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QUESTIONS OF DIAGNOSING AND TREATING MENIERE'S DISEASE

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16. Abstract

The author considers the possibilities of diagnosis and treatment of Meniere's disease. Special attention is given to the use of dehydration tests which are based on glycerol administration or intravenous injection of furosemide. The risks of bilateral sensorineural hearing impairment in prolonged conservative treatment is emphasized. The data of auditory function sutdy before and following endolymphatic sac surgery are presented.

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QUESTIONS OF DIAGNOSING AND TREATING MENIERE'S DISEASE

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Methods for diagnosing and treating Meniere's disease have been signifi- /1** cantly perfected in recent years. In addition to the normal audiometric techniques to study disorders in the auditory function during this disease acoustic impedance metering and the technique of recording short-latent auditory induced potentials (S. N. Khechinashvili (1978,a) have been used. Improvements have been made in the technique of adequate stimulation of the vestibular analyzer (by rotation), and the technique of recording nystagmus has been perfected. Of especial importance is the introduction into practice of new functional tests that are based on study of the auditory and vestibular functions after the administration of glycerin or intravenous injection of furosemide (V. T. Pal'chun, 1977; I. B. Soldatov, N. S. Khrappo, 1977; S. N. Khechinashvili, 1978, b; Klockhoff and Lindbloom, 1966; Futaka et. al., 1975). It has been established that attacks of Meniere's disease can be repeated in the space of many years, in the final analysis causing progressive reduction in hearing of irreversible nature. With lengthy duration of the disease the frequency of two-sided

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injuries to the inner ear increases significantly (up to 50%) (Morrison, 1975). In this respect it is doubtful whether it is expedient to use expectant tactics during Meniere's disease with the employment only of conservative methods of therapy, many of which are symptomatic. Such tactics can result in the development of two-sided neurosensory hypoacusis in severe and frequently repeating attacks of Meniere's disease. The expediency of surgical intervention of the destructive type is also doubtful. It is evident that complete loss of hearing in the operated-on ear can have serious consequences for the patient, if over time the pathological process develops in his second ear. Destructive type surgery includes different methods of labyrinthectomy. However it is necessary /2 to note that complete deafness on the side of the operated-on ear rarely develops even after more limited interference in the labyrinth. Such an outcome is observed in long periods (usually over a year) after vesibulotomy, vestibular bypass and other surgical intervention in which the perilymphatic space is opened. This is explained by the drastically increased sensitivity of the labyrinth to surgical injury during Meniere's disease. In this respect operations that stop attacks of Meniere's disease without disrupting hearing or even improving it to a certain extent are becoming more popular. In the first place they should include surgical intervention on the endolymphatic sac (V. T. Pal'chun, 1977; S. N. Khechinashvili, 1978, a; I. B. Soldatov, 1978; Portmann, G., 1927; W. House, 1964; M. Portmann, 1964, Shea, 1966, Morrison, 1975; and Fisch, 1976).

One can consider it established that the reason for disorders in auditory and vestibular functions during Meniere's disease is hydrops of the membranous labyrinth, that is expressed in a dilation of the spaces filled with endolymph,

mainly in the region of the cochlea and vestibule. This provided the grounds to view Meniere's disease as idiopathic endolymphatic hydrops (Hallpike and Cairns, 1938). The possibility of formation of spot ruptures in the walls of the membranous labyrinth and their hernia-like ruptures during Meniere's disease has been proven. The wall of the dilated sacculus can touch the base of the stapes and even grow together with it. The pronounced nature of the atrophic-degenerative changes in the cochlear receptors (hair cells) corresponds to the degree of stretching of the membranous labyrinth (Antoli-Candella, 1976). These changes are more pronounced during a lengthy period of the disease, especially after frequent and severe attacks of Meniere's disease. In the initial period of the disease changes prevail in the labyrinth of a reversible nature that induce fluctuating hypoacusis. The given type of disorder in the auditory function during Meniere's disease depends on exacerbation in the conditions of sound conducting in the cochlea (V. F. Undrits, 1958; V. S. Olisov, 1973), as well as on the change in metabolism of the hair cells (Schmidt, et al., 1974). The phenomenon of accelerated increase in loudness (recruitment) is characteristic for a disruption in the auditory function during Meniere's disease. Vestibular recruitment is a symptom that is similar in nature and is revealed during repeated vestibular stimuli (rotational, caloric tests) of increasing intensity. With a rise in the intensity of the stimuli the vestibular reactions are strenghthened to a greater degree (faster) than in healthy individuals (I. A. Sklyut and S. G. Tsemakhov, 1978; Fluur and Mendel, 1973).

