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Epilepsy in Children: Individual Symptomatic (Structural) Forms.

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Annotation. Epilepsy is a chronic disease of the central nervous system. Most studies have shown that the peak incidence occurs in children under 15 years of age, especially in the first year of life. The diagnosis of epilepsy, unlike other chronic diseases, imposes a sociocultural and moral burden on patients and their parents. Data on the prevalence of this disease in children in different countries are presented. The mortality rate in children with epilepsy is 2-4 times higher than in the rest of the population. A new classification of epilepsy in 2017 by distribution depending on the etiologic factor is demonstrated, which is important for choosing the tactics of the course. Epileptic seizures in patients with infectious diseases of the brain, ischemic or hemorrhagic stroke, after traumatic brain injury are described in more detail, and the features of acute attacks, as well as late epileptic seizures in these diseases are presented. Recommendations on antiepileptic drugs as initial monotherapy in children with focal seizures and depending on the underlying process causing the development of a particular symptomatic (structural) form of epilepsy are highlighted.

Keywords:structural (symptomatic) epilepsy, infectious diseases of the central nervous system, acute brain disorders, traumatic brain injury, treatment

Epilepsy is the most common neurological disorder worldwide, accounting for 1% of the global disease burden [1, 2]. Symptomatic focal epilepsy was the single most common group of epilepsy in both age groups. The highest incidence of epilepsy during life is observed during the first year of life. Epilepsy in children and adolescents is a complex problem that is addressed by neurologists, pediatricians, psychologists, psychiatrists in collaboration with teachers, jointly implementing a variety of medical, pedagogical and medical and social measures to rehabilitate patients. Success in the treatment of epilepsy is completely dependent on accurate syndromological diagnosis. Patients with epilepsy are forced to take antiepileptic drugs for many years, and therefore an important requirement for drug therapy is the absence of their negative impact on the child's quality of life. Physicians frequently consider that epilepsy is a disease in children and young adults; however, its incidence in elderly patients is not lower and commonly higher than those among children and young people. Among the causes of epilepsy in elderly patients, there is a predominance of acute and chronic cerebral circulatory disorders (50 % of all cases). Other causes of epilepsy (neurodegenerative processes, tumors, etc.) are rarely encountered in the elderly. However, there is actually no real pattern of incidence of epilepsy in the elderly since the diversity and features of its clinical manifestations in these patients, as well as difficulties in describing their status make the diagnosis of the disease very hard in this category of patients. Seizures without loss of consciousness, which are especially associated with the development of transient muscle tone disorders and autonomic dysfunction, are commonly regarded as benign vertigo, autonomic or mental disorders. Children with epilepsy under 3 years of age are more likely to suffer from cognitive and behavioral comorbidities. Comorbidities are more common among children who develop drug-resistant seizures and those with a high seizure burden. The main risk factors for seizures in children are correlated with a positive family history [1], high fever, mental retardation, alcohol abuse, and maternal smoking during pregnancy, which doubles the risk of seizures. In addition, the 30% of

children who experience their first seizure are more likely to have recurrent seizures. Patients with all of these risk factors have a greater than 70% chance of having a second seizure, while those without any of them have a lower chance of having a recurrent seizure. The mortality rate in people with epilepsy is 2–4 times higher than in the general population, and 5–10 times higher in children. The risk of early death in children without neurological comorbidity is similar to the general population, and many deaths are not related to the seizures themselves, but to pre-existing neurological disability. This increased risk is a consequence of lethal neurometabolic changes, systemic complications, etc. Sudden death in epilepsy can be defined as the sudden cessation of vital activity in the absence of obvious causes of death (anatomical, toxicological, etc.). This phenomenon is called sudden unexpected death in epilepsy (SUDEP) and accounts for 2–17% of all causes of death in this disease [6]. SUDEP is the most common cause of epilepsy-related death in children: it occurs infrequently, but the risk of death increases if epilepsy persists into adolescence [1,2].As for the new classification of epilepsy of the International League Against Epilepsy (ILAE) 2017, when distributing etiological groups, emphasis is placed on those groups that may be important for choosing the tactics of the course. These are structural, genetic, infectious, metabolic and immune, as well as unknown etiology. Symptomatic epilepsy has different etiologies, while pathological conditions leading to the development of epilepsy have different mechanisms, both disrupting the structure of the brain and forming foci of morphological damage, and not leading to macrostructural disorders. Purulent meningitis, usually caused by various purulent infections, is a type of infectious disease of the central nervous system (CNS), most often found in children, especially in infants and young children. Bacterial meningitis is a serious, often disabling and potentially fatal infection, resulting in 170,000 deaths worldwide each year [8]. Young children are particularly vulnerable to bacterial meningitis; two-thirds of meningitis deaths in low-income countries occur in children under 15 years of age [29]. The main bacterial pathogens causing meningitis after the neonatal period are Streptococcus pneumoniae (pneumococcus), Haemophilus influenzae type b and Neisseria meningitidis (meningococcus) [10–12]. Pneumococcal meningitis is associated with the highest case fatality rates worldwide [13].

