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DIAGNOSIS OF OTONEUROLOGICAL SYMPTOMS AND SYNDROMES IN YOUNG CHILDREN

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Abstract : Hearing loss in children is a congenital or acquired pathology in which the level of sound perception is reduced. Unlike deafness, with hearing loss, hearing is only partially lost. The child can hear sounds and distinguish them, but the threshold of perception is significantly increased. The development of the pathological process is associated with intrauterine pathologies, genetic abnormalities and other factors.

Hearing loss affects the child's intellectual development, speech development, ability to speak normally and express one's own thoughts. The nature of treatment for hearing loss depends on the cause of the disorder.

Keywords: Genetic, Alport syndrome, hypovitaminosis, electrocochleography, neuroinfections, acoustic reflexometry.

INTRODUCTION:

A decrease in the level of auditory perception is a group of disorders. Accordingly, there are many causes of the pathological condition. Globally, all causes of the disorder can be divided into congenital and acquired. Identification of causes is carried out using instrumental and other methods. Including by collecting a detailed medical history.

A group of causes underlie congenital lesions and ear diseases. Among them are:

genetic abnormalities;

intrauterine infections;

maternal diseases of a non-infectious nature.

Genetic abnormalities make up a significant proportion of the morbidity structure. In the vast majority of cases, we are not talking about an isolated form of a pathological condition, but about a complex lesion within the framework of one or another severe Down or Alport syndrome. Almost always we are talking about severe lesions that are not limited to hearing impairment. There is a complex lesion that affects most body systems. Leads to early disability of the patient.

Intrauterine infections are no less dangerous. Risks are created by agents such as syphilis bacteria, tuberculosis, staphylococci, representatives of venereal flora, and also many viruses, such

as measles, rubella, herpes viruses, especially cytomegalovirus and Epstein-Barr virus. Possible damage by fungal agents, which are no less dangerous.

Hearing loss and partial hearing loss of a congenital nature may be caused by other diseases in the mother. For example, thyrotoxicosis, when the body produces an excess of thyroid hormones. Sometimes diabetes mellitus, anemia and hypovitaminosis or vitamin deficiency, a complete lack of vitamins in the body, become provocateurs of the disorder.

The prevalence of bilateral hearing loss among all newborns is 2–3 cases per 1000 births. Among children treated in neonatal intensive care units, hearing pathology occurs in 20–40 per 1000 infants. During the first years of life, another 1–2 children out of 1000 lose their hearing.

Hearing loss in a child can also be acquired. In such a case, the disorder develops after the influence of the disorder factor. Among the causes of the pathological condition, the most common are:

diseases of the external ear, ENT organs;
disorders of the inner ear, mainly associated with infectious diseases;
injuries and their consequences;
traumatic brain injuries.

Possible risk factors directly affect the development and likelihood of a pathological process. They create additional risks. Possible risk factors include:

bad habits of the mother: smoking, alcohol abuse, all these habits can play a negative role;
maternal hormonal imbalances;
severe pregnancy, severe toxicosis at the early and even later stages of gestation;
damage to the endocrine system in a pregnant woman;
low level of social well-being, children in dysfunctional families are at much greater risk;
negative environmental conditions in the place of residence;
suffered brain injuries;
insufficient nutrition of the mother, the nutritional factor plays a negative role, since it can provoke vitamin deficiencies or hypovitaminosis;
unfavorable heredity, burdened genetic history.

Risk factors can be overcome. The study of the probable preconditions of the pathological process is carried out as part of the comprehensive prevention of hearing loss in young patients.

The pathological process is classified according to the characteristics of its origin and severity of the disorder.

If we use the origin of the pathological process, the cause of hearing loss in children, as a criterion, three forms of the disorder are distinguished:

sensorineural hearing loss, also known as sensorineural hearing loss in children, develops as a result of damage to the brain, inner ear, nerve tissue, and occurs very often, including for hereditary reasons;

the conductive form is caused by damage to the outer, middle ear, the disorder also develops with deformation of the auditory canals, congenital anomalies of the skull;

mixed type, this form is transitional, caused by two factors in the development of the pathological process.

