International Journal of Medical Sciences And Clinical Research (ISSN – 2771-2265)
VOLUME 03 ISSUE 10 PAGES: 13-17
SJIF IMPACT FACTOR (2021: 5. 694) (2022: 5. 893) (2023: 6. 184)
OCLC – 1121105677
Crossref doi Google Scholar WorldCat MENDELEY
Publisher: Oscar Publishing Services

OSCAR PUBLISHING SERVICES

Journal Website: https://theusajournals.com/index.php/ijmscr

Research Article

INDICATORS OF OTOACOUSTIC EMISSIONS AND SHORT-LATENCY EVOKED POTENTIALS IN CHILDREN WITH AUDITORY NEUROPATHY

Submission Date: October 01, 2023, **Accepted Date:** October 06, 2023,
Published Date: October 11, 2023
Crossref doi: https://doi.org/10.37547/ijmscr/Volume03Issue10-03

G.Khaydarova
Researcher, Tashkent Medical Academy, Uzbekistan

ABSTRACT

The article presents the results of dynamic observation of indicators of objective methods of hearing testing in 36 children with auditory neuropathy. Based on the data obtained, a comparative analysis of the indicators of SAEP and TEOAE in dynamics was carried out.

KEYWORDS

Auditory neuropathy, otoacoustic emissions, short-latency auditory evoked potentials.

INTRODUCTION

Today, thanks to the widespread introduction into the practice of audiologists of objective methods for studying auditory function, a new type of hearing impairment has been identified - auditory neuropathy (AN) [1, 2, 3]. According to G. Rance[4] and T. Picton[5], approximately 10% of children diagnosed as having sensorineural hearing loss may actually have HF. This figure reaches 15-20% in children with severe hearing loss [6].

It is already known that in HF, unlike sensorineural hearing loss, the outer hair cells are not damaged; the

International Journal of Medical Sciences And Clinical Research (ISSN – 2771-2265)
VOLUME 03 ISSUE 10 PAGES: 13-17
SJIF IMPACT FACTOR (2021: 5. 694) (2022: 5. 893) (2023: 6. 184)
OCLC – 1121105677
Crossref doi Google Scholar WorldCat MENDELEY
Publisher: Oscar Publishing Services

complexity of diagnosis and the diversity of the clinical picture of this disorder complicates the choice of rehabilitation method.

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

Studies have examined that in patients with HF, conventional rehabilitation tactics that help patients with sensorineural hearing loss are not always effective [7]. However, most studies studying the characteristics of HF were carried out on small groups of patients, and there is inconsistency in the results obtained by different authors.

AIM OF THE RESEARCH

To study the indicators of SAEP and TEOAE in auditory neuropathy over time.

PATIENTS AND RESEARCH METHODS

180 children with hearing impairment were examined. Of these, 36 children with auditory neuropathy (AN) were selected. This represented 20% of all patients. Among those examined, 20 were boys (56%), 16 were girls (44%).

In the majority of patients (29 people), the diagnosis of HF was established before the age of 5 years. In 5 patients, HF was detected at the age of 1-3 years. In one patient, HF was diagnosed in adolescence.

As objective methods for assessing hearing, we used the method of recording otoacoustic emissions (OAE) and short-latency auditory evoked potentials of the brain (SAEP). The study was carried out at initial treatment and over time after 3 months.

The study was carried out using the Neuro-Audio apparatus. To register the UAE, they used a probe containing two phones and a microphone. One tone is continuously transmitted through one telephone, and a second tone is continuously transmitted through the other. The microphone provides registration of OAE and control of the level of test tones. To isolate OAEs, it is also necessary to reduce the level of input noise as much as possible. Therefore, the examination was carried out in a quiet room, and the probe was hermetically installed in the external auditory canal.

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

The source of sound stimuli for recording SAEP was in-ear telephones with an earmold pre-selected to size. Silver chloride cup electrodes were used to record

International Journal of Medical Sciences And Clinical Research (ISSN – 2771-2265)
VOLUME 03 ISSUE 10 PAGES: 13-17
SJIF IMPACT FACTOR (2021: 5. 694) (2022: 5. 893) (2023: 6. 184)
OCLC – 1121105677
Publisher: Oscar Publishing Services

brain responses. Electrodes were fixed to 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). During the studies, the interelectrode resistance did not exceed 5 kOhm, which was achieved by pre-treatment of the patient's skin and the use of special conductive gels. When conducting SAEP, various types of stimuli were used - an acoustic click lasting 100 ms, tones with a frequency of 1000, 4000, 2000 and 500 Hz

RESULTS AND DISCUSSION

Analysis of the results showed that in all patients with HF we examined during the initial examination, OAE was registered in the right and left ear. The exception was one patient in whom OAE was recorded in only one ear.

