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TREATMENT OF ACUTE SENSORINEURAL HEARING LOSS OF VARIOUS GENESIS

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ABOUT ARTICLE

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Abstract: Hearing loss is a socially significant problem. In a significant number of cases, it is based on sensorineural hearing loss. Given the polyetiology of the disease, the approach to treating patients should be comprehensive. Over the past decades, there has been a steady increase in the number of patients with hearing impairment due to the development of sensorineural hearing loss, which, in turn, leads to social and labor maladaptation, deterioration in the quality of life of patients, and in children to a violation of the psycho-emotional , speech and intellectual development. The treatment of acute sensorineural hearing loss (ASNHL) remains an important and problematic task of modern otolaryngology. Thus, in acute sensorineural hearing loss, therapy is aimed at combating edema, inflammation, circulatory disorders, and tissue metabolism.

INTRODUCTION

Sensorineural hearing loss is a hearing loss, caused by damage to the structures of the inner ear, the vestibulocochlear nerve, or the central parts of the auditory analyzer (in the brainstem and auditory cortex) [1]. Over the past decades, there has been a steady increase in the number of patients with hearing impairment due to the development of sensorineural hearing loss, which, in turn, leads to social and labor maladaptation, deterioration in the quality of life of patients, and in children to a violation of the psycho-emotional , speech and intellectual development [2, 3]. Regardless of the etiology of the development of sensorineural hearing loss, the only cause of its formation is circulatory failure in the inner ear, impaired microcirculation, which leads to insufficient blood supply to the receptor zone of

the organ of Corti, impaired delivery and utilization of oxygen, enzymes, and others. substances for a complete metabolism and function of the neuroepithelium of the inner ear [4].

After the diagnosis is made, the doctor faces the difficult task of choosing the tactics of managing and treating the patient. Currently, there is no unequivocal answer regarding drug regimens used in a given situation. The treatment of acute sensorineural hearing loss (ASNHL) remains an important and problematic task of modern otolaryngology. Thus, in acute sensorineural hearing loss, therapy is aimed at combating edema, inflammation, circulatory disorders, and tissue metabolism. The scheme of complex treatment, in addition to eliminating the impact of the etiological factor, as a rule, primarily includes the use of corticosteroids, then antihypoxants, antioxidants, and correctors of mitochondrial metabolism [5, 6]. It is known that therapy should be carried out taking into account the cause, the form of the disease, the permeability of the hematolabyrinth barrier, the blood-brain barrier and is aimed at improving the functional state of receptor structures, tissue and cellular metabolism of the central nervous system and neuro-synaptic transmission. In the early stages of the lesion, the neuroepithelium can be in a state of inhibition, in the reverse parabiosis mode, and the changes are functional. It is at this stage, which is manifested by vascular spasm, capillary stasis and swelling of the nuclei of hair cells, that therapy is especially effective [7].

Currently, the use of corticosteroids is considered the most effective and common treatment for this pathology. However, a significant number of side effects associated with the systemic administration of corticosteroids limits the possibility of their use and is contraindicated in some concomitant diseases [8].

Some conditions should be considered in the treatment of ASNHL:

- the period of treatment after the onset of the disease is very important, because the earlier the treatment is started, the more effective it is
- age of the patient
- degree of hearing impairment
- according to the characteristics of hearing threshold audiometry
- pathogenetic basis of treatment
- presence of vestibular changes

Patients with the diagnosis of ASNHL should receive urgent inpatient treatment [10]. At the early stage of treatment, procedures should be carried out taking into account all pathogenetic relationships:

- anti-inflammatory steroid drugs;
- drugs that improve nerve-synaptic transmission;
- detoxification and dehydration therapy that improves blood rheology;
- drugs that improve metabolic processes in the shell;
- drugs that reduce the amount of endolymph;
- antioxidant therapy;
- drugs that reduce the aggregation of platelets;
- other medicinal and non-medicinal treatment methods;
- antiviral drugs

However, treatments and interventions for this disease remain a subject of ongoing debate. For acute losses, acute initiation of therapy seems logical, and many authors have found that early treatment is beneficial[11]. Salihoglu et al. compared two groups: one group was treated for 10 days and the other after 10 days. The early treatment group was significantly better at 6, 8, 12.5, 14 and 16 kHz compared to the late treatment group[11].

Medical methods of treatment of acute sensorineural hearing loss. Steroid hormones are the drugs of first choice for acute sensorineural hearing loss. The blockade of the inflammatory process (anti-inflammatory effect) by steroids occurs regardless of the application to a bacterial, viral, immunopathological factor. Therefore, there is a basis for the universal use of steroids in the treatment of various cochleovestibular diseases, such as acute neurosensory hearing loss, autoimmune neurosensory hearing loss, Meniere's disease, tinnitus and acoustic trauma, regardless of the specific pathological mechanism that caused this disease [12].

Since the 1980s, two double-blind studies have shown the effectiveness of corticosteroids, including the Wilson study. Corticosteroids have become one of the most commonly used and effective clinical treatments for ASNHL, probably due to their anti-inflammatory effects and effects on blood rheology. Steroids have strong anti-inflammatory, antitoxic and immunoregulatory effects. Some studies report that glucocorticoids may protect hair cells from various adverse factors such as noise and inflammation. However, due to various side effects, especially in patients with diabetes, hypertension, severe gastric ulcers and severe bone porosity, a systemic steroid should be administered with caution[13]. Thus, there is currently an increase in the use of intratympanic steroids (ITS) as an alternative or adjunct to systemic steroids, and as a salvage treatment starting 2 weeks after symptom onset. Intratympanic (IT) steroid treatment was first used on the basis of streptomycin injection in 1956 to relieve the symptoms of Ménière's disease (Schuknecht 1956). Bird et al. (2007) concluded that intratympanic administration

of dexamethasone (DEX) resulted in a 1.270-fold increase in its perilymphatic concentration along with a decrease in plasma concentration. Corticosteroids increase oxygen uptake by mobilizing amino acids for gluconeogenesis and altering glucose utilization by oxygen uptake mechanisms[14].

