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16. Abstract Features and significance of individual vestibular symptoms for the diagnosis of [latent] labyrinthitis and limited forms of labyrinthine affections offering considerable difficulties are discussed. Vestibular symptoms are indistinct. In case of the negative fistular symptom the greatest significance is acquired by the study of posture nystagmus according to the results of electronystagmograms, changes of tonic reactions and statics, as well as data of experimental vestibular tests. The necessity of evaluation of all the vestibular symptoms from the point of view of their vector characteristics and in a complex of evidence obtained by otoneurological examination of the patient is emphasized. Delicate topic and differential diagnosis of vestibular disturbances is of great importance and significance in the choice of the conservative or surgical method of treatment.					
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DIAGNOSIS OF LATENT FORMS OF LABYRINTHINE AFFECTIONS

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Vestibular disorders often complicate the course of inflammatory processes /22\*\* in the middle ear. With an explicit clinical pattern of labyrinthitis the diagnosis is not difficult. Considerable difficulties arise in evaluating weakly pronounced vestibular symptoms, in which it is difficult to isolate features that are typical of the peripheral affection. To diagnose limited forms of labyrinthine affections the fistulous symptom has decisive importance, however, limited labyrinthitis can also be present without labyrinthine fistulas.

Vestibular disorders that sometimes complicate sanitizing and hearing-improvement operations on the ear can be observed during surgery, in the near and distant period after it (L. T. Levin, 1937; N. A. Preobrazhenskiy and O. K. Patyakina; 1973, Yu. B. Preobrazhenskiy, 1973, and others). There can be many causes, including different traumatizing moments during surgery: injury to the osseous wall or membranous labyrinthine formations, introduction of osseous fragments into the fistula, subluxation of the stapes during sanitizing operations; fragments of the stapes falling into the labyrinthine vestibule during stapedectomy and many others (N. F. Bokhon, 1944; N. A. Preobrazhenskiy and L. I. Tsukerberg, 1974). After the hearing-improvement operations the prosthesis can shift. A fistula can form around the prosthesis.

In certain cases, excess mobility develops in the newly created transformation system, sometimes the prosthesis is too long (O. K. Patyakina et al., /23

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\*\*Numbers in margin indicate pagination in original foreign text.

Weakly or distinctly pronounced vestibular disorders can be observed also in the distant period after surgery. It is also possible that patients can form granulations, cysts with microfistulas in the region of the vestibular window, both in the "dry ear," and on the background of inflammation in the middle ear in patients with chronic otitis and after operations done on the ear (A. P. Sluchanko, 1973; Ye. A. Paramonova, 1974). Many other factors can also cause vestibular disorders in such patients.

Many years of observation of such patients, comparison of the clinical pattern with the data of surgical revision of the ear, analysis of the data of electronystagmograms and the results of otoneurological study permitted us to evaluate the importance of a number of vestibular symptoms to diagnose limited and latent forms of labyrinthine affection with weakly pronounced, often doubtful vestibular symptoms.

The main conclusions that characterize the vestibular disorders on the labyrinthine level are generally acknowledged: first, complaints of systemic, more often rotating vertigo; second "harmonic" nature of all the vestibular symptoms with distinct vectoriality of the spontaneous nystagmus, disorders in tone, statics, gaits and experimental vestibular reactions that are expressed either as irritation or inhibition of the labyrinth. And the third conclusion-- vestibular disorders in such patients are rapidly compensated for by the central nervous system and disappear in 3-4 weeks (S. Ya. Gol'din, 1951; N. S. Blagoveshchenskaya, 1962).

In fact, in the acute period of affection of the labyrinth explicit vestibular symptoms are noted, the vertigo as a rule has a distinct rotating nature. At the same time, frequent cases of symptomless clinical course of the fistula despite the presence of explicit destruction of the labyrinthine wall are generally known. Bandtlow (1961), Palva et al. (1971) found symptomless fistulas of the labyrinth in 50-60% of the patients that they operated on for chronic otitis. In a number of cases not only the limited, but also the chronic diffuse labyrinthitis occurs latently, which governs the considerable difficulties in diagnosing them.

Often in patients with distinct labyrinthine fistula, even with the most thorough inquiry one does not successfully reveal the presence, much less the nature of the vertigo. The patients complain of flinching to the side (many cannot determine which), indistinct vertigo that they describe as the impression of oscillations of objects or a sensation of instability during sharp movements and walking, difficulty in orientation, especially on the street in the form of moving transportation. According to our data, such complaints are made by patients with limited labyrinthitis no less than complaints of rotating vertigo.