The acoustic reflex was not recorded in 55% of children with HF. In 29% of children, the acoustic reflex was recorded at frequencies of 500 Hz and 1000 Hz. The reflex registration threshold in these cases was 120 dB.

When registering SAEP, we obtained the following results: in 95% of children, SAEP was not registered during the initial and repeated examinations. In 2 (5%) children, SAEP was recorded to sound stimuli at a level of 95-103 dB nHL.

HF refers to disorders of sound perception and differs from other hearing pathologies in terms of damage to the structures of the inner ear and auditory nerve [3,7]. In HF, the outer hair cells are preserved, which is why OAE and OAEPI are recorded. The presence of OAE in the absence of SAEP or recording of SAEP only at maximum stimulus levels is a generally accepted sign specific to CH.

However, our data indicate that in some patients with HF, TEOAE may disappear over time. According to our data, this was observed in 22% of patients. Similar cases were reported in the study by J. Attias [8] (Table 1).

Table 1 shows the results of a dynamic study of OAE in children with heart failure 3 months after the initial examination.

Table 1

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

	OAE was recorded during the initial examination	OAE was registered after 3 months
Quantity in percentage	92%	76%

International Journal of Medical Sciences And Clinical Research (ISSN – 2771-2265)
VOLUME 03 ISSUE 10 PAGES: 13-17
SJIF IMPACT FACTOR (2021: 5. 694) (2022: 5. 893) (2023: 6. 184)
OCLC – 1121105677
Publisher: Oscar Publishing Services

Significant changes in patients with HF were also detected when registering SAEP. In 95% of patients with auditory neuropathy, SAEP were not recorded during stimulation of either the right or left ear. In only 2 out of 36 patients, SAEP were recorded to sound stimuli at a level of 95-103 dB nHL.

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

Dynamic observation was carried out to analyze the variability of the registration parameters of SAEP and TEOAE in children with HF (Table 2).

Table 2

Dynamics of changes in the registration indicators of SAEP and TEOAE during repeated examinations

Number of children	Frequency of occurrence (%)					
	Raising thresholds		Lowering thresholds		Threshold stability	
	SAEP	OAE	SAEP	OAE	SAEP	OAE
36	-	-	-	-	100	100

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

Based on the above, electrophysiological criteria for diagnosing hearing loss are quite specific and do not allow for discrepancies. At the same time, the results of instrumental studies of patients with auditory neuropathy are not always clear and require a deep understanding of the complexity of the mechanisms of sound perception.

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

CONCLUSION

Features of auditory function in patients with auditory neuropathy (AN) indicate differences in the mechanisms underlying hearing impairment in these

International Journal of Medical Sciences And Clinical Research (ISSN – 2771-2265)
VOLUME 03 ISSUE 10 PAGES: 13-17
SJIF IMPACT FACTOR (2021: 5. 694) (2022: 5. 893) (2023: 6. 184)
OCLC – 1121105677
Publisher: Oscar Publishing Services

groups of patients. Differences in the structure of risk factors in patients with AN from other hearing pathologies indicate the etiological heterogeneity of these forms. This gives grounds for their isolation into independent nosological units.

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

REFERENCES

1. Kaga K., Nakamura M., Shinogami M., Tsuzuku T., Yamada K., Shindo M. Auditory nerve disease of both ears revealed by auditory brain- stem responses, electrocochleography and otoacoustic emissions. Scand Audiol 1996; N25: P.233-238.
2. Starr A., Picton T.W., Sininger Y.S., Hood L.J., Berlin C.I. Auditory neuropathy. Brain 1996; N119: P.741-753.
3. Deltenre P., Mansbach A., Bozet C., Clercx A., Hecox K. (1997). Auditory neuropathy: A report on three cases with early onsets and major neonatal illnesses. Electroencephalography and Clinical Neurophysiology, 104, P.17-22.
4. Rance G. Auditory neuropathy/dys-synchrony and its perceptual consequences. Trends Amplif 2005; N9: P.1-43
5. Picton T.W. Auditory neuropathy—when time is broke. In: Human Auditory-Evoked Potentials. Plural Publishing Inc 2011; P.648.
6. Hood L.J., Morlet T. Current issues in auditory neuropathy spectrum disorder. In: K.E. Tremblay, R.F. Burkard. Eds. Translational Perspectives in Auditory Neuroscience. Plural Publishing 2012; P.577.
7. Madden C., Rutter M., Hilbert L., J.H.Greinwald., D.I.Choo (2002). Clinical and audiological features in auditory neuropathy. Arch Otolaryngol Head Neck Surg 128, P.1026-1030.
8. Attias J., Raveh E. (2007). Transient deafness in young candidates for cochlear implants. Audiol Neuro Otol 12 (5), P.325-333.