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Optimization of Vestibular Tests in Adolescents

Davronov U. F., Normuradov N. A., G'ulomov A. M.
Department of Otorhinolaryngology No. 2, Samarkand State Medical University

Abstract: When studying the vestibular apparatus of healthy adolescents by the method of electronistagmography after a rotational test, 23 of 36 adolescents revealed secondary nystagmus. Secondary nystagmus was often observed and was more pronounced to the left. Its duration exceeded the duration of primary nystagmus, but the intensity in terms of frequency, amplitude and speed of the slow phase was much less. Secondary nystagmus was closely associated with latent spontaneous nystagmus. The latter has always been accompanied by prolonged secondary nystagmus in the same direction. Detection of prolonged unilateral secondary nystagmus should obviously have the same significance for issues of professional suitability as the detection of latent spontaneous nystagmus.

Key words: nystagmus, rotational test, electronistagmography.

Secondary nystagmus (inverted, post-rotational nystagmus), observed after the termination of the main reaction to irritation of the vestibular apparatus, is directed in the opposite direction [1,3]. In the available literature, we have met only a few works devoted to the study of secondary post-rotational nystagmus. The authors mentioned above associate secondary nystagmus with phase processes of excitation in the Central nervous system that occur during the aftereffect of angular acceleration. According to them, there may be several phases that change in direction. In practice, only the secondary phase is observed [2,4,6].

The mechanism and significance of secondary nystagmus have not been clarified to date. It is known that it is not always caused, most often-after irritation of the vestibular apparatus by rotation and at a high speed of 180° per second.

Secondary nystagmus can occur after either positive or negative angular acceleration. The existence of secondary nystagmus is currently associated with a large variability in the duration of nystagmus after the Barani test [1,4,7]. Mittermaier studied the information content of secondary nystagmus in pathology in various ear diseases, ear and brain injuries. He came to the conclusion that secondary nystagmus of Central origin is unstable, in some patients it disappeared after recovery, in others it persisted even when other focal symptoms had already disappeared [3,5,7]. Secondary nystagmus was always reinforced in the direction of the spontaneous nystagmus. With equivalent indicators after a rotational nystagmus on both sides, the presence of a secondary nystagmus on one side indicated an increase in the excitability of the labyrinth in the direction of which the secondary nystagmus was directed, which was confirmed by the data of the caloric sample. the author considers a Pronounced unilateral secondary nystagmus to be equivalent to a "hidden"," latent " spontaneous nystagmus detected by electronistagmography. Mittermaier concludes that in pathology, the observation of secondary nystagmus after rotation makes it possible to distinguish the peripheral lesion of the vestibular analyzer from the Central one. According to Morimoto, in an experiment on rats, secondary nystagmus after rotation is easier to reproduce when the large hemispheres of the brain are removed [1,3,2,6].

The aim of the study was to study post-rotational nystagmus in adolescents.

Materials and methods of research. We observed secondary nystagmus in the study of the state of the vestibular apparatus of adolescents admitted to flight school. The group of examined teenagers consisted of 36 people. At the age of 16, 17 people were examined, 17 years 19. All the teenagers were healthy, no pathology was detected on the part of the ears. There is also no history of ear diseases or vestibular disorders.

During the audiometric examination, no changes were detected on the part of hearing. Visual spontaneous nystagmus was not detected in adolescents. 17 teenagers were examined twice (at the beginning and at the end of training).

Registration of nystagmus was performed on an eight-channel electroencephalograph "Medicor" at a constant time of 0.7, the speed of paper movement of 15 mm/s. As an adequate stimulus to the vestibular apparatus, a stop stimulus was applied from rotation in an electrically rotating chair at a speed of 180° per second. The study was performed in a shielded chamber. The teenager was placed in a chair with his head tilted forward by 30° and his eyes closed. The electrodes were fixed at the outer corners of the eyes. Eye movement calibration in degrees was performed using the method of N. S. Blagoveshchenskaya.

Before starting the rotation, the initial data was recorded - a "hidden" spontaneous nystagmus was detected (when looking directly and looking to the sides). The duration of the uniform rotation was about 2 minutes (until the complete disappearance of nystagmal tremors). At first, they moved to the left, and after resting for an hour, they moved to the right. Before re-spin re-produce the calibration of the eye movement.