As in adults, all seizures in children with stroke are divided into 3 types:

• convulsions in the first 24 hours from the development of stroke;

• acute seizures that occur within the first 7 days after an episode of stroke;

• seizures that develop 1 week or more after the onset of stroke (late seizures). Although the exact mechanisms that cause PTE are not fully understood, a number of models have been developed to study the molecular, cellular, and other processes that occur after TBI, including assessing their significance in epileptogenesi. Such processes begin immediately during injury and progress subsequently. Processes that are believed to be involved in the development of epilepsy after TBI include: immediate brain responses to injury that lead to cell loss; changes in the organization of the nervous system that lead to an imbalance between excitatory and inhibitory neurotransmission; increased permeability of the blood-brain barrier. In an adult cohort of patients, variations in genes encoding neuronal glutamate transport were found to be associated with epileptogenesis after severe TBI. Less is known about gene regulation in children. The role of inflammation in epileptogenesis in TBI has received increasing attention, particularly with respect to age-related differences. Variability in neuroinflammation across brain development has been suggested to contribute to differences in outcomes between childhood and adult TBI. In particular, younger patients may be more vulnerable to epileptogenesis due to greater sensitivity to inflammation in the developing brain. Alternatively, other studies suggest greater resilience of the pediatric brain to seizures. Both possibilities highlight the importance of pediatric studies rather than extrapolating data from adults.

Rehabilitation of patients with epilepsy is a relevant and promising area, but is still in its infancy [9]. The first and one of the main principles of rehabilitation of patients with epilepsy is timely diagnosis of the disease and identification of the features of its clinical picture and course. The second important principle of rehabilitation is adequate and optimal antiepileptic therapy. Starting it from the first days of the disease, it is faster and easier to achieve the desired positive result. However, in children, due to various circumstances, the period of "early" therapy is often missed, and the child begins to receive adequate treatment later, which cannot but affect the course and outcome of the disease. A major obstacle to the prescription of effective anticonvulsants are restrictions on their use in children of younger age groups.

Pharmacotherapy of epilepsy requires deep knowledge of anti-epileptic drugs (AEDs), including the following issues: spectrum of therapeutic efficacy and therapeutic strength, adverse effects (especially severe and life-threatening adverse reactions); specific features of pharmacokinetics, pharmacodynamics, and drug interactions; titration rate, the need for laboratory tests during treatment, pharmacoeconomic components. The main properties of antiepileptic drugs are defined by their mechanisms of action. Today, particular attention is paid to the drugs with broad spectrum activity, which give an ability to use them in patients with so-called undifferentiated epilepsies. In this article, the authors describe their own experience in optimization of antiepileptic therapy in a group of 141 patients with various forms of epilepsy. This new optimized strategy implies inclusion of modern broad spectrum AEDs in treatment schemes along with the reduction in use of narrow spectrum drugs. Moreover, polytherapy was used in most of the cases after treatment regimen correction. All the measures allowed to achieve remission in about half of the patients with epilepsy earlier considered as incurable.

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