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Clinical and Neurological Characteristics of Partial Frontal Epilepsy

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Partial frontal epilepsy is the second most common and accounts for approximately 30% of other forms of epilepsy. The neurological and mental status of frontal epilepsy depends on the etiology. In frontal epilepsy, an etiological connection is often found with focal atrophy, injuries, neuroinfections, tumors (astrocytomas and oligodendrogliomas) or arteriovenous malformations (AVMs). Often the cause is detected by NMR disorders of neuronal migration or dysgenesis. Epileptic status is formed with frontal lobe epilepsy especially often.

Motor paroxysms occur when the anterior central gyrus is irritated. Jackson's seizures are characteristic, developing contralateral to the focus. Convulsions are predominantly clonic in nature and can spread by the type of ascending (leg-arm-face) or descending (face-arm-leg) march; in some cases with secondary generalization. With a focus in the paracentral lobules, convulsions can be observed in the ipsilateral limb or bilaterally. Post-onset weakness in the extremities (Todd's paralysis) is a frequent phenomenon of LE.

Opercular seizures occur when the opercular zone of the inferior frontal gyrus is irritated at the junction with the temporal lobe. They are manifested by paroxysms of chewing, sucking, swallowing movements, smacking, licking, coughing; hypersalivation is characteristic. There may be ipsilateral twitching of the facial muscles, speech disorders or involuntary vocalization. Partial seizures of opercular epilepsy with facial clones, epigastric sensations, taste hallucinations, speech inhibition, fear and vegetative symptoms. Complex partial seizures with swallowing, chewing movements, salivation, laryngeal symptoms.

Dorsolateral seizures occur when the upper and lower frontal gyrus are irritated. They are manifested by reversible attacks with a violent turn of the head and eyes, usually contralateral to the focus of irritation. With the involvement of the posterior parts of the inferior frontal gyrus (Broca's center), paroxysms of motor aphasia are detected. Dorsolateral seizures are simple focal tonic (rotations, propulsions, bows), accompanied by aphasia and complex focal with initial automatism, without aura. Psyche: "frontal" personality changes, eccentricity, perseverative and inert behavior, difficulties of social adaptation, disinhibition, decreased criticism. With dorsolateral epilepsy, the psyche changes quite quickly, perseverance, disinhibition are observed, cognitive processes worsen.

Orbitofrontal seizures occur when the orbital cortex of the inferior frontal gyrus is irritated and manifest a variety of vegetative-visceral phenomena. Epigastric, cardiovascular (pain in the heart, changes in heart rate, blood pressure), respiratory (inspiratory shortness of breath, feeling of suffocation, compression in the neck, "coma" in the throat) attacks are characteristic. Pharyngeal-oral automatisms with hypersalivation often appear. Attention is drawn to the abundance of vegetative phenomena in the structure of seizures: hyperhidrosis, pallor of the skin, often with facial hyperemia, violation of thermoregulation, etc. The appearance of typical complex partial (psychomotor) paroxysms with automaticities of gestures is possible. Seizures of the orbito-frontal region are complex focal; first there are manifestations of automatism or olfactory hallucinations, vegetative paroxysmal symptoms and urination.

Anterior frontopolar seizures occur when the pole of the frontal lobes is irritated. They are characterized by simple partial seizures with impaired mental functions. They are manifested by a feeling of sudden "failure of thoughts", "emptiness in the head", confusion or, conversely, violent memory; a painful, painful feeling of the need to remember something. A violent "influx of thoughts", a "whirlwind of ideas" is possible - a feeling of a sudden appearance in consciousness of thoughts that are not related in content to the current mental activity. The patient does not have the opportunity to get rid of these thoughts before the end of the attack. Seizures with a focus in the anterior (pole) frontal region are characterized by violent thinking, vegetative accompaniment, loss of reactivity - "pseudo-resonance". Seizures begin with loss of contact, inverse and then contraversive movement of the eyes and head, axial clonic twitching, falling, as well as with autonomous manifestations. Very often they turn into generalized tonic-clonic convulsions

Cingular seizures originate from the anterior part of the cingulate gyrus of the medial parts of the frontal lobes. They are manifested mainly by complex, less often by simple partial seizures with a violation of behavior and the emotional sphere. Complex partial seizures with automaticity of gestures, redness of the face, expression of fright, ipsilateral blinking movements, and sometimes clonic convulsions of contralateral limbs are characteristic. Possible occurrence of paroxysmal dysphoric episodes with malice, aggression, psychomotor agitation. Seizures with cingular epilepsy are complex focal seizures with initial automatism of a sexual nature, vegetative manifestations, mood changes, arousal, urinary incontinence.

