Basic prerequisites for rehabilitation of children with convulsive syndrome

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Abstract: The article provides data on the possible causes of convulsive syndrome in children, as well as tactics and the algorithm of management, care for this category of patients by general practitioners. An integrated approach allows for timely and correctly identify of the cause of convulsive activity in children of different ages, based on objective clinical, laboratory and instrumental research methods.

Keywords: children, convulsive syndrome, general practitioner, tactics, management algorithm

Convulsive syndrome in children is characterized as an urgent pathological condition in domestic and foreign, manifested by convulsions or their equivalents in the type of sudden involuntary contractions of the striated muscles arising under the influence of pathological impulses from the central nervous system (CNS) as a non-specific reaction of the latter to exogenous and endogenous factors (tremor, twitching, flinching, involuntary movements, etc.). Convulsive syndrome is often accompanied by disorders of consciousness [11,12,17,18].

The incidence of convulsive syndrome is high in children, especially at the age of 1 year, during the period of most active brain development. Children are much more likely than adults to experience this condition. About 75% of all cases of epilepsy debut mainly in childhood, and its occurrence is 78.1 per 100,000 child population. According to various authors, convulsive syndrome is quite common and is placed in about 3% of children, according to other sources, 17-20 children out of 1000 (among children with CNS pathology, on average, 10-15%), and in most cases passes during the first three years of life. Neonatal seizures are diagnosed from 1.1 to 16 per 1000 newborns, epilepsy in 0.5-0.7% in the infant population [1,2,3,17,19, 29,31,32].

Convulsive syndrome may be a typical manifestation of epilepsy, should be due to hereditary burden on epilepsy, then we are talking about epileptic seizures. Due to the reason that caused it, it is most often organic or functional, that is, non-epileptic, and is determined by the typical causes of its appearance in various age groups of children, while it is not considered as a separate disease [4,5,20,21,26].

Convulsive syndrome can be a consequence of hemolytic disease in newborns, congenital anomalies in the development of the central nervous system (microcephaly, hydrocephalus, holoprosencephaly), asphyxia, oxygen starvation of the brain, transferred during intrauterine development or developed during childbirth, drug or alcohol withdrawal syndrome in a newborn, nuclear jaundice with severe hyperbilirubinemia, hemorrhage in the cerebral ventricles(most often in premature babies). Moreover, if convulsive syndrome occurs among 1.4% of newborns, then in premature babies this figure rises to 20%.

Organic seizures can occur as a result of various diseases of the central nervous system: infectious diseases accompanied by brain damage (encephalitis, meningitis, meningoencephalitis); intrauterine infections suffered by the child that affected the formation and development of the central nervous system (toxoplasmosis, cytomegalovirus, rubella, herpes, listeriosis, congenital syphilis, etc.); trauma, including intracranial birth trauma, etc.Functional seizures arise because of violation of brain blood circulation, toxic diseases of food origin and a gipovolemiya owing to vomiting or diarrhea, congenital heart diseases, fever, a metabolic disorder (a gipokaltsemiya, a hypoglycemia, acidosis, a gipomagniyemiya, hypo - and a gipernatriyemiya), endokrinopatiya, overheating, a likhoradkiya of other causes [1,2,3,11,12,17,18].

Abnormal, highly amplified brain neuronal activity arising from pathological factors plays an important role in the pathogenesis of seizures in children. Pronounced depolarization of brain neurons can be local or generalized, then partial seizures or a generalized attack occur accordingly. According to statistics, convulsive syndrome is most often manifested in preschool children, with its maximum peak in the first three years of the baby’s life, since it is at this age that excitatory ones prevail over inhibitory reactions due to the immaturity of some brain structures, since the child’s brain works in a state of high convulsive readiness due to the low concentration of gamma-aminobutyric acid and low level of connections. Excitatory mediators include histamine and folic acid, and inhibitory mediators include gamma-aminobutyric acid. The biochemical process associated with an increase in the concentration of excitatory mediators leading to membrane permeability, water and sodium flow, tissue hydrophilicity and, as a result of polarization, ultimately leads to the formation of a convulsive focus, clinically manifested by an attack at the moment when the mass of excited neurons reaches a critical level. After the passage of time, the child’s brain also "grows up," myelination is improved, the concentration of gamma-aminobutyric acid increases, respectively, the brain’s resistance to excitatory factors increases and the brain’s convulsive readiness decreases [4,5,9,11,13,20,21].