According to the degree of disorder of the auditory analyzer, 4 more forms of the pathological process are distinguished:

hearing loss of the 1st degree: sound, addressed speech is perceived from a distance of up to 6 meters, whisper - up to 3 meters, minimal impairment of auditory function is observed, there are one-sided or two-sided;

violation of the 2nd degree, addressed speech is heard from a distance of up to 3 meters, whispering - up to 1 meter;

hearing loss of the 3rd degree, accompanied by the perception of speech at a distance of up to 2 meters, the child cannot distinguish a whisper;

at grade 4, spoken speech is not perceived, although hearing is partially preserved.

When describing the pathological process, the full characteristics of the disorder are given. For example, grade 2 sensorineural hearing loss in a child or grade 3 sensorineural hearing loss in a child.

Symptoms of damage to the sound-receiving apparatus depend on the severity of the pathological process. With grade 1 hearing loss, parents may not realize that there is something wrong with their child's hearing.

The problem becomes obvious later, as they grow older. With more developed forms of the pathological condition, clinical manifestations are more obvious, the child:

tries to read lips;

cannot recognize speech addressed to him;

does not respond to loud sounds;

does not make sounds independently.

Speech underdevelopment is observed. Or the child cannot speak at all. Underdevelopment of the speech apparatus leads to disorders of higher nervous functions. Possible mental retardation.

Symptoms appear differently at different times. The disorder is most obvious between 1 and 3 years of age or slightly earlier. Hearing loss in newborns is especially difficult to identify. An examination is required.

Methods for diagnosing hearing loss. There is a wide range of diagnostic methods for examining the hearing organs of a child. In the first year, otoscopy is used, a routine hearing test using improvised means and methods. Further diagnosis is carried out using more accurate methods:

audiometry;

impedance measurements;

electrocochleography.

The diagnosis of hearing loss and other forms of disorder is made based on the results of a thorough examination. Research data is systematized and leads to a unified picture. To identify lesions of the brain center, as well as the cochlea, other structures of the brain, and inner ear, imaging methods are indicated: MRI, CT, etc. For various disorders, damage to the structures of the skull, ear canal, X-rays and CT are indicated. These are the main ways by which you can make a correct diagnosis and distinguish between disorders similar in the group. Both in children and adult patients.

Audiometry is a research method in otolaryngology that allows you to determine hearing acuity. It requires special equipment, but is performed quickly and does not cause pain to the patient. The basis of audiometry is the study of the hearing threshold - the minimum intensity of sound of a given frequency that can be heard by the ear of a particular person. There are average values for this value under normal conditions, but in pathology its values change significantly, usually increasing.

The result of hearing audiometry is an audiogram, a graph where the frequency of sound is displayed on the horizontal axis, and its intensity heard by the patient's ear on the vertical axis. All methods of this research are divided into subjective and objective. Subjective are based on the patient's feelings. They are quite simple, at the same time informative, but have a common drawback - they do not exclude simulation on the part of the subject. These include speech and pure tone audiometry. The latter, in turn, is divided into threshold and suprathreshold.

Objective methods are based on the assessment of physiological processes in the body in response to a specific sound. The patient's words do not play any role here, no action is required from him - the sensors of the devices will determine everything themselves. Hearing impairment cannot be simulated using these methods. Patients with speech impairments, immobilized patients, as well as young children can be examined. These are computer audiometry techniques - electroencephaloaudiometry and electrocochleography.

Indications and contraindications for the study

Hearing acuity testing is indicated for all patients who note a decrease in hearing acuity. This symptom occurs especially often in the following diseases:

acute or chronic infectious and inflammatory processes in different parts of the ear such as otitis media, labyrinthitis, mastoiditis;

neuroinfections (meningitis, encephalitis);

traumatic brain injuries;

neoplasms of the brain or ear;

acoustic neuritis;

acute cerebrovascular accidents;

in newborns – congenital diseases of the hearing organ or nervous system.

