

Ойих Энтони Адаколе
ОПРЕДЕЛЕНИЕ ФАКТОРОВ ТЯЖЕСТИ РАЗВИТИЯ
МЕНИНГОЭНЦЕФАЛИТА У ДЕТЕЙ

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DETERMINATION OF MENINGOENCEPHALITIS SEVERITY FACTORS
IN CHILDREN

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Резюме. Менингоэнцефалит (МЭ) – это тяжёлое состояние, при котором развивается воспаление оболочек головного мозга и его вещества. Менингоэнцефалит у детей характеризуется особой тяжестью, большой частотой неврологических осложнений и высокой летальностью. Последствия менингоэнцефалита могут проявляться в течение нескольких лет или всю жизнь. Поэтому очень важно быстро распознать у ребёнка болезнь менингоэнцефалит, выяснить причины и начать лечение.

Ключевые слова: менингоэнцефалит, дети, судорожный синдром.

Resume. Meningoencephalitis (ME) is a serious condition in which inflammation of the membranes of the brain and its substance develops. Meningoencephalitis in children is characterized by special severity, high frequency of neurological complications and high mortality. The effects of meningoencephalitis can last for several years or a lifetime. Therefore, it is very important to quickly recognize meningoencephalitis in a child, find out the causes and start treatment.

Keywords: meningoencephalitis, children, convulsive syndrome.

Relevance. Meningoencephalitis (ME) is a severe condition in which inflammation of the membranes of the brain and its substance develops. Meningoencephalitis in children is characterized by particular severity, a high frequency of neurological complications and high mortality [1-3].

ME can be caused by a bacterial or viral infection and be a complication of many infectious diseases and local inflammatory processes. In many cases of meningoencephalitis, the underlying cause of the disease is not identified, leaving the possibility that there are multiple pathogens that are not routinely tested for.

Clinical symptoms may include fever, headache, and altered consciousness, and focal or multifocal neurological deficits may also be observed, as well as focal or generalized seizures, movement disorders, or autonomic instability. However, encephalitis may sometimes present with nonspecific symptoms, and this, combined with multiple causes, makes the treatment of the neurological syndrome difficult [1-3]. Encephalitis caused by viruses or an autoimmune process may not differ from each other in clinical manifestations,

and the latter is often a diagnosis of exclusion after laboratory tests fail to reveal a specific cause of encephalitis [1-3].

Various tests may be performed to identify the causative agent, including: a lumbar puncture to obtain spinal fluid for polymerase chain reaction (PCR) testing to look for signs of infection in the brain or spinal cord, imaging tests such as an MRI of the brain or a CT scan, an electroencephalogram (EEG) to look for seizures or specific patterns of electrical activity in the brain, and blood or urine and stool tests may be needed to look for antibodies responsible for the infection. Additional tests may be needed, including sputum cultures to look for specific infections, monitoring intracranial pressure to look for cerebral edema, and in rare cases, a biopsy of the affected brain tissue.

The consequences of meningoencephalitis can manifest themselves over several years or throughout life. Therefore, it is very important to quickly recognize meningoencephalitis in a child, find out the causes and begin treatment.

Aim: to determine risk factors for the development of severe meningoencephalitis in children.

Objectives:

1. Determination of the characteristics of the course of meningoencephalitis in children depending on the etiological factor.

2. To identify risk factors for the development of severe meningoencephalitis.

Materials and methods. The observation group consisted of 37 children who were treated at the Minsk City Children's Infectious Diseases Clinical Hospital, in the Department of Anesthesiology and Resuscitation from January 1, 2024 to December 31, 2024.

Results and their discussion. Among the 37 children, there were 7 girls (18.9%) and 30 boys (81.1%), the average age was 4.9 ± 1.2 years, while the age distribution was as follows: 1-12 months - 3 people; 1-3 years - 3 people, 4-7 years - 9 people and over 7 years old - 21 children), of which 23 were residents of Minsk and 14 were from the regions of the Republic of Belarus. Children were admitted to the hospital by the ambulance team for emergency indications 3 ± 4.5 hours after the onset of the first signs of the disease.

Bypassing the emergency department, four patients (10.8%) were delivered to the emergency department due to the onset of convulsive syndrome for the first time in their lives.

