

## DIAGNOSTIC CRITERIA AUDITORY NEUROPATHY IN CHILDREN

Khaydarova G.S.<sup>1</sup>

<sup>1</sup>Tashkent Medical Academy

**Abstract.** The article presents the results of objective techniques of hearing study in 36 children with auditory neuropathy and 180 children with sensorineural hearing loss. Based on these data, a comparative analysis of auditory neuropathy, and sensorineural hearing loss. The differences in the mechanisms underlying disorders. Diagnosis and differential diagnosis in auditory neuropathy includes the identification of the etiological factor, as well as the topics of the lesion, on which the tactics of further treatment and rehabilitation largely depend.

**Keywords:** auditory neuropathy, sensorineural hearing loss, otoacoustic emission.

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## КРИТЕРИИ ДИАГНОСТИКИ СЛУХОВОЙ НЕЙРОПАТИИ У ДЕТЕЙ

Хайдарова Г.С.<sup>1</sup>

<sup>1</sup>Ташкентская медицинская академия

**Аннотация.** В статье представлены результаты объективных методик исследования слуха у 36 детей со слуховой нейропатией и 180 детей с сенсоневральной тугоухостью. На основании этих данных проведен сравнительный анализ слуховой нейропатии и нейросенсорной тугоухости. Различия в механизмах, лежащих в основе расстройств. Диагноз и дифференциальный диагноз при слуховой нейропатии включает в себя идентификацию этиологического фактора, а также топика поражения, от которых во многом зависит тактика дальнейшего лечения и реабилитации.

**Ключевые слова:** слуховая нейропатия, нейросенсорная тугоухость, отоакустическая эмиссия.

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### INTRODUCTION

The use of auditory evoked potential techniques such as the auditory brain stem response (ABR) and otoacoustic emission (OAE) for the assessment of hearing in young and difficult-to-test children is now well established. Auditory neuropathy (AN) - is a new type of hearing loss, which was made possible thanks to an objective method to diagnose hearing research. Unlike sensorineural hearing loss (SNL), where the damaged outer and inner hair cells of the cochlea, while AN preserved outer hair cells.

Evidence for the existence of AN in the infant population recently has begun to appear in the literature. Deltenre et al. [2] described the findings for three infants who had suffered major neonatal illness and who showed electrophysiologic results

fitting the AN profile within the first year of life. Stein, Tremblay, Pasternak, Banerjee, Lindermann, and Kraus [5] identified four children through a special care nursery screening program with normal GAEs and absent or abnormal ABRs in the neonatal period.

The complexity of detection AN and a variety of clinical symptoms of the disorder hinder the development of adequate rehabilitation measures. Do not clear the causes and mechanisms of this disorder. A number of publications has been suggested that the probable causes of auditory neuropathy may be a high level of bilirubin, hypoxia, low birth weight, demyelinating disease [1; 3; 7; 4]. There is information about the presence of genetic factors associated with the development of AN [8].

A particular problem is the choice of tactics

rehabilitation of patients with AN, as observations show that traditional in patients with sensorineural hearing loss techniques are not always effective in these patients [6; 10]. As a rule, all of these studies were conducted in small groups of patients, characterized by a certain inconsistency of the results obtained by different authors.

#### THE PURPOSE

To conduct a comprehensive study of auditory function and identify the characteristics of auditory neuropathy.

#### MATERIAL AND METHODS

During the period from 2021 to 2023 yy. were surveyed 180 hearing impaired. Of these, 36 children were selected with auditory neuropathy. This was 5% of all patients. Among the surveyed, 20 were boys (56%), 16 - the girls (44%).

The majority of patients (29 men) diagnosed with AN has been established under the age of 5 years. In 5 patients AN was identified at the age of 1-3 years. One patient AN was identified as a teenager.

As the objective methods of hearing assessment on patients using registration techniques evoked otoacoustic emission (TEOAE) and brainstem auditory evoked potentials (ABR), the acoustic impedance (AI). Some patients also recorded otoacoustic emission distortion product (PIOAE) and stationary auditory potentials in the modulated tones (ASSR).

The study was conducted using the "Neuro-Audio" company "Neuro-Soft" (Russia). For registration UAE used the probe, which houses two phones and a microphone. After one phone single tone is continuously fed through another continuously thereto a second tone. The microphone provides a registration and monitoring OAE levels of test tones. To highlight the OAE is also necessary to minimize the level of input noise. Therefore, a survey was carried out in a quiet room, and the probe is installed tightly into the ear canal.