One has to differentiate Meniere's disease most often with vestibular and auditory disorders that are due to vertebral-basilar insufficiency, as well as with primarily vestibular disorders caused by focal injuries to the central

nervous system. The vertebral-basilar insufficiency is characterized by vertigo and nystagmus of position; here one can observe two-sided treble hypoacusis with phenomenon of accelerated rise in loudness expressed only at high frequencies. With focal injuries of the central nervous system vestibular symptoms prevail and the neurological symptoms are pronounced (N. S. Blagofeshcenskaya, 1962, 1965). If auditory disorders are also observed here, then they are not typical for Meniere's disease. Attacks of Meniere's disease can be similar to the cochleovestibular disorders with limited labyrinthitis, neurinoma of the VIII nerve, otosclerosis, syphilis and Paget's disease. With limited labyrinthitis the diagnosis is made based on data of otoscopy (presence of chronic otitis media purulenta) and the pressor test (development of a fistulous symptom). Although the attack-like course is observed fairly rarely during neurinoma of the VIII nerve (in roughly 5% of the observations), an erroneous diagnosis in the given case is fraught with very serious consequences since it excludes the possibility of timely removal of the tumor. Of great importance in recognizing neurinoma of the VIII nerve is detection of audiological symptoms that are characteristic for retrocochlear injuries, in particular the phenomenon of retarded increase in loudness and pathological auditory adaption. The latter audiological symptom can be revealed both under conditions of tonal suprathreshold audiometry, and during acoustic reflexometry. During otosclerosis, syphilis and Paget's disease the same changes can be observed in the inner ear as during Meniere's disease. In contrast to idiopathic and endolymphatic hydrops that is characteristic for Meniere's disease, it is customary to view these changes as symptomatic endolymphatic hydrops (Morrison, 1975). Syphilis and Paget's disease with injuries to the temporal bone pyramid are observed extremely rarely. These pathological conditions are characterized by clinical and x-ray symptoms that are not

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observed during Meniere's disease. It is very important to recognize that form of otosclerosis that is accompanied by the development of symptomatic endolymphatic hydrops. As already noted, during Meniere's disease (idiopathic endolymphatic hydrops) the sensitivity of the inner ear to surgical injury increases sharply. There are grounds to assume that the same occurs during symptomatic endolymphatic hydrops, in particular with that modification that is observed during otosclerosis (Morrison, 1975). Therefore the fluctuating nature of hypoacusis and the presence of vestibular disorders must be considered as contraindications in solving the question of surgical treatment of patients with otosclerosis.

In the otorhinolaryngological clinic of the Tbilissi S. M. Kirov State Institute for Advancement of Physicians the glycerin test is carried out as follows. In the morning the patients are given tonal threshold audiometry, after which they are given glycerin in a calculation of 1.5 ml per 1 kg of mass of the subject on an empty stomach. After this we repeat the tonal audiometry with intervals of 1 hour. Within 2-3 hours after taking the glycerin the maximum effect is noted in the form of a decrease in the threshold of air and osseous conductivity, mainly at the lower frequencies. The study is made under hospital conditions since it is impossible to carry out dehydration without a thorough study of the general condition of the patient, and in addition, after the glycerin test the patient must be under a physician's observation. When all the necessary precautions are observed the glycerin test does not cause any complications. Certain patients complain only of a slight burning and short-term headache. A single injection of a furosemide (lazix) solution also does not cause any complications.

Figure 1 demonstrates the results of using a glycerin test during Meniere's disease. The maximum reduction in auditory thresholds is noted in 2 h after administration of glycerin. Subsequently this patient was exposed to surgical treatment. As a result of surgery on the endolymphatic sac a somewhat greater decline was observed in the auditory thresholds than after administration of glycerin (Figure 2).

