GALAXY INTERNATIONAL INTERDISCIPLINARY RESEARCH JOURNAL (GIIRJ)
ISSN (E): 2347-6915
Vol. 11, Issue 12, December (2023)

HEARING RESEARCH METHODS

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ABSTRACT

One of the topical issues of the day that appeared in this article is the examination of children with hearing lossmethods of managing inflammation and methods of their supportrevealed.

Keywords:audiology, audiometry, objective and subjective, acumetry, tympanometry, impedanceometry.

Subjective and objective methods of studying the physiology of the auditory analyzer.

Examination of the ear begins with the collection of anamnesis, which is examined and the function of hearing is checked. When examining the ENT organs in an embodied state, before examining the ear, the nose and trachea are always removed.

Complaints of the disease are checked to the following:

Is there a pain in the ear, what is the nature of it? Is it pus? Is the hearing heavy or completely deaf? Is your ear ringing? Dizzy? Determining how the patient feels, whether he has a headache or nausea, is also very relevant. It is necessary to find out whether the patient suffered from diseases such as flu or acute flu before the ear pain.

Examination of the ear means looking from the outside, looking at the ear and mastoid growth, and seeing the outer ear and tympanic membrane (otoscopy). The audiology department of otorhinolaryngology deals with the study of the physiology of the hearing analyzer. The use of hearing is called audiometry.

Checking the hearing function of the ear

Hearing function is tested with audiometers using tuning forks and tuning forks. Whisper hearing tests should be conducted in a quiet, large room. Uses different ears. In this case, the second ear is closed with a finger. Illness can not hear the words of the examination from the lips without seeing the face that holds the ear to the side of the examination. The same whisper should always be heard during the inspection. Low sounds in the normal ear, i.e. words with a preference for labial consonants - b, p, t, m, n, can be heard from a distance of 5-10 m when spoken in a whisper. Words containing high-pitched sounds (silent and sliding c, з, ч, ш) can be heard from materials up to 20 m away. When listening to whispers, count from one to one hundred, and introduce numbers such as low (1, 4, 7) and high (3, 8, 80). A whisper is considered normal in hearing use if it can be heard from a distance of about 6-8 meters. If the patient does not hear the whistling sound at all, it may be difficult to fill the ear with a Polischer balloon and allow the otoscope to read the air. In this case, it is checked by speaking or speaking loudly. When determining unilateral deafness, it is not enough to cover the healthy ear with a finger, because the patient can hear with the healthy ear. Accordingly, he listens to it so that sounds do not enter the healthy ear. When the tartar is working, the ear does not hear any sound. Inspection with cameras. Diseases of the sound-acting and sound-receiving apparatus are

necessary for the middle differential specialized diagnosis, to pay the hearing power. Tuning tuning forks give a pure tone without overtones. The human ear can distinguish between 16 and 20,000 vibrations per second. The highest tone heard by the ear determines the upper limit of hearing, the lowest tone - the lower limit of hearing. The tones produced by the upper lower limit produce the range of hearing. To determine whether there is an air hole, a tuning fork is used to sound the hole. A tuning fork that produces bone resonance is placed on another or suction cup. If the ear hears normally, it can be prolonged with bone continuity that can lead to movement.

From the point of view of psycho-physiological areas, audiometric examination can be controlled by objective and subjective methods.

Subjective methods are based on the patient's answers to examination questions and their analysis by the doctor himself, laboratory will. However, the patient can not hear even if he hears, or he can say "I heard" even if he does not hear (aggravation, simulation). In addition, small children can perform the same tasks differently depending on their lack of understanding, fear, and the development of their intelligence. Babies and fetuses generally do not complain about hearing or are indifferent to examinations. Such methods include:

Subjective methods

1. Acumetry (hearing passport). These are tools that can be practiced in any polyclinic setting, do not require a lot of use, and help general support tools.

2. Audiometry.

- Tonal, busaga audiometry
- Audiometry over the tonal bus. (Si-Sitest, Fowler, Luscher test, etc.)
- Speech (Rechevaya) audiometry
- Noise audiometry
- Game audiometry.
- Ultrasound and infrasound audiometry.

