

NEUROLOGICAL, LABORATORY AND INSTRUMENTAL EXAMINATIONS OF CHILDREN BEFORE VACCINATION

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Abstract: This article provides a detailed examination of neurological, laboratory, and instrumental methods for examining children prior to vaccination. It describes indications for conducting electroencephalography, neurosonography, complete blood count and biochemical blood tests, immunogram, and other diagnostic procedures. Special attention is devoted to identifying absolute and relative contraindications to vaccination, as well as the algorithm for pre-vaccination examination. The material contains practical recommendations for parents and healthcare workers aimed at ensuring safe and effective immunization of the pediatric population.

Vaccination represents one of the most effective methods of protecting a child's body from dangerous infectious diseases by activating the immune system. However, each child possesses individual physiological characteristics, and in some cases, careful preparation for vaccination is required. This is precisely why comprehensive examination of the child before vaccination and assessment of their health status are critically important for the safety and effectiveness of this procedure. The primary purpose of examinations conducted before vaccination is to identify temporary or permanent contraindications to vaccine administration. Through these examinations, we gain the ability to detect the presence of acute infectious diseases, neurological problems, or other health disorders in the child. This approach ensures the safety of vaccination and prevents the development of possible complications that may negatively affect the health of the young patient.

Neurological Examinations

Neurological examinations are particularly important for children with brain diseases, convulsive syndrome, and psychomotor developmental delays. These studies help assess the state of the child's nervous system and identify hidden pathologies that may constitute a contraindication to vaccination.

Clinical Neurological Examination

During clinical examination, the neurologist carefully assesses the child's general condition, level of consciousness, reflexes, muscle tone, and motor activity. The specialist measures head circumference, evaluates the condition of the anterior fontanelle in infants, and analyzes motor development according to age. If the child has problems such as epilepsy, brain tumors, or hydrocephalus, special neurological tests are employed for their detection. The physician observes the child performing simple movements such as arm rotations, walking, and the ability to sit. Eye movements, movement coordination, and sensitivity are also evaluated. These examinations demonstrate how properly the young patient's nervous system is functioning.

Electroencephalography (EEG)



Electroencephalography is an important instrumental method that measures the electrical activity of the brain. This examination is especially necessary in children with epilepsy or predisposition to convulsive seizures. EEG records electrical impulses arising in various areas of the cerebral cortex, and based on this data, epilepsy or other neurological diseases are diagnosed. EEG examination is painless and safe. Special electrodes are placed on the child's head, and they remain in a calm or sleeping state. The examination lasts approximately twenty to thirty minutes. If EEG results show the presence of abnormalities in brain activity, it is recommended to postpone vaccination or apply special precautionary measures.

Neurosonography (Ultrasound Examination of the Brain)

Ultrasound examination of the brain is used predominantly in children during the first year of life, since the bones of their skull are not yet fully ossified and the anterior fontanelle remains open. This method allows determination of brain structure, ventricular size, the condition of blood vessels, and the presence of any changes in brain tissue. Neurosonography is safe and performed quickly. The physician applies a special ultrasound probe through the anterior fontanelle and visualizes brain structure on the screen. This examination is very useful for identifying brain developmental defects, intracranial hemorrhages, or hydrocephalus.

Magnetic Resonance Imaging (MRI) and Computed Tomography (CT)

If serious neurological problems are suspected in a child, MRI or CT studies are prescribed. These methods allow obtaining precise and detailed images of the brain. MRI visualizes soft tissues well and is conducted without radiation, therefore it is considered safer for children. CT is used for visualizing bone structures and in cases requiring rapid diagnosis. These examinations are expensive and often conducted under general anesthesia, since the child must lie motionless. However, they show brain structure very precisely and have special significance in diagnosing serious diseases.

Laboratory Studies

Laboratory studies play an important role in assessing the child's overall health status. Through these analyses, hidden infections, inflammatory processes, or immune system problems can be detected.

Complete Blood Count

Complete blood count is one of the most frequently used and important studies before vaccination. Through this analysis, the number of erythrocytes, leukocytes, platelets, and hemoglobin level in the child's blood is determined. An increase in leukocyte count indicates the presence of an inflammatory or infectious process. In such cases, it is necessary to temporarily suspend vaccination, since the body's immune system is already fighting the infection. For example, if a child has a very high leukocyte level and elevated body temperature, this may be a sign of acute respiratory infection or another bacterial disease. In such a situation, it is necessary to postpone vaccination until complete recovery.

Biochemical Blood Test



Biochemical blood testing is used to assess liver and kidney function. Through this analysis, the content of glucose, creatinine, urea, and liver enzymes (ALT, AST) in the blood is measured. If there are liver or kidney function disorders, some vaccines may be contraindicated or require the application of special precautionary measures. In children with inflammatory processes in the liver or who have had hepatitis, an increase in liver enzymes is observed. In such cases, it is necessary to postpone vaccination until complete liver recovery, since the vaccine may create additional burden on this organ.