The features of the manifestation of convulsive syndrome (single or recurrent; generalized, partial, clonic, tonic or tonic-clonic) and accompanying symptoms will

most likely help to establish the etiology of seizures, select and prescribe the optimal treatment and diagnostic solution [6,8,11].

If a convulsive seizure covers the entire skeletal muscles, we are talking about generalized seizures. Generalized seizures are life-threatening in themselves, as they can cause respiratory arrest due to tonic spasm (contraction) of the diaphragm and intercostal muscles. The smaller the age of the child, the more often generalized seizures occur.

In the case of involuntary contractions of an individual muscle, individual muscle tufts or muscles of one anatomical region, we are talking about partial (local) seizures, which can last from several minutes to several tens of minutes without relaxation. Usually, this type of seizures does not pose an immediate danger to life, but nevertheless requires special attention to their possible causes, since it most often happens with tetanus.

The upper limbs are most often bent at the elbows, the head is thrown back during tonic convulsions, and a convulsive attack is a prolonged (up to 3 minutes or more) forced tension of the trunk and limbs. Thus, tonic convulsions are defined as a prolonged fixed muscle contraction. Depending on the fixed position of the trunk and limbs in a seizure, tonic convulsions are divided into extensor or flexion. Flexion contracture is predictively more favorable than extensor contracture, although the predominance of extension or flexion in tonic convulsions is usually associated with the physical strength of various muscle groups.

Clonic seizures look like rhythmic second-by-second alternations of contractions and relaxations of the muscles of the body and limbs, leading to stereotypical movements of various amplitudes. They can not only be common, but also local, and capture only a certain part of the body.

In the case of mutual transition of others or alternation of clonic and tonic muscle contractions, we are talking about mixed clonic-tonic (or tonic-clonic) seizures, depending on the predominant component. It should also be noted muscle or fascial twitches, which are a manifestation of local clonic seizures of individual muscle bundles [1.2.3.11.12.17.18.20.21.29].

Manifestations of convulsive syndrome are clinically visible to the naked eye even to an inexperienced specialist. The usual generalized tonic convulsive seizure is as follows: convulsive syndrome in children almost always develops suddenly. While the child is active, he suddenly fades with his whole body. At the same time, the eyes can remain stationary, roll or begin to wander, rotate from side to side. Breathing becomes difficult. The upper extremities of the baby bend in the elbow and wrist joints, and the lower extremities straighten. Body muscles are tense. The child’s consciousness "turns off": he does not respond to your voice, does not watch the objects. Bradycardia

develops. Skin color changes, up to cyanosis. After the seizure ends, a deep breath occurs, the breath becomes noisy, the skin pales, the child can fall asleep.

In tonic-clonic seizures, the attack is usually preceded by crying of the child, general anxiety. Starting with the muscles of the face, it descends to the upper, then lower parts of the trunk. The body is stressed, however, rhythmic contractions of individual muscle groups can be observed against this background. A distinctive feature of the above convulsive seizure is the pale skin, less often marble. An important symptom is tachycardia and hoarse breathing [1.2.3.11.12.13.17.29.31.32].

In newborn age, parents are misled by the so-called childhood "fading." At first, it may seem that the child is listening to something or falling asleep. But convulsive seizure is manifested by general body tension, "glass" eyes and unnatural movements. An attentive mother usually realizes from the first time that something strange is happening to her child [12,17,29,31].

Special attention should be paid to status epilepticus in children. Status epilepticus (ICD-10 G41.9) is an urgent fixed epileptic condition characterized by either rapidly recurring seizures without recovery or recovery of consciousness between seizure episodes, or prolonged continuous epileptic activity. It is generally accepted that the duration of status epilepticus is 30 minutes or more, this is the period after which the dysfunction of the brain is very likely and immediate medical attention is required.

The prevalence of epileptic status varies. Three epidemiological studies have shown that its prevalence is from 17 to 108 cases per 100,000 population. Although epileptic status can occur at any age, it is most common in infancy and childhood, and 40% of all cases occur before the age of 2 years, during the period of most active brain development. Such prevalence in early life is due to the presence of excessive quantities of neurons and excitatory connections before functional specialization when undergoing neuronal pruning, which increases the vulnerability of the developing brain to epileptic status. In children in the status, an imbalance between the inhibitory and excitatory neurotransmissions leads to abnormalities in neuronal pulses, which provokes the duration of attacks [9,14,22,23,25,30].

