SYMPTOMS OF AUDITORY NEUROPATHY BASED ON AUDITORY INDICATORS

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The article presents the results of the examination of children with auditory neuropathy. comparative indicators of otoacoustic emission and short-latency auditory evoked potentials are given. In children with AN, there were violations of the transmission of acoustic signals to the central auditory system, as well as violations of the maturation of the auditory pathways and centers.

Keywords: auditory: auditory neuropathy, hearing loss

Auditory neuropathy (AN) - retrocochlear lesion, classroom neuropathy is a symptom complex characterized by the normal functioning of the inner ear and impaired processing of sound information in the deeper parts of the auditory system. According to world statistics, about 1 out of 10 children with chronic hearing loss suffer from this type of hearing system lesion. [1, 2, 3].

It is already known that with AN, unlike sensorineural hearing loss, the outer hair cells are not damaged, the complexity of diagnosis and the variety of the clinical picture of this disorder complicates the choice of a rehabilitation method [4].

Various symptoms of AN are explained by functional disorders or pathological changes in the peripheral part of the auditory analyzer. Nevertheless, with AN, the main clinical manifestation is sensorineural hearing loss of varying degrees with the preserved function of the outer hair cells. Patients have otoacoustic emission (OAE), but there are no short-latency auditory evoked potentials (SAEPs).

In studies, it has been studied that in patients with AN, the usual methods of rehabilitation tactics that help patients with sensorineural hearing loss are not always effective [5,6]. However, most studies on the study of the features of AN were performed on small groups of patients, there is a contradiction in the results obtained by different authors.

The purpose of the study: to study the indicators of OAE and SAEPs in auditory neuropathy in dynamics.

Patients and research methods: 180 children with hearing impairments were examined. 36 children with auditory neuropathy were selected from them. This was 20% of all patients. Among the surveyed 20 were boys (56%), 16 were girls (44%).

The majority of patients (29 people) were diagnosed with AN before the age of 5 years. In 5 patients, AN was detected at the age of 1-3 years. In one patient, AN was detected in adolescence.

The method of registration of otoacoustic emission and short-latency auditory evoked potentials of the brain were used as objective methods for assessing hearing. The study was carried out at the initial treatment and in dynamics after 3 months.

The study was carried out on the Neuro-Audio device. To register the OAE, a probe was used, in which two phones and a microphone are located. One tone is continuously fed through one phone, and a second tone is continuously fed through another. The microphone provides OAE registration and control of the level of test tones. To highlight the OAE, it is also necessary to minimize the level of input noise. Therefore, the examination was carried out in a quiet room, and the probe is hermetically installed in the external auditory canal.

The stimuli were broadband acoustic clicks presented with a repetition rate of 20-50/s. The response signal emitted by the microphone is amplified at a bandwidth from 500 to 5000 Hz and sent to the computer via an analog-to-digital converter.

The source of sound stimuli for the registration of SAEPs were in-ear phones with a pre-sized earbud. Cup silver chloride electrodes were used to register brain responses. The electrodes were fixed on the area at the border of the scalp (reference electrode) and in the area of the mastoid processes on the right and left (active electrodes). In studies, the interelectrode resistance did not exceed 5 ohms, which was achieved by pretreatment of the patient's skin and the use of special conductive gels. Various types of stimuli were used during the VSWP - an acoustic click with a duration of 100 ms, tonal signals with a frequency of 1000, 4000, 2000 and 500 Hz.

Results and discussion. The analysis of the results showed that all the patients with AN examined by us had an operation on the right and left ear during the initial examination. The exception was one patient in whom the OAE was registered only on one ear.

Acoustic reflex was not registered in 55% of children with AN. In 29% of children, acoustic reflex was registered at frequencies of 500 Hz and 1000 Hz. The threshold for registering the reflex in these cases was 120 dB.

We obtained the following results when registering SAEPs: in 95% of children, SAEPs was not registered during primary and repeated examinations. In 2 (5%) children, a VSWP was registered for sound stimuli with a level of 95-103 dB.

AN refers to sound perception disorders and differs from the rest of the hearing pathology in the topic of damage to the structures of the inner ear and auditory nerve [7]. With AN, the outer hair cells are preserved, thanks to which the TEOAEs and DPOAEs are registered. The presence of OAE in the absence SAEPs of or registration

of SAEPs only for maximum incentive levels is a generally recognized feature specific to AN.

However, the data obtained by us indicate that in some patients with AN, OAEs may disappear over time. According to our data, this was observed in 22% of patients. Similar cases were reported in the J.Attias study [8] (tab 1). Table 1 shows the results of a dynamic OAE study in children with HF 3 months after the initial examination.

Table 1

Comparative analysis of the UAE registration results in patients with auditory neuropathy (N=36)

	the OAE was registered at the initial examination	the OAE was registered after 3 months
Percentage quantity	92%	76%

Significant changes in patients with AN were also detected during the registration of SAEPs. In 95% of patients with auditory neuropathy, SAEPs was not recorded during stimulation of both the right and left ear. Only in 2 out of 36 patients, SAEPs was registered for sound stimuli with a level of 95-103 dB.

Repeated examination of patients with auditory neuropathy did not reveal any changes in the SAEPs.

Dynamic observation was carried out in order to analyze the variability of the indicators of registration of SAEPs and OAE in children with AN (tab 2).

Table 2

Dynamics of changes in the indicators of registration of VSWP and SVOAE during repeated examinations

Number of children	Frequency of occurrence (%)					
	Increase in thresholds		Decrease in thresholds		Stability of thresholds	
	SAEPs	OAE	SAEPs	OAE	SAEPs	OAE
36	-	-	-	-	100	100

The data obtained indicates that a single study of auditory function in children is not enough and requires dynamic observation.

Based on the above, the electrophysiological criteria for the diagnosis of hearing loss are quite definite and do not allow for discrepancies. At the same time, the results of instrumental studies of patients with auditory neuropathy are not always unambiguous

and require a deep understanding of the complexity of the mechanisms of sound perception.

Timely identification of the features of the nature of pathology in the sound perception system is of great clinical importance due to the difference in the tactics of treatment and rehabilitation of such patients. This, in turn, makes it possible to carry out a full-fledged rehabilitation of such patients.

Conclusions. The features of auditory function in patients with auditory neuropathy indicate differences in the mechanisms underlying the disorders of auditory function in these groups of patients. Differences in the structure of risk factors in patients with AN from the rest of the hearing pathology indicate the etiological heterogeneity of these forms. This gives grounds for their separation into independent nosological units.

The results obtained showed that children with AN, on the one hand, have violations of the transmission of acoustic signals to the central auditory system, on the other - violations of the maturation of the auditory pathways and centers.

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