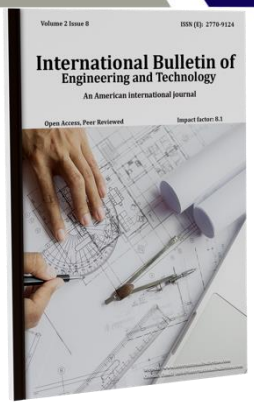

POSTUROGRAPHIC STUDY DATA IN PATIENTS WITH ACUTE SENSORYNEURAL HEARING LOSS

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Abstract. The article describes the treatment results of patients with acute sensorineural hearing loss in different age groups. The results of hearing restoration were analyzed depending on the cause of the sensorineural disorder, the time of the patient's visit and the methods of implementation using posturography.

Key words: sensorineural hearing loss (SNHL), pure tone threshold audiometry (PTA), glucocorticosteroids (GCS).

Relevance. Acute sensorineural hearing loss (ASHL) is a problem that attracts close attention of otolaryngologists due to its social relevance. The solution to this problem depends on the successful solution of a number of problems, the most important of which can be considered the clarification of the etiopathogenesis, without which it is impossible to develop effective treatment methods. It is known that the success of treatment depends on the degree of differentiation of the approach to the choice of treatment tactics in each specific case. Hence, the need for careful diagnostics is obvious. Significant advances have been made in audiological diagnostics; the state of the auditory function can now be assessed quite accurately. Close anatomical and physiological connections between the auditory system, on the one hand, and the vestibular system, on the other, give every reason to assume that the pathological process leading to OSHL has some effect on the latter. Among the etiologic factors of acute sensorineural hearing loss, viral infection is the second most common after vascular infection (5). Acute sensorineural hearing loss can be a complication of infectious and viral diseases such as influenza, parainfluenza, mumps, herpes zoster, and measles (1,4). Analysis of anamnestic data and clinical examination data shows that acute hearing loss in a significant proportion of cases (one third each) is preceded by symptoms of catarrhal inflammation of the upper respiratory tract (2,6). In some observations, a higher proportion of post-influenza OSNT (about 45%) was noted, which probably indicates the possibility of an epidemic nature of OSNT. Currently, the posturogram is one of the basic methods of the clinical and fundamental scientific direction known as posturology. As a method for studying the balance function, the proprioceptive system, the visual analyzer, the vestibular apparatus and other functions of the body directly or indirectly related to maintaining balance, the posturogram and its variants are used in many areas of medicine (3,4). It is enough to list such specialties as orthopedics-traumatology, neurology, otolaryngology, ophthalmology, rehabilitation, manual medicine. In addition, the posturogram is a global characteristic of body balance and is used as a non-specific indicator of the functional state of the musculoskeletal and nervous systems. The aim of the work was the data of a posturographic study in patients with acute sensorineural hearing loss. Material and methods of research. At the stage of the study, 80 patients with a diagnosis of acute sensorineural hearing loss were examined. Examination of the ENT organs was carried out by separating them according to the generally accepted

method, especially with an endoscopic examination of the nasopharynx, otomicroscopy. Combined ENT pathology was detected in 56 patients of the study groups. To diagnose the state of the vestibular analyzer, various diagnostic tests were used to assess the state of the oculomotor, statokinetic and statocoordinator functions of the body.

The following oculomotor tests were used: detection of overt and latent spontaneous nystagmus, study of the vestibulo-ocular reflex (VOR), visual saccades, smooth tracking, optokinetic nystagmus (OKN), VOR suppression, head shake test (HST), Valsalva test, Dix-Hallpike and McClure-Panini maneuvers (roll test).