Objective methods

Objective methods are based on the registration (recording) of reflexes and biopotentials that are conditionally and unconditionally observed in the formation of sound in the body in a state that does not obey the producer's and the subject's mental state, mind, perception, will, and will. These methods include:

Hearing test recording potentials

- Long latency
- Medium latency
- Short latency

Tympanometry

Impedanceometry

Acumetry (hearing passport)

The following table, which shows the data of 13 tests, is called "Acumetry or (hearing passport)" (table 1)

AD (auriculus dextra)	Tests	AS (auriculus sinistra)
	S.Sh. Subjective noise	
	SH.G. (whispering)	
	OG (normal speaking)	
	BG (shouting)	
	S128 air (passport)	
	S128 bone (passport)	
	S2048 (passport)	
	Wb (Weber test)	
	R (Rinne test)	
	Sch (Schwabach test)	
	(Jelly test)	
	(try bingo)	
	(Federicchi test)	

All you need for acumetry is low (S128) and high (S2048) frequency tuning forks and a stopwatch.

Subjective noise

All kinds of noises that can only be heard by the patient and are not heard by others (such as playing music, the sound of water, the hum of a tractor, the hum of a factory, etc.) are called subjective noise.

S.Sh. A symptom (a sign of the disease) observed in non-purulent diseases of the ear (cochlear neuritis, adhesive urota otitis, otosclerosis, Menoer's disease) is discussed.

If the patient complains of tinnitus, the performance of the acumetric table is put in the box corresponding to the ear with a plus (+). If there is no, this box is written minus (-) or abs (from the French word absent).

Sh.G. (Whispering).

It is possible to speak in a whisper. We can check this method starting with 4-5 year old children.

The examination is carried out in a quiet room by whispering with the help of axillary air of the lungs. It is understood that the patient must repeat what he heard. In this, each ear of the patient is lowered. the patient looked to the side. The earlobe can be loosened with a finger in

the opposite ear. So that he does not read from his lips, he shields his eyes with his palm. The patient stands 6 meters away from the doctor.

The examination is carried out in the patient's native language, age at the beginning, and in the state of transition to speech. For verification, we use two-digit numbers, providing names of objects familiar to the patient. For this, we can also use tables with special words (such as the Sivtsov table of ophthalmologists).

It is known from physics that sound power decreases inversely proportional to distance. Sh.G. how far the work is checked and the bed frame is determined. Normally, SH can be heard from a distance of more than 6 meters.

Sh.G. the result is written. Results may include:

- >6 m,
- 1...6 m,
- ad concha ...99 cm;
- abs

OG (normal speaking).

This is also an amalgam opening like a whisper check. Loudness depends on the load you are working with. Usually (normally) OG can be heard from a distance of not less than 50 meters. It is better to check this examination in patients who have not heard of Sh.G[1]. If the patient has good hearing in one ear, the hearing impaired ear can be heard with the healthy ear, but it can be closed. To avoid this, the better hearing ear creates a mask. This is done by rubbing the palm of the ear or rubbing a piece of paper between the palm and the ear. The shape of the Barani, whose structure resembles a clock bell, and which produces a sound when the button is pressed, is also used for masking. We can also get the following result:

- >10 m,
- 1...6 m,
- ad concha ...99 cm;
- abs

BG (shouting).

Sight speaking is checked just like normal speaking. Masking is a must! This method is performed in patients who cannot hear normal speech.

S128 air (passport) .

The human ear hears through air and bone. When the air conditioner is turned on, the sound relay reaches the aosus of Cortiev, which belongs to the sound-amplifying parts of the ear. Hearing to the bones is understood by means of vibration and compression.

Hearing is checked using a tuning fork. A representative S128 tuning fork representative of the past is triggered by striking the tenor. It is recommended to hold the camera only by the foot. If caught by the horns, the tuning fork quickly asked. The tenor is timed from the time it is

[1]Kandel, Eric R.; Schwartz, James H.; Jessell, Thomas M. (2000). Principles of Neuroscience Fourth Edition. United States of America:McGraw-Hill. p. 324.

struck. For this, a second or a second of the clock's support is used. The excited tuning fork is held at a distance of 0.5 cm from the external auditory canal. Its horns should not touch the top of the ear or any other place. To prevent adaptation, the tuning fork is periodically moved away from the external heating path.

Normally (usually) the tuning fork should be heard during the time (mostly this time is 60-70 seconds) stored in its passport. What is the camera's passport, how is it determined? This is the technical characteristic of each tuning fork. It will be possible to hear the camera tone of the device of 10 people to get it.

Weber's experiment (sound lateralization experiment). A sounding C-128 cameraton is placed above the patient's head. And it is asked which ear works best with the sound. If the apparatus that works well with sound is not damaged (when sera (sulfur plug) accumulates in the sulfur path, when the middle ear is inflamed), the diseased ear hears the sound of a tuning fork. A tuning fork can be heard in a healthy ear when the sound-improving apparatus is damaged.