Immunogram

An immunogram provides detailed information about the state of the child's immune system. In this analysis, various types of lymphocytes, the quantity of immunoglobulins (IgG, IgM, IgA), and other immunity indicators are determined. In children with immune system deficiency, live attenuated vaccines may be dangerous, therefore immunogram examination is necessary. For example, if a child has very low levels of immunoglobulins IgG or IgM, this means their body cannot adequately respond to infections. In such cases, a vaccination plan must be specially prepared.

Urinalysis

Urinalysis helps assess the condition of the kidneys and urinary tract. If protein, leukocytes, or erythrocytes are detected in the general urinalysis, this indicates an inflammatory process or kidney disease. In such cases, vaccination should be postponed until the problem is resolved.

C-Reactive Protein (CRP) and Erythrocyte Sedimentation Rate (ESR)

C-reactive protein and erythrocyte sedimentation rate are important indicators of the presence of an inflammatory process. If these indicators exceed normal boundaries, this means that a hidden infection or inflammation is present in the child's body. In such cases, vaccination may be dangerous, since the body's immune system is already occupied with another problem.

Instrumental Studies

Instrumental studies are used to visualize and assess the condition of the child's internal organs and systems. These examinations are necessary predominantly in children with complex or chronic diseases.

Cardiovascular System Examination (ECG, EchoCG)

Electrocardiography (ECG) measures the heart's electrical activity and helps identify heart rhythm disorders and changes in the heart muscle. Echocardiography (EchoCG) is an ultrasound examination of heart structure, showing the condition of heart ventricles, valves, and heart walls. If a child has heart defects, arrhythmia, or heart failure, it is necessary to carefully assess heart condition before vaccination. Some vaccines may create additional burden on the cardiovascular system, therefore these examinations are important.

Chest X-ray



Chest X-ray is used to assess the condition of the respiratory system. If a child has chronic bronchitis, pneumonia, or other lung diseases, X-ray examination is necessary. This examination helps identify inflammation in the lungs, fluid accumulation, or other pathologies. In children with respiratory system diseases, vaccination is conducted with caution, since some vaccines may lead to additional respiratory system problems.

Abdominal Ultrasound

Abdominal ultrasound allows assessment of the condition of the liver, gallbladder, spleen, pancreas, and kidneys. If a child has liver diseases, biliary tract inflammation, or kidney problems, this examination is necessary. This method is painless and safe. The physician applies the ultrasound probe to the abdomen and visualizes the structure and size of internal organs. If a change in the size of any organ or structural problem is detected, vaccination postponement or the application of special precautionary measures is required.

Pre-Vaccination Examination Procedure

In practice, it is important to understand in what sequence examinations before vaccination are conducted. Usually the process proceeds as follows. First, parents bring the child for examination to the pediatrician. The pediatrician examines the child's general condition, measures body temperature, examines the skin, throat, and ears. If the child has no complaints and alarming signs, additional examinations are not required for routine vaccination. However, if the child has chronic diseases, allergic history, neurological problems, or unusual reactions to previous vaccinations, additional examinations are necessary. In such cases, the pediatrician provides referrals to a neurologist, allergist, or other specialists. In children with neurological problems, neurological examination, EEG, and sometimes MRI examination are conducted. In children with weakened immune systems, immunogram analysis is performed. In children with cardiovascular diseases, ECG and EchoCG examinations are conducted. After completion of all examinations, results are collected and the child's readiness for vaccination or the presence of temporary contraindications is determined. If the child's health is good and no contraindications are detected, vaccination is conducted at the appointed time.

Absolute and Relative Contraindications Before Vaccination

Based on examinations before vaccination, two types of contraindications may be identified: absolute and relative. Absolute contraindications are permanent and serious; they completely exclude the use of a particular vaccine. For example, severe immune system diseases, severe allergic reaction to a previous vaccination, acute convulsive seizures, or progressive brain diseases are considered absolute contraindications. In such cases, live attenuated vaccines are considered dangerous and other alternative protection methods are used instead. Relative contraindications are temporary, and after a certain time, the possibility of vaccination appears. For example, acute respiratory infections, high body temperature, inflammatory processes, or the acute period of a chronic disease are considered relative contraindications. After the child's recovery, vaccination is conducted safely.

Conclusion



Neurological, laboratory, and instrumental examinations conducted before vaccination of children constitute the fundamental part of ensuring safe and effective vaccination. Through these examinations, hidden diseases, immune system problems, or other health disorders in the child's body can be identified. Each child is unique and their body may react differently, therefore an individual approach is very important. Parents must understand the importance of vaccination and conduct their children through necessary examinations. Only based on thorough preparation and proper assessment can vaccination protect the child from dangerous diseases and help preserve their health. A healthy child is the foundation of a healthy society, and vaccination is one of the most important steps on this path.

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