Results of the study. To study the state of the balance function in case of damage to the peripheral part of the vestibular analyzer, we examined a group of patients with acute sensorineural hearing loss, consisting of 80 patients. Among the examined patients, there were 19 patients with acute sensorineural hearing loss of traumatic genesis, 29 patients with infectious genesis, 32 patients with vascular genesis, and all patients had a unilateral process of acute sensorineural hearing loss. The main diseases that caused ASNHL were hypertension, cervical osteochondrosis, vegetative-vascular dystonia of the hypertensive or hypotonic type. Infectious etiology was in second place in frequency. In this group, the onset of hearing loss was immediately preceded by influenza, acute respiratory viral diseases, epidemic mumps. ASNHL of traumatic genesis was caused by acoustic trauma (12 people) or mild closed craniocerebral injury (7 people). Clinical and videostabilometric examination was conducted after the attack had been stopped, since the severity of vestibular disorders accompanied by autonomic symptoms makes examination during the attack impossible. The main thing in the clinical picture of the disease is the presence of auditory and vestibular disorders. In the vast majority of patients, the development of dizziness is preceded by a feeling of heaviness in the occipital region, increased noise in the ear, on the one hand, a feeling of "stuffiness" in one ear. The diagnosis is substantiated by examining the functional state of the auditory and vestibular sections of the inner ear. Threshold and suprathreshold audiometry, sound lateralization tests, rotational and caloric effects are used. All patients with OSNT were examined using the method of functional posturography. Figure 1 shows a graphical comparison of 95% confidence intervals for the average values of the LM coordinates when performing a test with open and closed eyes. It was noted that the differences in the average values of X and Y in two samples, when assessed by the paired Student's criterion, are statistically insignificant at $p<0.05$ (for X $t=0.19$, for Y $t=0.55$, $t0.05=2.02$). However, we found a statistically significant difference in the variance of Y in samples with open and closed eyes, when assessed using the Fisher criterion at $p<0.05$ ($F=3.48$, critical value $F0.05=1.69$)

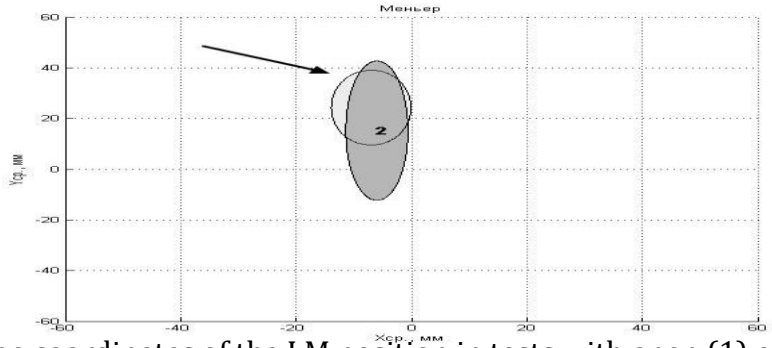

Fig. 1. Average coordinates of the LM position in tests with open (1) and closed (2) eyes in patients with OSNT

Анализируя средние значения X и Y и их дисперсии в пробах с открытыми и closed eyes, it can be concluded that the lack of visual control over the orthostatic posture among patients leads to a reliable increase in the spread of discrete LM positions in the sagittal plane. In the group of patients with OSNT, when performing the test with open eyes, it is 5566.3 ± 1000.6 mm2. When visual control is turned off, this indicator increases to 7998.2 ± 980.3 mm2. The difference is statistically significant at $p < 0.05$ ($t = 4.32$, $t0.05 = 2.02$). The increase in the area in the test with closed eyes is reflected in the Romberg coefficient, which among patients in this group is 187.63 ± 36.49%. That is, the lack of visual control leads to an average increase in S among patients with BM by approximately 2 times. A statistically significant increase in L is noted in the test with closed eyes (1319.2±121.5 mm) compared to open eyes (994.2±119 mm). This difference is reliable at $p<0.05$ ($t=4.63$). The table shows that in the absence of visual control, V increases to 27.42±2.54 mm/s (with open eyes, V is 20.24±2.42 mm/s). The difference is statistically significant at $p<0.05$ ($t=6.07$). The differences in LFS when patients perform two tests are statistically insignificant. When conducting a comparative analysis of stabilometry data in two tests, it was revealed that with closed eyes in patients with OSHL, there is a reliable decrease in the stability of the main stance (objectively expressed in an increase in S, L, V).