Seizures originating from the additional motor zone were first described by Penfield, but systematized only recently. This is a fairly frequent type of seizures, especially when you consider that paroxysms that occur in other parts of the frontal lobe

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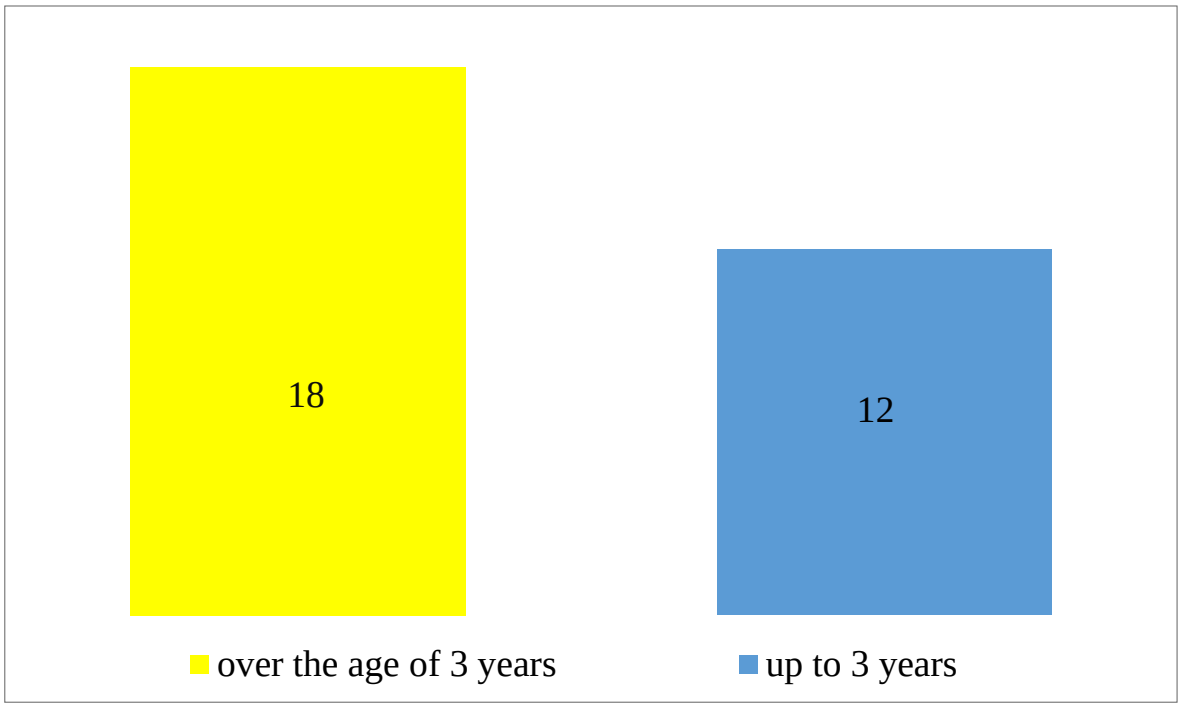
often radiate into an additional motor zone. It is characterized by the presence of frequent, usually nocturnal, simple partial seizures with alternating hemi convulsions, archaic movements; seizures with cessation of speech, fuzzy, poorly localized sensory sensations in the trunk and limbs. Partial motor seizures are usually manifested by tonic seizures that occur either on one side or on the other, or bilaterally (while they look like generalized). Tonic tension is characteristic with the rise of the contralateral arm, the inversion of the head and eyes (the patient looks at his raised hand, as it were). The occurrence of "inhibitory" seizures with paroxysmal hemiparesis is described. Attacks of archaic movements usually occur at night with a high frequency (up to 3-10 times a night, often every night). Characterized by sudden awakening of patients, screaming, grimace of horror, motor storm: waving arms and legs, boxing, pedaling (reminiscent of cycling), pelvic movements (as in coitus), etc. The degree of disturbance of consciousness fluctuates, but in most cases consciousness is preserved. These attacks should be differentiated from hysterical and paroxysmal night terrors in children.

The purpose of the study: to identify characteristic clinical and paraclinical signs of frontal epilepsy.