The indefinite nature of vertigo is considered to be a sign of the retro-labyrinthine affections of the vestibular apparatus, however, we would like to stress that the absence of distinct systemic vertigo is not the grounds that would permit negation of localized affection in the labyrinth. It is known that distinct rotating vertigo occurs during acutely developing dysfunction of the labyrinth and rapidly disappears. As is apparent, the distinct, slowly developing process in the labyrinth, in which processes of central compensation of the vestibular disorders simultaneously occur can not yield an explicit clinical pattern of disease; here a distinct sensation of vertigo is missing.

This conclusion that promotes an explanation of the features of vertigo in the limited and latent forms of labyrinthine affections does not contradict the general laws of vestibulology. In the opinion of N. S. Blagoveshchenskaya (1962), vertigo of the vestibular nature can develop during affection of any section of the vestibular analyzer from the peripheral receptor to the cerebral cortex. Here, vertigo does not always develop. Its appearance and nature depend on several factors, including on the rate of effect of the pathological process on the vestibular formations and on the degree of their preservation. Localization of the affection of vestibular formations and the functional condition of the cerebral cortex have importance up to a certain degree. At the same time, the difference between the central vertigo and the peripheral is not strictly specific, and it can be evaluated only with regard for the entire clinical pattern of the disease.

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Of especial importance in evaluating vertigo during topical diagnosis is its dependence either on the inflammatory process, or on surgical intervention

in the ear, its nature, as well as on the clinical pattern of the auricular process. Attention should be drawn to the possibility of yet another feature of vertigo with partial affection of the labyrinth--it can be preserved for a long time. The presence of a constant source of irritation of the labyrinth with preservation of its function can induce vestibular disorders that sometimes do not disappear for many years (I. B. Soldatov and N. S. Krappo, 1973). We observed long-existing vestibular symptoms in patients with long-established labyrinthine fistula, shift in the prosthesis, introduction of fragments of the stapes into the vestibule, etc.

Consequently, the conclusion that vestibular disorders during labyrinthine affection are compensated for by the central nervous system and disappear in 3-4 weeks is not firm. The duration of vertigo also should be evaluated only in a set with all the examination data.

Spontaneous nystagmus during limited labyrinthitis and other latent forms of labyrinthine affection is encountered comparatively rarely, only in the acute period of the disease. This symptom is important, but is not decisive in the diagnosis. As a rule, it is not very sweeping, of the first degree, and can be rapidly exhausted. The direction of nystagmus depends on the functional state of the labyrinth at the moment of examination, the presence of the stage of stimulation or its replacement by the stage of labyrinthine suppression. The degree of pronouncement of the processes of central compensation also is important. Attention should also be drawn to the fact that patients can be in the transitional stage of the disease, when a stage of labyrinthine stimulation still exists, and the phase of its suppression already begins. In this case, we noted lability of the nystagmus. For example, at rest the spontaneous nystagmus is directed towards the healthy ear, but after movements of the patient sometimes for the purpose of examining the ear, we observed distinct nystagmus towards the painful ear, sometimes to both sides. Soon nystagmus stopped, and then spontaneous nystagmus again developed that was directed towards the healthy ear. We observed a similar pattern fairly often in patients with chronic suppurative epitympanitis, complicated by fistula of the horizontal semicircular canal. Such variability in the nystagmus was established during its objective recording on the electronystagmogram in dynamics.

A valuable symptom of the vestibular dysfunction is the position nystagmus that is successfully revealed with the help of electronystagmography. G. M. Grigor'yev (1962, 1976) considers position nystagmus to be a valuable sign of partial affection of the labyrinth. T. D. Zadorova (1970) stresses that position nystagmus sometimes is the only symptom of vestibular dysfunction in patients with labyrinthine fistula after stapedioplasty. In limited labyrinthitis position nystagmus was defined by us more often than spontaneous. In addition to other authors (Seiferth, 1937; G. M. Grigor'yev, 1962; Norre, 1978), we believe that position nystagmus during labyrinthitis can appear more often than spontaneous; position nystagmus is its beginning stage. However, the features of spontaneous and position nystagmus have diagnostic importance only in the set of data from a otoneurological examination of the patient. The question of the importance of position nystagmus in topical diagnosis continues to be discussed in the literature (Haid, 1977; Laciak and Lukomski, 1977; Kosoy, 1977; Norre, 1978). /25

It is known that a disorder in the tone of muscles is determined in an examination of the reactions of arm deviation: spontaneous, during finger-finger, and finger-nose tests. The statics are studied in the Romberg position, including during turns of the head.