Table 1. Spectral analysis parameters of posturogram of patients with OSNT (n=80)

Тест	Статисти-показатель ческий	maxAx, мм	maxFx, Гц	maxAy, мм	maxFy, Гц	Fx60, Гц	Fy60, Гц	ANØ2 X,%	ANØ2 Y,%	Fx1, Гц	Fx2, Гц	Fx3, Гц	Fy1, Гц	Fy2, Гц	Fy3, Гц
глазами		4,19	0,285	4,99	0,237	1,796	1,783	55,57	38,02	0,369	0,521	0,824	0,349	0,673	1,116
	СКО	1,91	0,058	1,90	0,033	0,582	0,354	19,35	11,19	0,046	0,037	0,043	0,029	0,035	0,034
	среднее	±0,62	±0,019	±0,61	±0,011	±0,187	±0,114	±6,23	±3,61	±0,015	±0,012	±0,014	±0,009	±0,011	±0,011
глазами		5,18	0,283	7,43	0,224	1,539	1,619	61,27	49,87	0,352	0,510	0,813	0,357	0,677	1,116
	среднее	±0,46	±0,022	±0,82	±0,009	±0,150	±0,162	±8,17	±5,03	±0,013	±0,014	±0,012	±0,011	±0,012	±0,012
	СКО	1,41	0,069	2,54	0,027	0,465	0,502	25,34	15,63	0,039	0,042	0,038	0,035	0,037	0,037

maxAx, maxAy – maximum amplitude for frontal and sagittal componentsof oscillations; maxFx, maxFy – frequency of maximum amplitude for frontal and sagittal components of oscillations; Fx60, Fy60 – level of 60% of spectrum power for frontal and sagittal components of oscillations;

ANØ2X, ANØ2Y – normalized amplitude of oscillations at a frequency of 0.2 Hz for frontal and sagittal components; Fx1,2,3; Fy1,2,3 – frequencies of extremes in three frequency intervals for frontal and sagittal components of oscillations

The average value of maxAx, maxAy in the test with open eyes is 4.19±0.62 mm and 4.99±0.61 mm, respectively. When performing the test with closed eyes in patients with OSHL, we observed an increase in this indicator in both directions (maxAx to 5.18±0.46 mm and maxAy to 7.43±0.82 mm). The increase in the amplitude of oscillations is statistically significant at $p<0.05$ (for the frontal direction $t=3.24$, for the sagittal direction $t=4.42$). When analyzing ANØ2Y with open and closed eyes, a statistically significant increase in this indicator was revealed from 38.02±3.61% to 49.87±5.03%. The difference in mean values is statistically significant at $p<0.05$ ($t=4.49$). The differences in other spectral analysis parameters in the tests with open and closed eyes are statistically insignificant at $p=0.05$.

Analyzing the spectral analysis parameters of video stabilograms when patients with OSHL perform tests, we can conclude that the lack of visual control reliably leads to an increase in the maximum oscillation amplitude in both directions, an increase in the spectrum of harmonic amplitude at a frequency of 0.2 Hz. When comparing the stabilogram parameters in the group of patients with OSHL and the control group, a number of statistically significant differences were revealed at $p=0.05$ (with the Bonferroni correction, the critical value $t=2.67$). In the test with open eyes, the following parameters were reliably different: Y ($t=2.96$), L ($t=3.42$), V ($t=3.22$), ANØ2X ($t=4.33$), maxAx ($t=6.57$), maxAy ($t=4.50$), Fx1 ($t=3.12$). When closing the eyes, reliable differences from the control group were revealed for the following parameters: Y ($t = 4.01$), ANØ2X ($t = 3.59$), maxAx ($t = 3.81$), maxAy ($t = 4.33$), Fx2 ($t = 3.33$), Fy2 ($t = 2.73$). The area of the posturogram in patients slightly exceeded the value in the control group in both tests, however, the difference is statistically insignificant at $p = 0.05$ ($t = 1.26$ with open eyes, $t = 1.11$ with closed eyes).

The proposed posturography method can serve as a screening test that allows for early diagnosis of balance disorders with their quantitative characteristics.

Using the example of the visual analyzer, we studied the significance of one of the alternative sources of sensory information in the development of vestibular deficiency. Thus, a comprehensive systems approach to the study of balance function in patients with damage to the peripheral vestibular analyzer using posturography revealed a number of consistent changes in parameters that are important for the differential diagnosis of diseases accompanied by impaired balance function.

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