If an ear disease has already been diagnosed and cochlear implantation is necessary, audiometry is carried out in order to select the appropriate type of hearing aid and ensure high-quality adjustment of the latter. After ear surgery, this test allows you to evaluate the effectiveness of the intervention - to determine whether your hearing has improved. There are no absolute contraindications to ear audiometry. At the same time, not all categories of patients are suitable for one or another method. Thus, it is impossible to conduct pure tone threshold audiometry on a newborn or paralyzed as a result of an acute cerebrovascular accident - they are not able to follow the doctor's instructions. Computer audiometry is indicated for such patients.

Audiometry techniques vary depending on the type of study. At the beginning of any type of procedure, the doctor will examine the hearing organ, clean the ear canal of wax, and if there is a foreign body, remove it.

The simplest technical method is speech audiometry. The doctor is 6 m from the patient. With different volumes, from a whisper to normal conversational speech, he pronounces a set of words or simple phrases that are understandable to patients with different levels of intelligence and different professions. The patient's task is to repeat them. Based on the patient's answers, the doctor manually builds an audiogram graph.

Another version of this type of diagnosis is the translation of words or simple phrases from an audio medium.

Background noise can be used to add complexity.

The most common method of testing hearing acuity is threshold pure-tone audiometry, which allows you to study the characteristics of sound conduction and sound perception separately from each other.

During the procedure, the patient is in a sitting position with headphones on his head connected to an audiometer, holding a remote control with a button in his hand. The left and right ears are examined alternately.

To determine the characteristics of sound conduction, a sound of a certain frequency and intensity is given to the patient through the earphone; when the patient hears it, presses the remote control button, and the device independently marks a point at the desired location on the audiogram graph. The frequency and intensity of sound gradually changes within a given range; a solid curve characterizing sound conduction is visualized on the audiogram.

To study sound perception and evaluate bone conduction, special sensors are placed on the mastoid processes located behind the patient's ears, through which the patient should feel vibration of a certain intensity and at this moment press the remote control button. As a result of the study, a second curve will appear on the audiogram, this time dotted, which characterizes bone conduction.

During the study, the patient may experience some discomfort in the ear, and, if desired, simulate hearing loss, which is a significant drawback of this type of hearing audiometry. Not used for acute inflammatory processes in the ear.

Some diseases of the hearing organ are accompanied by inadequate sensitivity to sounds of a certain frequency and intensity - for example, patients cannot hear quiet sounds at all, but can distinguish loud sounds well. To diagnose these disorders, pure tone suprathreshold audiometry is used - they increase the intensity of a sound of a certain frequency in the earphone until the test person experiences discomfort, and then evaluate the interval between the threshold of audibility and the threshold of unpleasant sensations.

As part of pure tone suprathreshold audiometry, some other tests that determine these indicators can be used.

Computer audiometry is a diagnostic method that does not require the active participation of the patient, so it can be used in people with mental disorders who do not understand the doctor's instructions, immobilized patients or young children who are unable to follow given instructions. If necessary, the patient may be under general anesthesia during the examination - in a state of drug-induced sleep.

Electrodes connected to a computer are installed on the patient's head, headphones are put on, and sounds of different frequencies and intensities are played through them. Based on the brain's reaction to sound, the computer records an electroencephalogram - a graphic image, from which the doctor will subsequently determine the localization of the process affecting hearing.

A variant of computer audiometry is electrocochleography - recording the reaction of the auditory nerve to electrical stimulation.

Another different method is the impedance measurement method, which can be used to assess hearing loss.

Impedance testing includes several diagnostic tests: testing the function of the auditory tube, tympanometry, acoustic reflexometry.