The main reason for the emergence of epileptic status is the withdrawal of drugs taken with anti-epileptic activity. However, in half of cases, it can develop without a predisposing factor - epilepsy. Several variants of clinical forms of epileptic status are distinguished: generalized (with an expanded tonic-clonic attack with an unconscious state); not fully generalized (complete loss of consciousness with atypical muscle spasms); tonic status (predominantly found in children with Lennox-Gastaut syndrome); clonic status (typical for convulsive syndrome in infants and for febrile seizures); myoclonic status (occasional or permanent muscle twitches are noted); the status of focal paroxysms (muscle contractions of a certain localization are noted, for example, face, half of the body, one limb, typical of Jackson’s epilepsy); unconscious

or absance status (complete loss of consciousness without muscle contraction); partial status (unconscious automatic actions are noted with incomplete or complete loss of consciousness). Recently, such concepts as impending and established epileptic status have been introduced in the English literature.

During epileptic status, several stages of development are distinguished: prostatus (duration 1-10 minutes); initial stage (from 10 to 30 minutes); unfolded stage (duration from 30 min to hour); refractory stage (lasts more than an hour) [9,15,16,19,21.30].

Depending on the cause of convulsive syndrome, manifestations will also be different. Details are important for the diagnosis, so the mother will have to find out everything: how the attack began, how long it lasted, how the child looked, what happened after the end of the attack, what circumstances preceded it, etc.

At the pre-hospital stage, convulsive conditions in children can be divided into conditional groups, depending on the cause that caused them:

• in response to various damaging agents (increased body temperature, neuroinfections, intoxications, metabolic disorders) as a nonspecific reaction of the brain of children develops so-called "random" seizures or epileptic reaction;

• for brain diseases such as tumors and other volumetric formations, strokes, injuries, congenital abnormalities of the brain vessels, congenital abnormalities of the brain, etc., symptomatic seizures are diagnosed;

• seizures directly in epilepsy [2,3,4,17,26,29].

Consider the most frequent types of non-epileptic seizures in children. First of all, we will talk about febrile convulsions. Febrile seizures are also known in foreign literature as fever seizures - these are seizures associated with high body temperature, but without any serious health problems. The cause of fever is more often viral infections. Among other infections that can lead to febrile seizures, shigellosis, salmonellosis, roseola are noted. It is assumed that these infections can affect the brain directly or through neurotoxin leading to seizures [24.28].

Febrile seizures are most common in children aged 6 months to 5 years, more often in boys than girls, with an average of 2-10% of children. Sometimes a predisposing factor for their development is perinatal damage to the central nervous system. The duration is usually 5 minutes (no more than 15 minutes) and the child quickly returns to normal within an hour after the attack. In 35-50% of cases, there is a risk of recurrence, especially in the presence of risk factors such as an early age at the time of the first episode, a family history of febrile seizures, seizures against a background of low-grade body temperature, a history of epilepsy, a history of a febrile seizures [10,12 , 24.28].

Febrile seizures are divided into two types: simple febrile seizures (diagnosed in a healthy child with no more than one tonic-clonic attack lasting less than 15 minutes for 24 hours) and complex febrile seizures (lasting more than 15 minutes, more than

once for 24 hours or there are focal symptoms). In 80% of all cases, simple febrile seizures are diagnosed, and in 2-10% there is a risk of their transformation into epileptic ones.

In 5% of cases, febrile status epilepticus can develop, a subtype of complex febrile seizures that lasts more than 30 minutes [10].

The mechanism of febrile seizures has not been fully studied, but it is believed that it is based on the pathological reaction of the central nervous system to the infectious-toxic effect with increased convulsive readiness of the brain. The latter is a genetic predisposition to paroxysmal states, structurally unstable brain damage in the perinatal period or a combination of these factors [4.5].

It is not difficult to diagnose febrile seizures because they always occur against a background of high temperatures (above 38 ° C), there are no clinical symptoms of infection and injury of the brain and its membranes, usually there are no patients with convulsive attacks in the family of the child, no history of attacks against a background of normal body temperature, low frequency (1-2 times during the period of fever). If we are talking about simple febrile seizures, then they do not pose a danger to the child, and an electroencephalogram does not reveal any changes in the brain.

