 06.3 title); "organic anxiety disorder" (F. 06.4). 35 (41,6%) patients had cognitive impairments - "mild cognitive impairment" (F. 06.7). 34 (40,5%) patients were diagnosed with personal changes - "organic personality disorder" (F. 07.0).

Neurological pathology has been assessed on the NHS3 scale (national hospital severity scale of seizures), which includes 7 criteria including duration of seizures, features of post-criminal status, level of trauma, etc. at the beginning of the observation, the weight of the eclipses averaged $19,8 \pm 7,73$ points. The progredience of paroxysmal syndrome was assessed in scores (0 to 3), taking into account the frequency, severity and rate of growth of polymorphism of seizures.

Violation of the personality-psychopathological framework was assessed using the SCL-90R clinical self — assessment scale, the Munich personality test (MLT), the multiple mental status scale-MMSE (Mini-mental State Examination) cognitive test, and the Hamilton Scale anxiety (nam-A) and depression (nam-D). A Wisconsin Card Sorting Test-WCST-was used to assess disorders in the neuropsychological field.

Results and their discussion. Clinical and psychopathological examination data show that all patients were characterized by cerebroasthenic symptoms, emotional lability, cognitive disorders and changes in the Mnestic area. Electroencephalography was performed on each patient while in hospital.

Analysis of its results showed that moderate (50,8%) and mild (33,4%) disorders of bioelectric activity of the brain were most common. Severe changes were observed in 15 patients (15,8%). Characteristic is that all patients have been found to have instability of the general functional state of the brain. Patients with mild lesions were more involved in the pathological process with non-specific median (38,5%) and diencephalic structures (23,4%). In patients with moderate disorders: diencephalic (42,3%), nonspecific median (35,6%), mesodienseal (18,9%), limbic-reticular (3,3%).

In patients with severe diseases: diencephalic (50,1 %), nonspecific median (32,1%), mesodienseal (10,4%), limbic-reticular (5,3%) and root (2,1%). It was also found that patients with moderate to severe disorders of bioelectric activity of the brain have significantly altered functional activity of limbic structures of the brain, observed dysfunction of regulatory systems, altered amplitude-frequency characteristics of Alpha rhythm, and increased index of slow oscillations.

According to the results of our study, patients with coronary artery disease and moderate levels of cognitive impairment show an increase in spectral capacity of the Theta range associated with cognitive impairment. There is evidence of increased strength and amplitude of slow rhythms such as Delta - and theta- (or "deceleration") in resting electroencephalography, disinhibition of subcortical structures, may be a sign of cortical inhibition caused by acute or chronic cerebral ischemia.

A slowdown in electroencephalography rhythm was found when cerebral blood flow dropped below 22 ml/100 g/min the same effect was found in the temporary deletion of the carotid artery with a catheter balloon during endovascular intervention.

In addition, an increase in slow wave electroencephalographic activity was previously detected in a variety of Genesis in patients with Alzheimer's type dementia. The slowing of electroencephalography rhythm is thought to reflect a decrease in inhibitory control of the frontal cortex over other cortical zones. In addition, in patients with AD, with the predominance of frontal symptoms and pronounced severity of the slow sensorimotor rhythm, there is simultaneously inhibition of low and medium-frequency components of the occipital Alpha rhythm, paradoxical, at first glance, an increase in the spectral power of the high-frequency component of the alpha rhythm and a general increase in beta activity. That is, they have a traditional electroencephalography-signs of activation, "disinhibition" of the cerebral cortex. The above symptoms of cortical dysfunction in our work are cognitive disorders found already in a moderate phase in patients with coronary artery disease.

It is known that the formation of diffuse damage to brain tissue is facilitated, first of all, by a long-term lack of blood supply to the brain or chronic ischemia of the brain. According to the results of our study, patients with coronary artery disease and moderate levels of cognitive impairment had lower ejection fraction levels, as well as higher severity of coronary artery injury in objective indicators (SYNTAX scale) compared to those without cognitive impairment. These facts indicate that in patients with coronary artery disease, even in the absence of clinically significant damage to the cerebral arteries, there is a lack of cerebral blood supply, which leads to dysfunction of cortical neurons.

Conclusions. Thus, in patients with coronary artery disease, electroencephalography-symptoms of cortical dysfunction associated with a deterioration in cognitive function and an increase in anxiety levels are already observed in a moderate phase cognitive disorders. The findings support the feasibility of using quantitative methods of electroencephalography for early detection and Prevention of cognitive impairment in patients with cardiovascular disease. Electroencephalography is the most common and affordable research method for diagnosing neurodynamic diseases. Studies determine the peculiarities of electroencephalography-disorders in patients with mental disorders due to brain damage or dysfunction. Several types of violence (mild, moderate and severe) are recorded in these patients, for each of which the specificity of electroencephalography was determined-disturbances in the form of changes in the alpha rhythm, involvement of certain structures of the brain in the pathological process.

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