Incentives were broadband acoustic clicks to be met with a repetition rate of 20-50 / sec. retractable microphone response signal amplified in the passband from 500 to 5000 Hz and sent to a computer via an analog-digital converter.

The source of the sound stimuli for ABR registration were in-the-phone with a pre-chosen size ear bud.

To register brain responses using pan silver chloride electrodes. The electrodes were fixed at the border area on the scalp (the reference electrode) and mastoid region right and left (active electrodes). In studies of the inter-electrode resistance does not exceed 5 ohms, which was achieved by pre-treating the skin of a patient and using special conductive gels. When carrying out various types of stimulus ABR were used - acoustic click 100 ms, frequency tones 1000, 4000, 2000 and 500 Hz.

The acoustic impedance (AI) was performed on impedancemetry AZ- 28, Interacoustics (Denmark). In the measurement of middle ear pressure was applied to the probe tone frequency of 226 Hz intensity of 85 dB SPL. The results were evaluated according to the classification of tympanometric curves, proposed by James Jerger.

#### RESULTS

As a result of the research, it was found that the same form of the disease can be accompanied by different types of structural restructuring of the tonsils, which may have an impact on the clinical manifestations of the disease and is associated with its prognosis. At the same time, it was found that operated patients with low clinical efficacy of antibiotic therapy and preserved in vitro sensitivity of the isolated microflora to antibiotics in the removed tonsils had a similar pathomorphological picture.

In the epithelial layer of the surface of the tonsils, in addition to areas of infiltration of the epithelium, areas of its thinning or complete desquamation were very often recorded, less often - areas with the replacement of the integumentary epithelium with scar tissue. The data obtained allow us to recommend the study of the morphological structure of the removed tonsils to clarify the issues of pathogenesis, clinical course and prognosis of the disease [1].

Also, when conducting an immunohistochemical study with markers of proliferation and anti-apoptosis, an increase in the proliferative and anti-apoptotic activity of lymphoid tissue cells in chronic tonsillitis of a simple form and a significant decrease in these indicators in chronic tonsillitis of toxic-allergic forms of the 1st and 2nd degree were revealed [3]. The study of the microbial landscape on the surface of the palatine tonsils in chronic

Table 1

Comparative analysis of TEOAE in patients with auditory neuropathy and sensorineural hearing loss

	Patients with AN (N=36)	Patients with SHL (N=180)
Number of patients (%) during the initial examination of TEOAE recorded: with 2 sides	92%	0%
one side	5%	0%
Number of patients (%), in which the re-testing TEOAE recorded: with 2 sides	76%	0%
one side	0%	0%
Number of patients (%) who have disappeared during the second TEOAE examination	22%	0%

Table 2

Changes in enrollment ratios ABR and TEOAE in repeated surveys

	Number of children	Incidence (%)					
		Raising thresholds		Lowering thresholds		Stability thresholds	
		ABR	OAE	ABR	OAE	ABR	OAE
SHL	180	12	7	9	11	79	82
AN	36	-	-	-	-	100	100

tonsillar pathology before the start of therapy did not reveal significant differences in the species and quantitative composition of the microbiocenosis of the mucous membranes in patients [10].

Scientists have analyzed the effectiveness of the treatment of staphylococcus in the palatine tonsils using Raman spectroscopy (RS). Based on the studied articles, spectral changes were established in the treatment of palatine tonsils with the antibiotic Amoxiclav. It was shown that at an antibiotic dosage of 500 mg/10 ml, the lines disappear at wave numbers 735 cm<sup>-1</sup> and 783 cm<sup>-1</sup>, 986 cm<sup>-1</sup> and 1635 cm<sup>-1</sup>, corresponding to adenine, cytosine, proteins and amide I, which indicates the effectiveness treatment [9].

In connection with the foregoing, a proper clinical examination of healthy individuals and patients with the detection of chronic pathology of the pharynx, as well as carrying out activities related to the activation of body resistance factors and aimed at observing sanitary and hygienic norms of work and life, which will reduce the percentage of vegetation of microbial flora among members of construction teams [7].

Thus, the data of the clinical study indicate that the determination of the microbial flora of the palatine tonsils in chronic tonsillitis in specific conditions is not of decisive importance. At the

same time, specific production and living conditions of the external environment can affect the relationship between macro- and microorganisms, to a certain extent determining the significance of the latter in the pathogenesis of chronic tonsillitis. The dependence of the probability of occurrence of additional cases of respiratory diseases (up to 500 cases per 1,000 children per year) on the content of suspended solids, fine fractions PM<sub>10</sub>, PM<sub>2.5</sub>, nitrogen dioxide, aluminum, manganese, solid and gaseous fluorides, chrome [5].