Materials and methods: The research was carried out on the basis of ASMI clinics. 30 patients were examined who were being treated with a diagnosis of epilepsy with cognitive impairment and convulsive syndrome of various etiologies in the period from 2020 to 2022. The study included patients aged 16 to 40 years with actively ongoing epileptic seizures originating from the frontal areas, and patients with actively ongoing epileptic seizures originating from the frontal areas. The study did not include patients with epileptic seizures originating from the parietal or occipital or from two or more adjacent areas of the brain, as well as patients with progressive neurological diseases.

The patients were divided into 2 groups: the first group consisted of 12 patients with frontal epilepsy with the onset of the disease up to 3 years, the second group included 18 patients with cognitive impairment and frontal epilepsy over the age of 3 years.



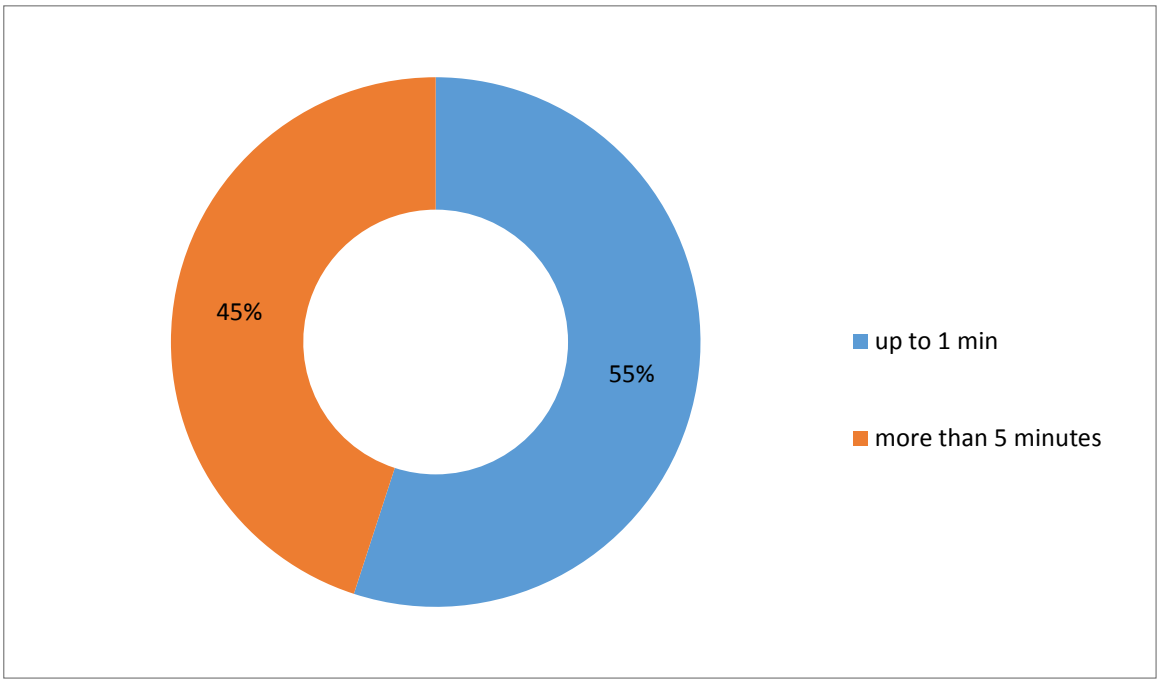
Clinical and neurological examination was carried out according to the generally accepted scheme (Gusev E.I., 1988): detailed collection of anamnesis (in patients and their relatives), including a detailed clinical description of seizures, clarification of their nature and frequency, features of postictal and interictal periods, dynamics of disease development, duration and effectiveness of therapy (all previously used PEP, their doses, the presence of side effects, reasons for drug withdrawal), a detailed analysis of somatic and neurological statuses. The type of epileptic seizures was determined according to the International Classification of Epileptic Seizures (ILAE 2017). The diagnosis was established in accordance with the International Classification of Epilepsy (ILAE 2017).

Neuroimaging. In order to confirm focal frontal epilepsy, to determine the localization and magnitude of the lesion in patients with symptomatic epilepsy, computer (CT) or magnetic resonance imaging (MRI) was performed the brain. The presence of cortical and subcortical atrophy, post-traumatic changes (defects of bone structure, foci of increased and decreased density), hydrocephalus and pathology of the ventricular system, intracerebral calcifications, vascular malformations, tumors, foci of increased and decreased density of vascular genesis were taken into account.