Acoustic impedance testing differs from audiometry in that while pure tone threshold audiometry allows one to objectively assess the state of hearing and determine the patient's hearing thresholds at different frequencies, then acoustic impedance testing allows one to assess the state of the sound conducting system of the middle ear, the state of the cochlea, dysfunction of the auditory tube, and pathological conditions of the auditory system. and facial nerves.

Acoustic impedance testing makes it possible to determine the presence or absence of fluid in the middle ear.

Perforation of the eardrum.

Tympanosclerosis.

Hypermobility of the eardrum.

Impaired patency of the auditory tube.

Exudative otitis media.

Otosclerosis.

Traumatic rupture of the auditory ossicular chain.

Neuroma and other pathological conditions of the auditory nerve.

Pathological conditions of the facial nerve.

Some central pathologies of the auditory analyzer.

To roughly determine hearing loss due to sensorineural hearing loss.

Monitor the treatment process for acute otitis media.

To assess the condition of the drainage tubes of the eardrum in the treatment of chronic adhesive otitis.

To carry out acoustic impedance measurements, a device is used - a middle ear analyzer. The middle ear analyzer consists of a special acoustic probe with an earmold, an audiometric telephone and a digital sound analyzer with a built-in air pressure regulator, control panel, screen and printer. The probe contains miniature telephones and a microphone, and a thin elastic tube from a pressure regulator passes through the probe.

One small telephone probe sends a sound - a probing tone - into the ear canal, which is closed by an earmold. The probe tone frequency should be 1000 Hz for children under 12 months of age and 226 Hz for all other ages. The microphone of this probe receives the probing tone and its reflection from the eardrum.

Basic diagnostic impedance tests:

Tympanometry

This is a method of examining the organ of hearing using sound pressure created in the ear canal. This determines the condition of the middle ear, the mobility of the eardrum, and the level of conductivity in the auditory ossicles.

Tympanometry is carried out using a device called a tympanometer. A probe with an insert is placed into the external auditory canal to create a seal. The probe is connected to an air pump, a

sound generator and a microphone. Sound of a given frequency is transmitted into the ear canal, which leads to vibration of the eardrum.

The obtained data is recorded in graphic form - tympanograms.

The following diseases are diagnosed using tympanometry:

Otitis (acute and chronic, purulent and serous, infectious and non-infectious nature)

Eustachitis (acute and chronic) – inflammatory processes in the Eustachian tube

Sclerosis, atrophy, stenosis - changes in the mucous membrane of the Eustachian tube and tympanic membrane

Adenoiditis – hyperplasia (overgrowth) of the adenoids as a result of a long-term infectious process

Polyposis - the formation of mucosal polyps in any part of the area under study

Cysts, tumors in the ear cavity.

Eustachian tube function tests

The auditory tube (Eustachian tube) is an anatomical canal that connects the middle ear cavity with the pharynx, and through it with the surrounding air.

Normally, the auditory tube performs drainage, protective and ventilation functions.

One of the leading etiological factors leading to middle ear diseases is dysfunction of the auditory tube. The mechanisms of occurrence of this dysfunction are different: changes in aeration in the nasal cavity and nasopharynx as a result of curvature of the nasal septum, hyperplasia of lymphoid tissue, the presence of viruses and bacteria in it, anatomical changes in the shape of nasal structures, anatomical features of the auditory tube. Violation of the ventilation function leads to the formation of negative pressure in the tympanic cavity. Long-term negative pressure creates conditions for the development of exudative otitis media.

Testing the ventilation function of the auditory tube is carried out as follows: the test for assessing the ventilation function of the auditory tube is that tympanometry is performed three times.

The 1st – control tympanogram – is recorded at normal pressure in the nasopharynx. It is carried out in the same way as conventional diagnostic tympanometry.

2nd tympanogram – with increased pressure in the nasopharynx (Valsalva experience). To do this, the subject is asked to exhale with his nose and mouth closed. With normal ventilation function of the auditory tube, the peak of the tympanogram is recorded at a pressure greater than on the control tympanogram.