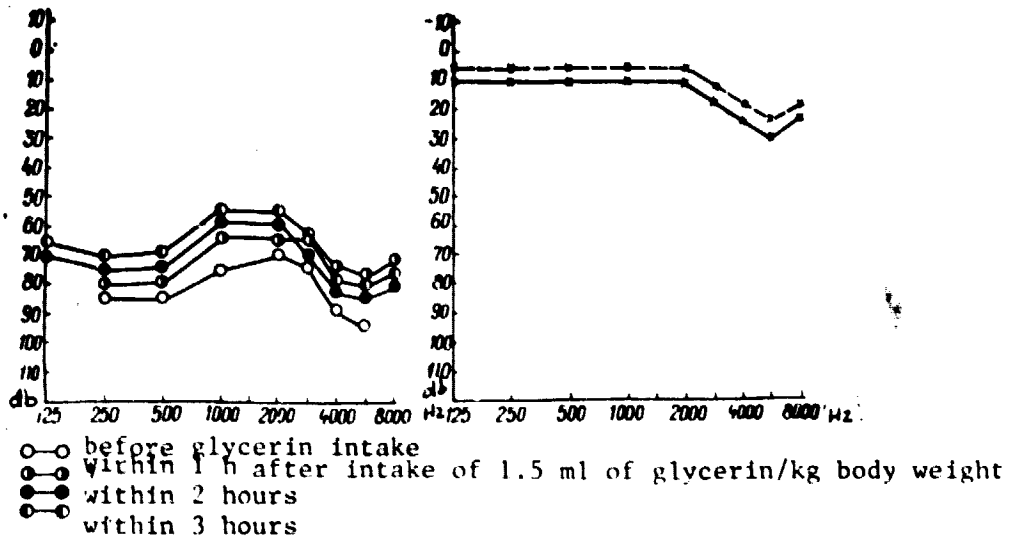

Figure 1. Reduction in Thresholds of Air Conductivity During Meniere's Disease After Administration of Glycerin

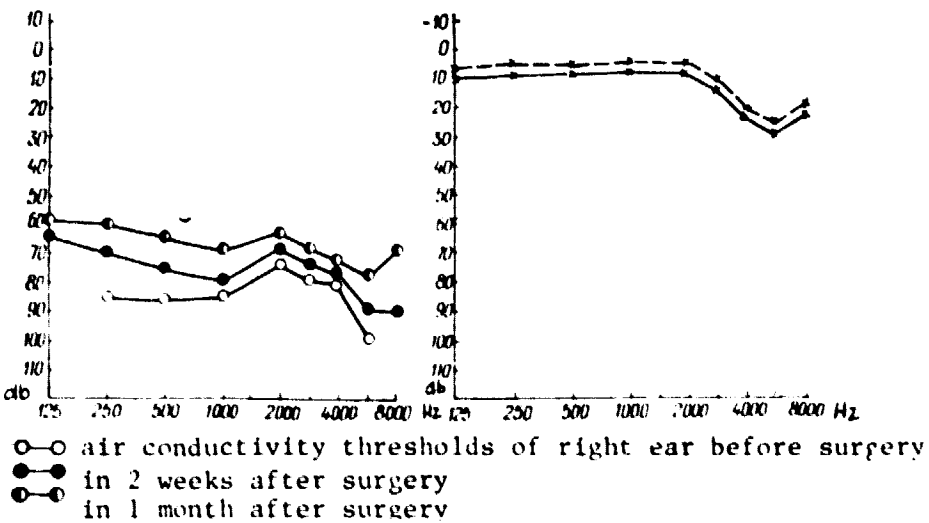

Figure 2. Effect of Surgery on Endolymphatic Sac from the Right in the Same Patient

We administer lazix intravenously in a quantity of 20 mg. Before conducting the test a rotation test on a stand with programmable control is given. The same is repeated 1, 2 and 3 h after injection of lazix. A positive result /4
of the test is expressed in an increase in vestibular excitability, which is demonstrated well with the help of electronystagmography.

Diuresis needs to be traced in both dehydration tests. It is also desirable to study the osmotic pressure of the plasma or its electrolyte composition. This method can reveal the relationship between the degree of dehydration of the organism and the nature of changes in the indices of the auditory and vestibular functions. The glycerin test makes it possible to predict, although not very accurately, the functional effect of surgery on the endolymphatic sac (Figures 1 and 2).