Rinne experiment (comparison of mobility of bone and air). A resonating C-128 tuning fork placed in a teat-like growth is held to the ear when it stops being heard. In this case, it is known that the sound is heard longer in the air above the bone (normally it is heard through the bone for about 45 s, 85-90 s in the air). In this case, it is called (Rinne +) as a Rinne experiment. A positive Rinne experience occurs in individuals with normal hearing and hearing loss. When the sound apparatus is damaged, bone hearing is similar to air hearing and can last much longer. In this case, the Rinne experiment is called negative (Rinne -).

Swb (Schwabach test).

The stimulated S128 tuning fork leg is placed on the patient's antrum to the bone, and when the disease says "I'm done, I won't hear any more", the examiner puts the tuning fork on his antrum examination. Normally, the doctor should not listen to the patient. In this case, the cell belonging to the Schwabach (N) side is written.

If the patient has a disease in the sound receiving apparatus, the doctor will listen to the patient again. That is, it is inclined to check the patient's hearing. In this case, the word "shortened" is written in the corresponding ear box.

In patients with a leaky ear (damaged eardrum), the reverse of the above is observed, a longer period of bone work is observed in patients with a higher rate of tinnitus. In this case, Schwabach's test is called "extended".

If the examiner has changed during the Schwabach testeitherIf it works low, the results will be captured.

(Jelle Cinema)

The activated S128 tuning fork is placed on the bone in the patient's antrum, and the air pressure in the external auditory canal is transferred using a Policer balloon. In this case, the pressure of the diaphragm is transferred from the bones to the oval window and limits the longitudinal plate. As a result, normal hearing is reduced or Jele cinema is negative. In otosclerosis, the longitudinal plate does not change in volume due to the fact that the dystrophic lesions in the bone are stuck to the window.

Jelle test for treatment of otosclerosisydigan spetssifone of the two tests is calculated

(Bing Cinema)

This test is also helpful for diagnosing otosclerosis. For this purpose, the excited S128 tuning fork is placed on the antrum protection. By closing the external ear canal with a finger, it is possible to hear through the bone and for a closed ear. Normally, when the external auditory canal is closed, hearing through the bone is improved or the hearing time is prolonged. It does not change in otosclerosis.

F (Federicchi test)

The excited S128 or S512 tuning fork or S512 is placed on the bone in the diseased antrum. When the patient says "it's over, I can't hear anymore", the examiner puts the camera to the eardrum (tragus). A hearing-impaired person hears a tumor in the eardrum much louder or louder. In case of otosclerosis, it is better to listen to an inverted mastoid tumor.

Baby hearing test

Reactions observed in newborns when exposed to 90 db 3000 Hz band noise:

- Autumn work;
- Startle - Moro reaction;
- Stillness (stopping of movement);
- provide the necessary assistance;
- Changes in heart rhythm;
- Turning his head to the side;
- twisting the appearance;
- Access to melting;
- awakening;
- Change in breathing rhythm;
- Autumn opening

Testing of vestibular function of the ear Testing of vestibular function of the ear begins by asking and examining the patient. Patients with diseases of the vestibular apparatus usually complain of dizziness, staggering when walking, nausea and vomiting. Medical history is collected. Checking Romberg stability in storage. When noticing the disease, it is possible to see the aids while standing with the legs in a pair, the extra toes are opened, the eyes are closed (the patient needs to be stitched up, he may fall). If the labyrinth function is disturbed, the patient falls to the opposite side despite the nystagmus. When the patient turns the head 90° to the left, the bursa labyrinth is damaged, and the regeneration of the fall is altered, as is the case when the head is turned to the right. Right away and step to the side.

1. Connect correctly. The patient takes 5 steps back with his eyes closed. When the function of the vestibular analyzer is disturbed, the patient moves to the other side of the object, opposite to the nystagmus. When the function of the cerebellum is disturbed, it goes to the affected side.
2. Step to the side. The patient puts his right foot to the right, puts the next left, and takes five steps in this position, and similarly 5 steps to the left. When the vestibular is well disturbed, the patient performs side steps on both roofs. When the function of the cerebellum is disturbed, the patient is unable to step to the side of the affected side (due to falling).