All patients underwent cerebrospinal fluid testing, including PCR and ELISA, using the FilmArray method. Meningitis / Encephalitis (ME) Panel » to determine the causative agent. The etiologic agents of ME were parvovirus B-19 (2.7%), herpes simplex virus-1 (HSV-1) (8.1%), enteroviruses virus (16.2%), Epstein-Barr virus (EBV) - 2.7%. SARS-CoV-2, N. Meningitidis and H. Influenzae were tested but not detected in any of the cases.

Meningoencephalitis was observed in children with a complicated premorbid background of anemia (32%, n = 12), previous diseases, including pneumonia (21.6%, n = 12), otitis (13.5%, n = 5) and sepsis in the anamnesis (6.25%, n = 2), which in turn contributed to the supply of general reactivity and sensitization of the body.

The first symptoms of chickenpox meningoencephalitis developed on the 5-8th day from the moment of the appearance of the rash on the skin or from the moment of the appearance of hyperthermic syndrome and proceeded with severe intoxication. With HSV and EBV, the first symptom was a combination of convulsive syndrome in the form of a

generalized seizure or tonic-clonic seizure, with an enterovirus nature, a combination of intoxication syndrome and general cerebral symptoms was noted.

Impaired consciousness was one of the early signs of nervous system involvement in the pathological process. According to the Glasgow scale, different levels of impaired consciousness were recorded. The degree of impaired consciousness according to the Glasgow scale in children averaged 13 (12-15) points. In the neurological status, all children showed clearly expressed meningeal symptoms of various genesis.

The focal symptoms of chickenpox encephalitis included the following: decreased muscle tone, instability in the Romberg pose, unsteady gait, coordinator tests were performed with intention on both sides, the presence of nystagmus and titubation in combination with a pronounced picture of general cerebral symptoms, which indicated the involvement of cerebellar structures in the pathological process.

During magnetic resonance imaging of the brain with contrast, the following changes associated with the etiologic factor were revealed: with chickenpox, enterovirus ME-specific changes in the structure of the brain were absent, with EBV-ME - bilateral damage to the cerebral cortex and basal ganglia, HSV-MR picture of damage to the parenchyma of the left temporal lobe - most likely of an infectious and inflammatory nature (as a manifestation of encephalitis caused by the herpes simplex virus).

When studying peripheral blood parameters, leukocytosis of $14.6 \pm 1.2 \times 10.9/l$ and neutrophilia of $10.3 \pm 0.8 \times 10.9/l$ were noted, as well as an increase in creatine phosphokinase; the remaining laboratory test parameters had nonspecific and statistically insignificant changes.

In EEG with enterovirus ME, a polyrhythmic EEG type was determined and paroxysmal activity was not recorded, however, in patients with HSV and EBV-associated ME, moderate diffuse EEG changes were recorded in various forms (the alpha rhythm index was reduced, zonal differentiation was smoothed out), functional load tests (FLT) did not significantly change the EEG recording, as well as diffuse EEG changes, with a predominance in the recording of polymorphic activity of the alpha -theta range, zonal differences were smoothed out and after FLT, bursts of theta -delta activity of medium amplitude were recorded.

In the recovery period of enteroviral ME and chickenpox ME, complete regression of neurological symptoms was noted, while after HSV- and EBV- associated ME, neurological symptoms such as pyramidal and extrapyramidal disorders in the form of generalized dystonia, tetraparesis, psychotic and dysmnestic disorders, and, as a consequence, contractures of large joints of the lower extremities persisted.

Conclusions:

1. For HSV- and EBV -associated ME is characterized by an aggressive onset of the disease with convulsive syndrome and depression of consciousness according to the Glasgow Coma Scale of less than 10, as well as organic damage to the structure of the brain according to MRI of the brain. Changes in chickenpox and enterovirus ME are abortive in nature without involvement of the organic structure of the brain in the process.

2. The severity and prognosis of meningoencephalitis development depend on the presence of a premorbid background, the patient's age, the presence of a convulsive syndrome from the first days of the disease, a decrease in the level of consciousness

according to the GCS of less than 10 points, the etiological factor (HSV and EBV-associated meningoencephalitis), as well as the severity of the pathological process according to MRI of the brain with contrast.

Literature

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