Transcript of electronystagmogram carried out according to the method used by most authors. The duration of post-rotational nystagmus was determined. The average amplitude, frequency of the nystagmus, the average speed of the slow phase of the nystagmus, and the ratio of phases were calculated in the first 10 seconds after stopping the chair. For secondary nystagmus, the duration was determined, the pause between the end after the nystagmus and the beginning of the secondary nystagmus, and the time when the secondary nystagmus culminated. The frequency of nystagmus, the average amplitude, and the average speed of the slow phase of nystagmus were determined for 10 seconds after the climax (table 1).

Table 1. Parameters after nystagmus (M± m).

Direction after nystagmus	Duration after nystagmus	Frequency after nystagmus	Average amplitude	Average speed of the slow phase
Rightwards Maximum-minimum options	29,8± 0,9 16,3-39,0	2,5 ±0,4 1,4 - 3,7	14,5± 1,4 5,2-33,3	87,0± 9,3 29,7-216,7
Leftward Maximum-minimum options	29,7± 1,4 13,4-44,8	2,5± 0,2 1,5-4,5	12,3± 1,1 1,5-4,5	70,6± 5,9 21,0-154,8

We observed a pronounced secondary post-rotational nystagmus in 23 out of 36 adolescents, while the rest of the adolescents had only single nystagmal movements in the opposite direction to the primary nystagmus.

Secondary nystagmus was determined after both positive and negative acceleration. Only secondary nystagmus was analyzed after negative acceleration (stop stimulus). However, it was considered mandatory to continue the uniform rotation until the teeth of the secondary nystagmus caused by positive acceleration completely disappear on the encephalograph tape.

Bilateral secondary nystagmus was observed in 11 people, unilateral-in 12. Unilateral secondary nystagmus was more often observed to the left after the end of the right-hand primary nystagmus (stopping after left-hand rotation). Thus, we observed secondary unilateral left nystagmus in 9 out of 12 adolescents. Of the 11 adolescents with bilateral nystagmus, 5 also had a predominant left secondary nystagmus in duration and intensity, 5 had approximately the same expression in both directions, and only one had a predominance of right-sided secondary nystagmus.

Secondary nystagmus began some time after the end of the primary nystagmus (according to our observations, with a rapid phase), after a certain period of time, it reached the highest intensity and gradually faded. Its duration exceeded the duration of the primary nystagmus, but the intensity in terms of frequency, amplitude, and speed of the slow phase was significantly less. We did not observe the third phase of the nystagmal reaction even with long-term recording (up to 6 MNI after the chair was stopped).

Secondary nystagmus curves were usually with uniform teeth. Sometimes poorly expressed, with indistinct teeth, nystagmus was replaced by a distinct long-lasting secondary nystagmus. Less frequently, secondary nystagmus curves repeated features of post-rotational nystagmus, such as nystagmal pauses.

In a repeated study of a group of adolescents consisting of 17 people, there was a relative constancy of secondary nystagmus: in adolescents with severe secondary nystagmus, it was determined on repeated examination after a year and, as a rule, was of the same nature (unilateral or bilateral) and duration. Thus, out of 13 adolescents who were diagnosed with secondary nystagmus in the first study, 8 had it preserved in the second study and none of them appeared again. Secondary nystagmus disappeared in those adolescents in whom it was less pronounced. The existence of secondary nystagmus seems to be related to age: it does not appear at an older age, and in some adolescents it disappears over time. This is consistent with experimental data from Morimoto. secondary nystagmus apparently disappears as the cortical connections of the vestibular analyzer improve[2,5].

In relation to post-rotational nystagmus, many authors have noted the predominance of right-sided nystagmus in healthy people. The predominance nyctimene reaction right when bitermal of colorization as well as "right -". According to our data, right-sided nystagmus in adolescents was also somewhat more intense. According to the indicators of the average speed of the slow phase, the reaction to the right was more pronounced than to the left. Secondary nystagmus, on the contrary, was more pronounced and more often observed to the left. The average data obtained during the study (table.2) also indicate a greater intensity of left-sided secondary nystagmus.