The duration of topical application of steroid drugs is selected individually in each case, but it should be carried out as long as there is a positive dynamic of the clinical course of ASNHL. In order to improve the rheological properties of blood, which are affected not only by the vascular factor, but also by inflammation, low-molecular dextrans are prescribed: reomodens, reopoliglyukin. Along with detoxification and dehydration action, they improve capillary blood circulation[15]. Widely used in the treatment of ASNHL means that affect the microcirculation system in the nervous tissue (pentoxifylline, cavinton, etc.). The positive effect is associated with the influence on the integrating departments of the auditory analyzer. These drugs reduce blood viscosity, lead to an increase in erythrocyte fluidity, disaggregation of erythrocyte aggregates, an inhibitory effect on platelet aggregation. This type of treatment helps prevent the progression of hearing loss and reduces tinnitus in 27% of patients suffering from tinnitus. In the ischemic genesis of acute SNT, parenteral administration of antihypoxic and antioxidant drugs, such as ethyl methylhydroxypyridine succinate 5%, is indicated[16].

In the presence of hypercoagulation syndrome, anticoagulants of direct and indirect action, heparin, neodicoumarin, sincumar, finilin, are used under the control of a coagulogram. However, after 6 hours, the anticoagulant effect disappears and the rheological properties of the blood return to their original level, and their long-term administration is dangerous for the development of hypocoagulation syndrome. As part of the complex therapy of any form of NST, vitamins of group B, milgamma (a combination of vitamins B1 and B6 in the form of a dragee or vitamins B1, B6 and B12 in the form of a solution), nicotinic acid that can improve metabolic and regenerative processes are prescribed [17].

To improve synaptic transmission, prozerin and galantamine are used in various forms of drug administration Viral infections associated with hearing loss include measles, mumps, varicella zoster (chicken pox), herpes simplex, Epstein-Barr virus, cytomegalovirus, adenovirus, influenza and parainfluenza virus, coxsackie, etc. Congenital and acquired hearing impairments of viral etiology differ [16]. Given the many ways of exposure to B vitamins in cases of development of degenerative-dystrophic changes in the nervous system, their use in the complex therapy of both acute and chronic sensorineural hearing loss is indisputable. It should be noted that the most significant therapeutic effect is achieved when using a combination of vitamins B1, B6, B12.

Non-medical methods of treatment of acute sensorineural hearing loss. The complex treatment of patients with ASNHL includes non-drug methods of influence, such as electrophoresis and ultraphonophoresis with various drugs, acupuncture, acupressure, magnetotherapy, laser therapy and ozone therapy, hyperbaric oxygenation. [17]. It is also advisable to conduct reflexology (classical acupuncture) in a course of 10 sessions with a possible repetition of the course after 1, 2 and 3 months [8]. In addition, for the treatment of SNHL, including those accompanied by tinnitus, it is possible to use barotherapy - a low pressure of a mixture of oxygen and air in a pressure chamber, which has a positive effect in angiogenic hearing loss [16].

With hyperbaric oxygenation (HBO), 100% oxygen is inhaled at a pressure of about 200-300 kPa, in sessions of 2-3 hours a day for about 10-25 days. HBO can increase perilymph oxygenation when given once daily. Each HBO session consists of two 40-minute periods in 100% oxygen with an intermediate 5-minute break in air to prevent oxygen poisoning[]. According to the 2019 American Academy of Otolaryngology-Head and Neck Surgery (Updated) guidelines for the treatment of ASNHL, HBO therapy remains an option, but only in combination with steroid therapy for initial or salvage therapy [8]. It has been suggested that initial therapy should be started within 2 weeks of onset of ASNHL and salvage therapy should be started within 1 month of onset of SSHL[18].

Kahraman et al. exposed 16 rats to 110 dB noise for 1 hour. All rats, except for the control group, underwent immediate HBO within 1 h after noise exposure. They received lower hearing gains in the HBO groups compared to the control group. However, a significant improvement was found in the group in which HBO was combined with corticosteroids. This study highlights the negative consequences of extremely early onset of HBO and the importance of combining HBO and corticosteroids in terms of better recovery[19].

CONCLUSIONS

The treatment of acute sensorineural hearing loss (ASNHL) remains an important and problematic task of modern otolaryngology. Thus, in acute sensorineural hearing loss, therapy is aimed at combating edema, inflammation, circulatory disorders, and tissue metabolism. The scheme of complex treatment, in addition to eliminating the impact of the etiological factor, as a rule, primarily includes the use of corticosteroids, then antihypoxants, antioxidants, and correctors of mitochondrial metabolism. Currently, there is no unequivocal answer regarding drug regimens used in a given situation. It is undeniable that the treatment must be carried out as soon as possible from the onset of the disease. Thus, in acute sensorineural hearing loss, therapy is aimed at combating edema, inflammation,

circulatory disorders, and tissue metabolism. The existing basic scheme is adjusted in each specific case, taking into account the etiology, clinical course and the presence of underlying diseases.

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