Indicative experience. In this case, the doctor changes the protection of the patient and extends the support to the chest energy, the middle finger is open, and the other hand is closed. The support of the disease will be cured, the fingers will be in the same position (the index finger is opened, the left one is a fist). To maintain the support of the disease, the fuel of the little finger will need to be touched to the finger for the help of the doctor. At first, the disease does all this 3 times with the eyes open, then with the eyes closed. When the labyrinth function is normal, it touches the doctor's finger. When the labyrinth function is disturbed, the nystagmus moves to the opposite side with both supports. When the brain is damaged, it moves to the affected side with one help. Adiadochokinesis (specific symptoms in cerebellar diseases). The patient stands on the Romberg Host and evaluates supination and pronation with two aids. When the function of the cerebellum is disturbed, depending on the affected side, there is a sharp delay in support on this side. Detection of spontaneous nystagmus. The doctor holds the finger in a vertical position, 60-70 cm away to the right, and asks the patient to look at the finger in order to transfer to the patient and improve his health. In this case, it is observed in the possible view (in this case to the right), it is necessary to move strongly, because the tension of the eye muscles, the involuntary movement of the eyelid to one side or the other in a rhythmic way ("flying ») to go along with it. In such a situation, it is determined whether nystagmus is present or not. If there is a spontaneous nystagmus, its characteristics (movement direction, strength, amplitude, speed) are determined. The disease is examined and evaluated in the same way by looking to the left and to the left. It should be considered that congenital spontaneous nystagmus is also encountered in a state independent of the direction of gaze (eye gaze), but it is distinguished by the absence of slow and fast components. When examining the disease, it is possible to see spontanetagmus in the relative eye. This condition is associated with a malfunction of the vestibular analyzer. Spontaneous nystagmus can be observed when the patient turns his eyes to the side, sometimes when looking at the main one. There are 3 basic safety tests for vestibular restraint: rotational, caloric, and pressor tests.

A twisting test. When the gavda rotates around its reading, it can be transferred to push the endolymph in the semicircular canals. Nystagmus occurs when the receptors are affected by the pushing of endolymph. The patient is placed on a rotating chair (Barani chair) in the horizontal plane and rotated 10 times in 20 seconds around the vertical axis. In this case, the endolymph is pushed and read in the semicircular canals of the side. If the course is stopped from turning to the right, nystagmus appears on the patient's left side, if it is stopped from turning to the left, nystagmus appears on the right side of the patient. To monitor nystagmus, after stopping the chair, the patient is asked to look at the probe finger: the probe finger is held at a distance of 30 cm on the side where nystagmus is expected to appear. Vestibular analyzer excitable normalbular load nystagmus from rotation in most people with a duration of about 30–35 sec.

Calorie test. The main essence is artificially or by cooling the endolymph in the semicircular canals. In this test, each maze is lowered. In which ear is water alternately poured from Jane's syringe; When cold (16–30°C) water is poured, nystagmus occurs on the opposite roof, and when advanced (38–41°C) water is poured, nystagmus occurs on the flooded roof. Pressor test. The doctor applies oil to the entrance of the opposite path to the patient, presses the right auricle with the index finger of the next left assistant, or compresses the air in the auditory path with the help of a balloon. When the labyrinth is not maintained normally, nystagmus is not

observed, when a fistula is placed in the horizontal channel of the hemiplegia, the nystagmus is on the same side, that is, on the right roof. The same can be done on the print side. Body deviation is the opposite of nystagmus.

audiometry.Duties of Cochlear Analyzer - Hearing is also tested using electroacoustic devices known as audiometers. Audiometry can be compared to testing with tuning forks of several frequencies (0.125, 0.25, 0.5, 1, 2, 4, 8 kHz). Sounds above 10,000 Hz are heard in the air, but not differentiated. Therefore, these frequencies are not tested in audiometry. According to some authors, the range of 500-4000 Hz is sufficient to produce a valid result (AS Rosenblum, 1980). Buton has the following advantages over speaking and checking with belts:

- Giving sound power in decibels for a long time;
- Examination of patients who are too hard of hearing;
- Examination of both ears at the same time and identification of various threshold diagnostic tests;
- View the hearing on the display and output it on the printer;
- Computerized audiometers produced by "Danac" can save the doctor's time by checking in automatic and manual modes.

The structure and basic principle of operation of audiometers.

The audiometer has a main unit. It contains the device that produces sounds and control buttons, a display and a printer.

It has a camera with no sound. A small room can be furnished and adapted to its urn. For this, the walls, roof, old mattresses, blankets and cloths are covered and researched (just like in a radio or television studio). The camera has a light, a ventilator and a microphone for checking with the patient. There are two air phones that are worn in the patient's ear to test for air and bone hearing.

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