Table 2. Parameters of secondary nystagmus (M± m).

Direction after rotational nystagmus (primary nystagmus)	direction	Pause between primary and secondary nystagmus (in C)	Continue-secondary nystagmus activity (in C)	Time The onset of climax nation from the beginning secondary nystagmus	Hour Thoth (beats/s)	Average amp (in deg)	Average speed of the slow phase(in deg / s)
Rightwards Maximum-minimum options	Left	11,7± 1,3 1,4-23,4	92,2± 6,2 52,6-157,2	17,9± 1,6 8,3-31,4	1,2± 0,5 0,9-1,7	7,9± 1,0 4,2-23,7	19,7± 2,9 8,8 65,9
Leftward Maximum-minimum options	Right	15,3± 1,7 9,6- 28,1	78,8± 6,0 60,0-145,3	16,0± 1,7 5,0-28,5	1,0± 0,4 0,8-1,7	7,4± 0,6 4,4-11,8	16,3± 2,0 8,4 37,4

Latent spontaneous nystagmus was closely associated with secondary nystagmus. The latter was detected during electronistagmography in 4 adolescents. They all had it pointed to the left. These adolescents simultaneously had a long-term left-sided secondary nystagmus, in 3 it was unilateral, and in 4 it significantly prevailed over the right-sided secondary nystagmus.

Thus, latent spontaneous nystagmus was always accompanied by a long-term unilateral secondary nystagmus in the same direction. Therefore, the detection of a long - term one-sided or predominant secondary nystagmus in electronistagmography can be considered a phenomenon identical to latent nystagmus. It should be noted that secondary nystagmus was a more permanent phenomenon than latent spontaneous nystagmus: 3 adolescents with spontaneous nystagmus were examined twice in 1 spontaneous nystagmus was detected in the first study, in 2 - only in the second.

We could not find a relationship between the parameters of post - rotational nystagmus and the nature of secondary nystagmus. With symmetrical indicators of post-rotational nystagmus on the right and left, both unilateral and bilateral secondary nystagmus occurred.

Conclusions. The practical significance of detecting unilateral secondary nystagmus in electronistagmography is the same as that of latent spontaneous nystagmus: its detection indicates the presence of asymmetry in the functioning of the right and left mazes and, consequently, the instability of the entire vestibular analyzer. It is especially important to identify secondary nystagmus in those people whose indicators after rotational nystagmus on the right and left are equal. Obviously, teenagers with such findings should not be allowed to study professions associated with increased requirements for the vestibular apparatus during electrostagmographic research.

List of references.

1. Consensus document of the Barany Society and the International headache society // Rev Neurol (Paris). —2014. –Vol. 170, №6-7. —P.401-406.
2. Morrimoto DJ. Evaluation and outcome of the dizzy patient // J FamPract. —2010. –Vol. 21, №2. —P.109-113.
3. Nasretdinova M. T., Karabaev H. E., Sharafova I. A. Application of methodologies of diagnostics for patients with dizziness //CENTRAL ASIAN JOURNAL OF MEDICAL AND NATURAL SCIENCES. – 2020. – Т. 1. – №. 1. – С. 29-33.
4. Nasretdinova M. T., Karabaev H. E. Vestibular neuronitis-the problem of systemic dizziness //European science review. – 2019. – Т. 2. – №. 1-2.Singh R.K., Singh M. Отorhinolaryngology Clibics: An International Journal. 2012. Vol. 4(2). P. 81–85.
5. Neuhauser H. K. Epidemiology of vestibular vertigo // Neurology. — 2005. –Vol. 65. —P.898-904.
6. Neuhauser H.K. Epidemiology of vertigo // Curr. Opin. Neurol. — 2007. - Vol. 20. — P. 40-46.
7. Peterka RJ, Black FO. Age-related changes in human posture control: motor coordination tests // J Vestib Res. —2012. –Vol. 1, №I. —P.87-96.
8. Нормирова, Н. Н., Насретдинова, М. Т., Шадиев, А. Э., & Нормурадов, Н. А. (2023). БОШ АЙЛАНИШИ БИЛАН ОҒРИГАН БЕМОРЛАРДА ПОЗИЦИОН ПАРОКСИЗМАЛ НИСТАГМНИ ЎРГАНИШ. ЖУРНАЛ СТОМАТОЛОГИИ И КРАНИОФАЦИАЛЬНЫХ ИССЛЕДОВАНИЙ, 4(3).
9. Насретдинова, М. Т., Нормирова, Н. Н., Шадиев, А. Э., & Нормурадов, Н. А. (2023). КОХЛЕОВЕСТИБУЛЯР КАСАЛЛИКЛАРИ БЎЛГАН БЕМОРЛАРДА ВЕСТИБУЛЯР ФУНКЦИЯНИ УРГАНИШ. ЖУРНАЛ СТОМАТОЛОГИИ И КРАНИОФАЦИАЛЬНЫХ ИССЛЕДОВАНИЙ, 4(3).
10. Насретдинова, М. Т., & Нормурадов, Н. А. (2023). Функциональное состояние вестибулярного анализатора по данным вращательной пробы при центральном поражении. Science and Education, 4(8), 65-71.
11. Насретдинова, М. Т., & Нормурадов, Н. А. (2023). Применение консервативной терапии у