3rd tympanogram – with reduced pressure in the nasopharynx (Toynbee's experience). To do this, the subject is asked to swallow with his nose and mouth closed.

Acoustic reflexometry

This is a recording of the reaction of the stapedius muscle in response to sound stimulation. The minimum sound level required to cause contraction of the stapedius muscle is called the acoustic reflex threshold. Normally, the threshold of the acoustic reflex is at the level of 65 - 90 dB.

Acoustic reflexometry is performed in two ways of delivering a sound stimulus:

Ipsilaterally - the sound stimulus is delivered to the same ear in which the acoustic reflex is recorded. And the acoustic reflex itself is called the "ipsilateral acoustic reflex." Contralateral - a sound stimulus is delivered to the ear opposite to the one in which the acoustic reflex is recorded. This acoustic reflex is called the "contralateral acoustic reflex."

Sound stimuli in acoustic reflexometry are tones with frequencies of 500, 1000, 2000, 4000 Hz and broadband noise. The middle ear analyzer automatically increases the strength (level) of the stimulus and finds the threshold of the acoustic reflex and determines the increase in the amplitude of the acoustic reflex as the stimulus increases.

This is a quick and non-invasive method for diagnosing diseases such as exudative otitis media, otosclerosis.

Using acoustic reflexometry, you can record the contraction of the intraauricular muscles in response to sound stimulation. The method is used for differential diagnosis of diseases of the middle and inner ear, as well as for determining discomfort thresholds used in the selection and adjustment of hearing aids.

Indications for the study:
Frequent dizziness;
Noise in ears;
Hearing loss (unilateral or bilateral);
Uncertain, shaky gait;
Ear congestion.

The study is of particular value in identifying pathologies characterized by increased endolymphatic pressure in the inner ear. This condition is called endolymphatic hydrops and occurs in Meniere's disease. The study is also used to monitor the treatment and its success.

Electrocochleography procedure

Before the extratympanic registration procedure:
perform otoscopy;
toilet the ear canal;
the eardrum is irrigated with saline;
the electrode is inserted under the control of an otoscope or operating microscope.

The sound source is clicks and tones sent through headphones or in-ear phones, which can also be replaced by speakers.

A prerequisite for the study is the complete absence of extraneous sounds, so the patient must stay in a special sound-attenuated chamber. Tone messages increase the frequency specificity of the responses received, which is of great importance in pathologies accompanied by persistent hearing loss, for example, Meniere's disease.

The average duration of the procedure is from half an hour to an hour. The subject is in a lying position on his side, with the examined ear facing upward. The data is recorded in the form of a curve, which is represented by positive and negative peaks. Each of them describes the state of a specific section of the sound analyzer.

In adults and adolescents, electrocochleography is performed under local anesthesia. General anesthesia is required for examination of young children. Advantages of this method for diagnosing ear diseases:
allows you to get an idea of hearing thresholds in a simple way;
used to differentiate conductive hearing loss from sensorineural hearing loss;
provides information about the state of the hair apparatus of the cochlea.
Electrocochleography can also be used to study deeper parts of the sound analyzer.

Treatment measures for the disorder

Treatment methods for hearing loss in children are determined by the characteristics and causes of the pathological process. If the disease develops as a result of neurosensory changes, the root cause is corrected, which lies in damage to the nerve tissue or inner ear. If a foreign body in the ear is to blame, it is simply removed. Lesions and damage to the middle ear due to improper formation of the auditory canals are treated promptly. Surgical intervention requires plastic surgery, which leads to the restoration of sound conduction. After some time, the child begins to hear normally.

Prognosis is determined by diagnosis. The prospects for recovery from foreign bodies and minor lesions of an organic, structural nature are favorable. The most difficult thing is with congenital sensorineural hearing loss. She is very difficult to respond to therapy.