During attacks of Meniere's disease treatment is symptomatic. During severe attacks it is expedient to give an intramuscular injection of aminazine (1-2 ml of a 2.5% solution) or droperidol (1-2 ml of a 0.25% solution). After the end
of the attack it is necessary to make a thorough clinical examination of the /5
patient. If disorders are found here in the activity of the cardiovascular system, symptoms of cervical osteochondrosis or manifestations of allergy, then the corresponding treatment is carried out. In order to detect foci of chronic infection in the area of the upper respiratory passages surgical sanitation is carried out. In terms of the general-sanitizing measures therapeutic physical culture has great importance. Limited intake of water and sodium chloride can play a positive role. Intranasal novocaine blockage and blockage of the stellate ganglion are less effective. V. S. Olisov (1973) has suggested treating Meniere's disease by inhalation of gases--oxygen, mixture of oxygen and carbon

dioxide, or a mixture of the latter with air. We have frequently observed the pronounced effect of such treatment, as well as the effect from an intravenous administration of solutions of dextran. Usually we administer intravenously by the drop method 400 ml of polyglucin in a mixture with 2 ml of a 2% solution of papaverine. The injections are repeated daily for 5 days.

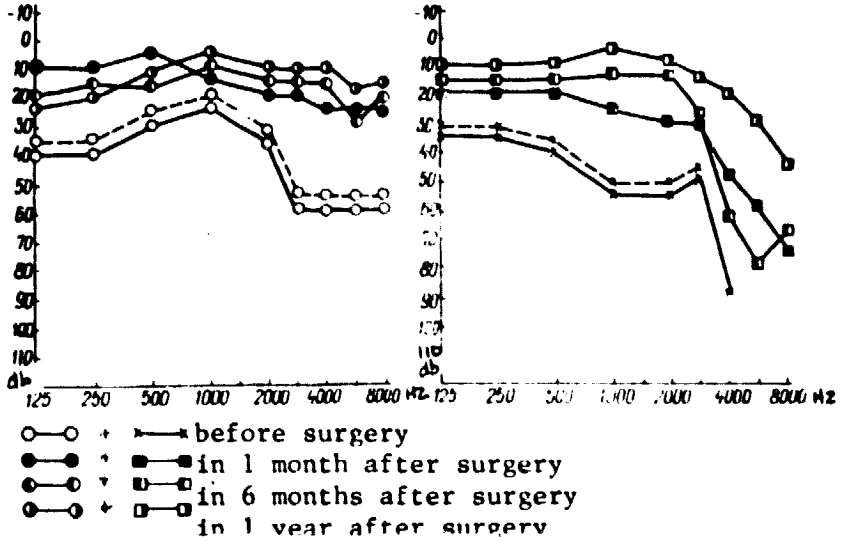

Figure 3. Effect of Surgery on Endolymphatic Sac from the Left on the Thresholds of Air Conductivity.

Surgical intervention becomes necessary in those cases, where despite the conservative treatment attacks of Meniere's disease occur with short intervals, and hypoacusis progresses fairly rapidly. Currently the problem has been solved of cutting the vestibular nerve (resection of the vestibular ganglion) without damaging the cochlear nerve fibers. Such interference is implemented by trans-temporal method, since the fibers of the vestibular and cochlear nerves are easily differentiated in the area of the meatus acusticus internus. However after such an operation complete compensation of the vestibular disorders does not always occur, especially in elderly people (Fisch, 1976). Prolonged

disorders in the vestibular function are not observed after disengagement of the vestibular receptors and semicircular canals with the help of ultrasound and a las r beam, i.e., with the preservation of neurons in the vestibular ganglion and their links to the central nervous system. No vestibular disorders are noted after surgery on the endolymphatic sac. Surgery of the given type is carried out transmastoidaly. The mastoid process is trepanized below the projection of the antrum, and the endolymphatic sac is revealed in the limits of /6 Trautmann's triangle or somewhat to the front of it (Morrison, 1975). After finding and opening the endolymphatic sac a graft is fused to it from the musculus temporalis (Fisch, 1976). Figure 3 presents an audiogram that demonstrates the considerable two-sided increase in hearing after such surgery on the endolymphatic sac. In the space of a year after surgery hearing improved on the side of the operation. On the opposite side stabilization in the auditory thresholds and even a certain increase in them has recently been noted. In the given case the effect appeared of improvement in hearing on an ear that has not been operated on, similar to that which is observed after hearing-improving surgery in patients with otosclerosis.

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