больных с болезнью Меньера. Science and Education, 4(8), 57-64.

12. Насретдинова, М. Т., & Нормурадов, Н. А. (2023). Оценка диагностических вестибулярных тестов у пациентов с кохлеовестибулярными нарушениями. Science and Education, 4(8), 72-78.
13. Слонова, А. И. (2022). Практики осознанности в развитии творческого потенциала детей: возможности использования в работе практического психолога. Психология. Журнал Высшей школы экономики, 19(3), 642-656.
14. Sayfullayeva Asila Abdulla qizi, R. K. A. qizi ,. (2024). Age-Related Characteristics of Vestibular Neurons. International Journal of Integrative and Modern Medicine, 2(4), 53–56. Retrieved from https://medicaljournals.eu/index.php/IJIMM/article/view/239
15. Rasulova, K. (2023). TREATMENT AND PREVENTION OF FUNGAL RHINITIS AND ALLERGIC RHINITIS. Science and innovation, 2(D10), 150-154.
16. Xatamov, J. A., Xayitov, A. A., Boltayev, A. E., & Davronov, U. F. (2023). Comprehensive diagnosis and treatment of chronic purulent otitis media with complications. World Bulletin of Public Health, 28, 73-75.
17. Насретдинова, М. Т., Набиев, О. Р., Хайитов, А. А., & Шадиев, А. Э. Диагностическое значение нистагма при болезни меньера. междисциплинарный подход по заболеваниям органов головы и шеи, 270.
18. Taxsinovna, N. M., Musinovna, R. K., Farmonqulovich, D. U., & Rahmonovichn, K. I. (2024). VESTIBULAR VASCULAR REACTIONS IN ASSESSMENT OF VESTIBULAR DYSFUNCTION IN PATIENTS WITH CRANIOCEREBRAL TRAUMA. INNOVATIVE ACHIEVEMENTS IN SCIENCE 2024, 3(29), 104-111.
19. Taxsinovna, N. M., Musinovna, R. K., Abruyevich, K. J., Maftuna, M., & Ibragimovna, R. E. T. (2024). DIAGNOSTIC INFORMATIVITY OF THE DRUGS USED TO REVEAL 1NTRALABYRINTHINE HYDROPS ACCORDING TO THE DATA OF AUDIOLOGIC AND BIOCHEMICAL STUDIES. INNOVATIVE ACHIEVEMENTS IN SCIENCE 2024, 3(29), 112-117.
20. Raupova, K., Nasretdinova, M. T., Normuradov, N. A., & Rakhimov, J. H. (2024). TEMPORAL CHARACTERISTICS OF THE ACOUSTIC REFLEXES OF THE INTRA-AURAL MUSCLES IN" NOISE" WORKERS WITH NORMAL HEARING AS WELL AS WITH INITIAL AND PRONOUNCED HEARING IMPAIRMENT. Ethiopian International Journal of Multidisciplinary Research, 11(04), 447-450.