The disorders in tone and statics during limited labyrinthitis and latent forms of labyrinthine affections can be insignificantly expressed and be revealed only in a thorough, lengthy and slow examination of the patient. At the same time, these disorders have great importance in diagnosing the level of affection. Only in labyrinth disorders is the vectoriality of these symptoms distinctly pronounced. Deviations of the arms (spontaneous, and especially in the finger-finger test) and torso in Romberg's position, and during turns of the head can be insignificantly pronounced, but are always directed towards the side opposite to nystagmus, more precisely, to the side that is opposite to the labyrinth that is most stimulated at this moment.

Many researchers (S. Ya. Gol'din, 1951; S. P. Fel'dman, 1965) have focused attention on that fact that disorders in tone, statics, gait during labyrinthitis disappear much later than spontaneous nystagmus, and consequently, they are

encountered more often. A disorder in tone reactions can be revealed sometimes only after vestibular loads, for example, after movements of the head. We used this approach in doubtful cases. Distinct vectoriality with harmonious deviation of the arms and torso indicates the interest of the labyrinth in the process.

In the examination of the gait, which is not decisive, additional data are revealed in diagnosing the latent forms of labyrinthine affections. Such an examination does not reveal harmonious deviation with weak forms of affections, especially in the stage of compensating for vestibular disorders (Rudert and Reker, 1977).

The data of the caloric test (especially bithermal) have great importance in examining patients who have undergone electronystagmography. Data on a drop or increase in the function of the labyrinth on the side of the affection in dynamics help to determine the degree and stage of labyrinthine affection. With a corresponding clinical pattern the sharp reduction in caloric nystagmus on the side of the disease that especially increases in dynamics, can indicate progression of the pathological process in the labyrinth. In patients with chronic epitympanitis and labyrinthine fistula, this symptom indicates the development of secondary diffuse labyrinthitis. In such cases, as a rule, disorders in sound perception join in.

The results from conducting a caloric test have diagnostic value only in the complex clinical pattern and in examining patients in dynamics. At the same time, being a valuable research method, the caloric test during limited, latent forms of labyrinthine affection does not always permit detection of fine asymmetry in the functioning of the labyrinths, the more so since in patients with pathology of the ear the caloric test is not always successfully done, especially in the presence of dry perforation of the tympanic membrane, in the immediate periods following hearing-improvement surgery, etc. It is also necessary to take into consideration different conditions for examining a sick and healthy ear with whole tympanic membrane, and either with its perforation or with total defect. The rotating test of Barani, moreover, does not permit detection of weak forms of vestibular asymmetry. Additional data can be obtained during a rotating test with dosed acceleration. However, the diagnostic potentialities of this

technique during varying degree of affection of the labyrinth are still subject to further study.

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The positive fistula symptom is important for diagnosis. However, the presence of a negative fistula symptom, especially in the presence of other vestibular symptoms, does not exclude the diagnosis of either labyrinthitis or labyrinthine fistula (M. F. Tsytovich, 1912; Kh. Vul'shteyn, 1972). Thus, in limited latent forms of labyrinthine affections, vestibular symptoms can be very slightly pronounced, therefore one does not always successfully reveal the features of peripheral vestibular syndrome. The vestibular symptoms have an obliterated nature. In the absence of such vestibular symptoms as rotating vertigo, spontaneous nystagmus, position nystagmus, disorders in tone and statics of the labyrinth type are defined more often, and they are more demonstrative after vestibular loads, for example, in the form of head movements. It is necessary to also take into consideration the data of experimental vestibular reactions, of which the bithermal caloric test and the rotating test with dosed acceleration have the greatest importance.

It is necessary to reveal even the most insignificant symptoms of labyrinthine affection, that can have diagnostic importance. Any of the vestibular symptoms should be compared and their interrelationship (correspondence) and differences established. Only a thorough examination of the patients with the use of modern vestibulometric techniques will help to reveal the slightly pronounced vestibular symptoms that indicate asymmetry in the functioning of the labyrinths.

Fine topical and differential diagnosis of vestibular disorders has great importance in selecting the conservative or surgical method for treating them, the more so since with the modern potentialities of otosurgery using surgical microscopes, many forms of labyrinthine affection are successfully cured and vestibular disorders are eliminated.