In the case of simple febrile seizures, neither antipyretic nor antiepileptic drugs are recommended to prevent seizures. In rare cases, when seizures last more than 5 minutes, benzodiazepine derivatives such as lorazepam or midazolam can be used[10.15.16.27.28].

According to statistical studies, today the rarely seen type of convulsive syndrome in children from three months to two years old is spasmophilia - a syndrome characterized by a predisposition to periodically repeated attacks of tetany associated with increased neuromuscular excitability. Premature babies are more susceptible to this disease. Explicit and hidden forms of spasmophilia are distinguished. With a hidden form, the child looks quite healthy, eats and sleeps well. Nevertheless, there are signs of increased excitability - the baby responds violently to any stimuli, trembles from sounds, knocks [2,3,7].

The main causes of spasmophilia are considered: impaired phosphorus-calcium metabolism (this is why in modern medicine rickets and spasmophilia are closely related, according to some reports in 17%); excess vitamin D in the body, which is most often caused by an overdose of drugs designed to prevent rickets; nutritional disorders (unsustainable artificial feeding, vomiting, diarrhea); excessive exposure of the skin to the sun (usually if radiation is prescribed as therapy); as well as other conditions affecting neural transmission between neurons and muscles. In older children, spasmophilia develops very rarely in conditions such as hemorrhage, severe forms of infectious diseases, tumors, including those that negatively affect the functioning of the thyroid gland, after surgery on the thyroid gland [4,5,7,32].

Obvious symptoms and severe disorders are characteristic of an explicit form. Often, at the beginning of the attack, laryngospasm occurs - a powerful and sudden spasm of the larynx muscles. Spastic respiratory stop, cyanosis are noted, cold sweat appears, common and clonic seizures are observed. Often the child loses consciousness. Apnea can last several seconds, after which the child takes a breath and calms down, there is a regression of pathological symptoms with restoration of the original state.

A characteristic sign of spasmophilia is carpopedal spasm - spasm of the muscles of the arms and legs: the feet and hands of the hands in a state of tonic spasm, and spasm can last from 2 hours to several days. The baby pulls his shoulders to the body and flexes the upper limbs in the joints as much as possible, his fingers are compressed into a fist. Prolonged spasm is often accompanied by severe swelling of the hand and foot. Constant muscle tension negatively affects the condition of the child - he experiences discomfort and pain, which leads to sleep problems, constant crying, increased excitability.

When viewed outside an attack, usually focal symptoms are not detected, but positive symptoms of "convulsive readiness" are noted, among which are especially significant: Khvostek’s symptom (the doctor gently pounds the area between the cheekbone and the corner of the mouth, in the presence of spasmophilia, a grimace appears on the baby’s face, associated with facial muscle spasm); Trousseau’s symptom (when the upper third of the shoulder is squeezed, an "obstetrician’s hand" appears); Lust’s symptom (when the lower leg is squeezed in the upper third, there is a simultaneous involuntary dorsiflexion, rotation and abduction of the foot); Maslov’s symptom (in response to a painful stimulus, for example, tingling with a needle, a short-term cessation of breathing occurs during inspiration) [7, 11,17,21].

Isolated spasmophilia can be accompanied by severe contraction of practically any muscle in children. For example, muscle spasm leads to the sudden development of strabismus. If tension covers the smooth muscles of the internal organs, then the child has problems with urination and defecation, a feeling of severe discomfort, symptoms of paresthesia, such as tingling with a needle or pin, numbness, less often - cramps of various soreness, most often localized in the abdomen. Respiratory muscle spasm is very dangerous, which can lead to stop breathing. Occasionally, tension spreads to the myocardium, the consequences in this case are extremely dangerous, since the child may develop tachycardia, and sometimes even cardiac stop [11,13,14,32].

The most dangerous form of spasmophilia is eclampsia. First, small spasms of mimic muscles appear, then the tension quickly spreads to the rest of the muscles - spasms of the limb muscles occur. In the future, breathing problems, laryngism arise. The skin is then covered and becomes pale, sometimes even bluish. The baby loses

consciousness, which is accompanied by urination or defecation. Foam appears on the lips. The attack can last about a few hours, in these cases a high risk of heart or respiratory failure develops.

To confirm the diagnosis of spasmophilia, a biochemical blood test is mandatory, in which calcium deficiency is determined.