### CONCLUSION

The data obtained allow us to recommend the study of the morphological structure of the tonsils to clarify the issues of pathogenesis, features of the clinical course and prognosis of the disease.

### CONFLICT OF INTERESTS

The authors declare the absence of obvious and potential conflicts of interest related to the publication of this article.

### SOURCES OF FUNDING

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### AVAILABILITY OF DATA AND MATERIALS

All data generated or analysed during this study are included in this published article.

**AUTHORS' CONTRIBUTIONS**

All authors contributed to the design and interpretation of the study and to further drafts. All authors read and approved the final manuscript.

**ETHICS APPROVAL AND CONSENT TO PARTICIPATE**

All applicable international, national, and/or institutional guidelines for the care and use of animals were followed.

**CONSENT FOR PUBLICATION**

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Авторы заявляют, что данная работа, её тема, предмет и содержание не затрагивают конкурирующих интересов.

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Авторы заявляют об отсутствии финансирования при проведении исследования.

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Все данные, полученные или проанализированные в ходе этого исследования, включены в настоящую опубликованную статью.

**ВКЛАД ОТДЕЛЬНЫХ АВТОРОВ**

Все авторы внесли свой вклад в подготовку исследования и толкование его результатов, а также в подготовку последующих редакций. Все авторы прочитали и одобрили итоговый вариант рукописи.

**ЭТИЧЕСКОЕ ОДОБРЕНИЕ И СОГЛАСИЕ НА УЧАСТИЕ**

Были соблюдены все применимые международные, национальные и/или институциональные руководящие принципы по уходу за животными и их использованию.

**СОГЛАСИЕ НА ПУБЛИКАЦИЮ**

Не применимо.

**ПРИМЕЧАНИЕ ИЗДАТЕЛЯ**

Журнал "Евразийский журнал оториноларингологии - хирургии головы и шеи" сохраняет нейтралитет в отношении юрисдикционных претензий по опубликованным картам и указаниям институциональной принадлежности.

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**ЛИТЕРАТУРА / REFERENCES**

1. Burenkov E. S. Changes in the morphological structure of the tonsils in chronic tonsillitis // Morphological sheets. - 2021. - Т. 29. - No. 2. - С. 571 [Electronic resource-elpub].
2. Butsel A.Ch. Chronic tonsillitis: prevention of autoimmune complications // Supplement to the journal "General Medicine". - S. 42.
3. Gurov A. V. et al. Indicators of proliferation and antiapoptosis in palatine tonsils with chronic tonsillitis // Medical Council. - 2022. - Т. 16. - No. 14. - S. 235-240.
4. Zakharova A. G., Dyakova A. A. Primary clinical laboratory diagnosis of acute tonsillitis // Mechnikov Readings-2020. - 2020. - S. 215-216.
5. Zemlyanova M. A., Tikhonova I. V., Koldibekova Yu. V. Peculiarities of the incidence of respiratory diseases in the child population living in the zone of influence of the components of emissions from large-scale alumina production // Health of the population and habitat. - 2019. - no. 7 (316). - S. 28-33.
6. Mikhailova E. A., Fomina M. V., Kirgizova S. B. Microbial ecology of palatine tonsils in patients with chronic tonsillitis // Bulletin of the Orenburg State University. - 2015. - no. 10 (185). - S. 270-272.
7. Narmatova K.K. et al. About the significance of the study of the microflora of the palatine tonsillitis in builder team // International Journal of Applied and Fundamental Research. - 2021. - no. 9. - S. 22-25.
8. Pantyukhin I. V. et al. Chronic tonsillitis: a new method of treatment and criteria for its effectiveness // Russian otorhinolaryngology. - 2002. - no. 3. - S. 90.
9. Timchenko E. V. et al. Study of the effectiveness of the treatment of staphylococcal infection in the palatine tonsils by Raman spectroscopy // Bulletin of the Reaviz Medical Institute: rehabilitation, doctor and health. - 2019. - no. 1 (37). - S. 109-114.
10. Hans M., Sklyar N. I. The state of microbiocenosis of the palatine tonsils as a criterion for the efficiency of various methods of treatment of patients with chronic tonsillitis // World science. - 2018. - Т. 2. - No. 8 (36). - S. 36-41.