Results and discussion: Analysis of various etiological factors in the genesis of frontal epilepsy in patients in our study showed that in the vast majority of patients, the probable etiological cause of the disease was perinatal brain damage of hypoxic-ischemic or infectious genesis (43.4%), in 23.4% of cases, the disease was caused by the presence of structural abnormalities of the brain. According to Nikanorova M.Yu. et al. (2001), in focal epilepsy in young children, hypoxic-ischemic injuries and brain dysgenesis accounted for a large proportion of etiological factors (20.6%/7.9%).

When analyzing clinical data, the effectiveness of the use of AEP in groups of patients with the onset of epilepsy from the onset of VGP up to 3 years and at an older age is comparable (in these groups of patients, there were also no significant differences in the frequency of detection of pathological changes on MRI of the brain).

According to the data we obtained, the general characteristics of frontal seizures include either a short duration (up to 1 min) in 55% of patients, or a long duration (more than 5 minutes) in 45% of patients.



According to video EEG monitoring, the sudden onset of seizures was noted in 75% of patients. 7.3% of patients had the appearance of an aura, mainly psychoemotional coloring, in the form of unaccountable fear in 3.3% of cases, depression in 0.8% of cases, headache in 1.6% of cases, somatosensory aura in 0.8% of cases, disorientation - in 0.8% of cases.

In the kinematics of frontal seizures, generalized tonic tension was noted in 47.5% of cases. In 35% of patients, versive seizures were observed, in 41.7% of patients, myoclonic seizures were observed in combination with other types of seizures or were the final type of transformation of seizures in the course of the evolution of epilepsy. Hypermotor seizures were observed in 14.9% of patients, atonic in 10.8% of patients. Motor symptoms in frontal seizures in adults are the main clinical manifestation, and, as a rule, are noted already at the beginning of the disease (Chauvel R. et al. 1995). Tonic postures are observed in 8-38% of cases in adult patients (O'Brien T. et al., 1999). Fogarasi et al. (2001) they were observed in frontal attacks in 64% of patients under the age of 7 years. In addition, tonic, clonic seizures and infantile spasms were leading in frequency. In our study, in 29% of patients, the disease debuted with the onset of infantile spasms, and tonic seizures were observed in almost half of the cases. Acharya G. et al. (1998) showed that in children, local ictal arousal often leads to rapid generalization in focal epilepsy. It is obvious that due to the hyperexcitability of cortical structures and the high rate of propagation of excitation in the immature brain of a child, focal triggers activate subcortical formations, demonstrating clinical patterns of generalized seizures (Dulac O. et al., 1999).

Along with this, components of automatic behavior were identified in the clinical picture of seizures in the patients we observed, namely oroalimentary automatism in 8.3% of cases, automotor automatism in 2.5% of cases, hand automatism in 1.6% of cases, sexual automatism in 2.5% of cases, the gelastic component in the form of violent laughter was noted in 5% of cases. In our study, only 16.9% of patients had verbal or verbal vocalisms, in contrast to the data of Fogarasi et al. (2001), who observed a higher frequency of vocalisms in frontal attacks (in 36% of patients).

Vegetative manifestations in the form of hypersalivation were observed in 16.7% of cases. Involuntary urination was observed in 5.8% of cases. Seizures occurred against the background of complete loss of consciousness in 42.5%, against the background of incomplete loss in 35% of cases, without turning off consciousness in 4.1% of cases.

In our study, it was found that in patients with a combination of several types of seizures, pathological changes in neuroimaging in the form of cerebral dysgenesis are detected in 80% of cases. In addition, in this group of patients, seizures during the evolution of the disease were more often transformed into secondary generalized, as well as simple or complex partial seizures. Thus, the value of studies of the age-dependent evolution of seizures in patients, reflecting the transformation of immature ictal manifestation into a typical mature ictal semiology of seizures in adults, is important for determining the ways of further diagnostic search and solving the question of the need for MRI in the epileptological mode.

Summarizing the above, it can be concluded that the clinical characteristics in patients with frontal epilepsy can serve only to a small extent as criteria in the differential diagnosis of seizures of various generations. The semiology of frontal seizures in children is very variable and often does not depend on the localization zone of ictogenic activity. In this regard, it is

difficult to overestimate the importance of conducting video-EEG studies, which allows us to assume the focal nature of epilepsy already at the early stages of the disease and timely determine the direction of diagnostic search and in the future the profile of the medical care provided, the prognosis of epilepsy.