#### References

Blagoveshchenskaya, N. S. Topicheskoye znachenie narusheniy slukha, vestibulyarnoy funktsii, obonyaniya i vkuša pri porazheniyakh golovnogo mozga ["Topical Importance of Disorders in Hearing, Vestibular Function,

- Sense of Smell and Taste in Cerebral Affections"], Moscow, 1962.
- Bokhon, N. F. Vospalitel'nyye zabolevaniya ushnogo labirinta i ikh terapiya ["Inflammatory Diseases of the Auricular Labyrinth and Their Therapy"], Leningrad, 1944.
- Vul'shteyn, Kh. L. Slukhouluchshayushchiye operatsii ["Hearing-Improvement Operations"], Moscow, 1972.
- Gol'din, S. Ya. Otonevrologicheskiye simptomy i sindrom ["Otoneurological Symptoms and Syndrome"], Moscow, 1951.
- Grigor'yev, G. M. Vestn. otorinolar., No. 3 (1962), p. 70-75.
- Grigor'yev, G. M. Issledovaniye positsionnogo nistagma. Metod. rekomendatsii ["Study of Position Nystagmus. Method. Recommendations"], Chelyabinsk, 1976.
- Zadorova, T. D. Metodika vyyavleniya nistagma polozheniya u bol'nykh otosklerozom posle khirurgicheskogo lecheniya. Metod. pis'mo ["Technique of Detecting Posture Nystagmus in Patients with Otosclerosis after Surgical Treatment. Method. Letter"], Moscow, 1970.
- Levin, L. T. Khirurgicheskiye bolezni ukha ["Surgical Diseases of the Ear"], Leningrad, 1937, Vol. 2.
- Nikitina, V. F. in Vserossiyskoye nauch. med. o-vo otorinologov. Pravlenniyeye. Plenum. Materialy ["All-Russian Scien. Med. Soc. of Otorhinolaryngologists. Administration. Plenum. Materials"], Ivanovo, 1974, p. 164-167.
- Paramonova, Ye. A. Ibid., p. 215-217.
- Patyakina, O. K.; Lyalina, V. L.; and Antonyan, R. G. Ibid., p. 159-161.
- Preobrazhenskiy, N. A.; and Tsukerberg, L. I. Ibid., pp. 147-151.
- Preobrazhenskiy, N. A.; and Patyakina, O. K. Stapedektomiya i stapedoplastika pri otoskleroze ["Stapedectomy and Stapedioplasty in Otosclerosis"], Moscow, 1973.
- Preobrazhenskiy, Yu. B. Timpanoplastika ["Tympanoplasty"], Moscow, 1973.
- Sluchanko, A. P. Vestn. otorinolar., No. 4 (1973), p. 28-32.
- Soldatov, I. B.; and Krappo, N. S. in Nauchno-prakticheskaya konf. otorinologov ESSR. 5-ya. Trudy ["Scientific-Practical Conf. of Otorhinolaryngologists of the Estonian SSR.], Fifth. Proceedings"], Tartu, 1973, pp. 44-45.
- Fel'dman, S. P. Otonevrologiya prakticheskogo vracha ["Otoneurology of the Practicing Physician"], Moscow, 1965.

- Tsytovich, M. F. Vestn. ushn., nos. i rogl. bol., 1912, May, p. 458-466.
- Bandtlow, O. cited in Szpunar, I. Ann. Otol. (St. Louis), 1976, Vol. 85, p. 291-298.
- Filipo, R.; and Jannetti, G. Valsalva, Vol. 46 (1970), p. 170-175.
- Haid, T. Z. Laryng. Rinol., No. 56 (1977), p. 1037-1045.
- Kosoy, J. Acta Oto-laryng. (Stockh.), Suppl. 343 (1977).
- Laciak, J.; and Lukomski, M. Oto-laryng. pol., Vol. 31 (1977), p. 323-328.
- Norre, M. E. Acta oro-rhino-laryng. belg., Vol. 32 (1978), p. 439-667.
- Palva, T.; Karja, J.; and Palva, A. Arch. Otolaryng. Vol. 93 (1971), p. 75-78.
- Rudert, H.; and Reker, U. H.N.O. (Berl.), No. 25 (1977), p. 246-248.
- Seiferth, L. B. Arch. Ohr.-Nas- u Kehlk. Heilk., No. 143 (1937), p. 52-74.

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