Treatment of a child with spasmophilia involves several stages. First of all, the child is prescribed anticonvulsants, which relieve muscle spasms, prevent problems with respiratory and cardiac activity. As a rule, magnesium sulfate, relanium, seduxen are used. It is important to restore normal levels of calcium in the body. Therefore, preparations such as calcium chloride, calcium gluconate, ammonium chloride are prescribed. Patients are sometimes given sleeping pills and sedatives. After the seizure, the child is prescribed calcium preparations. The diet should be enriched with cottage cheese, acid mixtures, kefir and other dairy products, the menu should include porridge, vegetable puree, fruit juices [6, 7,8,13,14].

Affective-respiratory seizures develop children with neurasthenia and neurosis, their genesis is due to anoxia in connection with the short-term spontaneous development of apnea. Sometimes in English literature they are called convulsions of "anger." They develop mainly in children from 1 to 3 years old and are conversion (hysterical) attacks. They are found mainly in families with hyperopeca. At the height of the effect, manifested by screaming, the child develops hypoxia of the brain, apnea and tonic-clonic seizures. After that, the child becomes weak and drowsy. Affective-respiratory seizures must be differentiated from the "white type" of such seizures as a result of reflex asystolia.

In affective-respiratory seizures, first aid includes, first of all, creating a calm environment around the child, taking measures for reflex restoration of breathing: spraying the face with cold water, patting on the cheeks. Medications with sedative action and improving metabolism in the nervous system are prescribed. Hospitalization is usually not required [1,2,3,11,12,29,31].

Among the seizure syndromes, there are a number of conditions that do not pose a threat to life and do not require special treatment. For example, kramp (muscle contractions) result from metabolic disturbances, usually salt metabolism; "Seizures of the fifth day" - the development of short-term seizures between 3 and 7 days of life in newborns, associated with a decrease in zinc concentration [17,18,31].

Along with this, children have a number of convulsive syndromes combined with progressive neurological symptoms. Among them, Otahar’s syndrome is a neonatal epileptic encephalopathy characterized by tonic seizures that appear sequentially both during wakefulness and during sleep; Vesta syndrome debuts in the first year of life (on average 5-7 months), seizures occur in the form of flexion, extensor or mixed, affect both axial muscles and muscles of the limbs. Short duration and high frequency

of attacks per day, their grouping in a series are typical. There is a delay in mental and motor development [11,12].

In general, it is not possible to describe all varieties of convulsive syndromes in children due to their multiplicity, multifactoriality and variety of clinical manifestations. At the same time, one should not forget about the possibility of paroxysmal disorders of non-epileptic genesis in childhood, such as sleep disorders, psychogenic seizures, migraine, apnea, tics, shuddering attacks, syncopes, gastroesophageal reflux, cardiac conduction disorders, etc. It is the conditions listed above that should be remembered when making a differential diagnosis between non-epileptic and epileptic paroxysmal states.

Primary diagnostic events by the general practitioner at the admission of a child with convulsive syndrome, regardless of the cause of their occurrence, consist of the following: ensuring patency of the airways; inhalation of humidified oxygen; prevention of tongue biting; aspiration by vomiting masses; prevention of head injuries; thermometry; glucometry (normal glucose level in infants - 2.78-4.4 mmol/l, in children 2-6 years old -3.3-5 mmol/l, in school students 3.3-5.5 mmol/l); collection of history; description of the nature of the attack from the words of parents, relatives, eyewitnesses present during seizures; advanced somatic and neurological examination with assessment of vital functions, isolation of leading neurological syndromes; assessment of the level of psychomotor development; determination of meningeal symptoms [1.6.8.9.13.14.15.16.17.27].

Children are diagnosed to identify the causes of convulsions, after providing emergency care for convulsive syndrome. Regardless of the etiology of the seizure syndrome, it is necessary to answer first of all the following questions: whether the observed seizures are seizures; if so, what type of seizures they relate to; what is the risk of a relapse or re-episode (epilepsy); if any, what type of epileptic syndrome should be attributed to the observed seizures; if in a particular case we are talking about symptomatic epilepsy, then what is its etiology.

In the case of a convulsive episode, usually in a child who is isolated (single), further treatment is not required. And recurrent seizures, most often related to various types of epilepsy, require careful and long-term anticonvulsant therapy under the supervision of a pediatric neurologist.

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