Measures to prevent hearing loss in children

Prevention of damage to various parts of the auditory analyzer in children begins with the mother. It is necessary to give up bad habits, quit cigarettes and alcohol. It is important to avoid infection and treat bacterial, fungal, and viral diseases.

References:

1. A.A. Blotsky, V.V. Antipenko. INFLAMMATORY DISEASES OF ENT ORGANS: textbook - Blagoveshchensk, 2021, 553 p.
2. Otorhinolaryngology: a textbook for universities / V. T. Palchun, M. M. Magomedov, L. A. Luchikhin. - 2nd ed., rev. and additional - 2008. - 656 p.

3. Bogomilsky, M. R. Diseases of the ear, nose and throat in childhood: national guidance / ed. M. R. Bogomilsky. - 2nd ed. , processed and additional - Moscow: GEOTAR-Media, 2021. - 1072 p.
4. Ovchinnikov Yu.M., Lopatin A.S., Gamov V.P. Diseases of the nose, pharynx, larynx and ear. - M.: Medical Information Agency, 2008. - 320 p.
5. G.B. Tilyakhodzhaeva Study of the incidence of chronic otitis in the Fergana region. Current issues of modern pulmonology materials of the V - republican scientific and practical conference with international participation 2018 – C-194-196
6. G.B. Tilyakhodzhaeva Some issues of ENT diseases in children and their prevention “Achievements of women in the field of science, education, culture and business” 2017.
7. Sensorineural hearing loss in children. Clinical guidelines of the Russian Federation 2021 (Russia).
8. G.B. Tilyakhodzhaeva Medical and social aspects of the prevalence of ENT diseases among the child population “Achievements of women in the field of science, education, culture and business” 2017.
9. Pulatova, Z., & Ganijonov, H. (2023, June). MODERN VIEWS OF BEHAVIORAL CHANGES IN 16-17-YEAR-OLD STUDENTS. In International Conference on Education and Social Science (Vol. 1, No. 2, pp. 30-32).
10. Mamadaliyevna, N. R. (2023). INSONIYAT O’ZINI O’ZI ZAHARLAMOQDA. " GERMANY" MODERN SCIENTIFIC RESEARCH: ACHIEVEMENTS, INNOVATIONS AND DEVELOPMENT PROSPECTS, 9(1).
11. Jalolidinovna, I. Z. Cellular Changes in Cardiomyocytes Due to Ischemia and Necrosis. JournalNX, 7(04), 1-2.
12. Zokirov, M. (2023, June). Features of cognitive impairment in patients with HIV encephalopathy. In Academic International Conference on Multi-Disciplinary Studies and Education (Vol. 1, No. 9, pp. 34-36).
13. Mamadaliyevna, N. R. (2023). INSONIYAT O’ZINI O’ZI ZAHARLAMOQDA. "GERMANY" MODERN SCIENTIFIC RESEARCH: ACHIEVEMENTS, INNOVATIONS AND DEVELOPMENT PROSPECTS, 9(1).
14. Zokirov M.M., & Madjidova Y.N., . (2020). Correction Of Cognitive Disorder In Patients With HIV - Associated Encephalopathy. The American Journal of Medical Sciences and Pharmaceutical Research, 2(07), 117–122. https://doi.org/10.37547/TAJMSPR/Volume02Issue07-15.
15. Zokiriv, M. (2021). Correction of cognitive impairments in patients with HIV-associated encephalopathy. J. Theor. Appl. Sci, 7, 62-66.
16. Melibaevnaa, B. K., & Toshtemirovna, M. K. (2023). PNEUMONIA IN NEWBORN BABIES ON VENTILATORS. World Bulletin of Social Sciences, 19, 16-17.
17. Shermatov, R. M., Nishanova, Z. X., & Mullajonov, X. E. (2021). Methods of dietotherapy and dietodiagnostics for different types of food intolerance in children. ACADEMICIA: An International Multidisciplinary Research Journal, 11(5), 808-816.