

## Complex therapy of resistant forms of cochleovestibular disorders in vertebrobasilar insufficiency on the background of cervical dorsopathy

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As part of the continuation of the theme of the complex application of pharmacopuncture and adaptive bioresonance therapy, in essence a new corrective technology, this work is presented. The results of a study of the combined use of bioresonance therapy and the antioxidant Mexidol by the pharmacopuncture method in 60 patients with vertebrobasilar insufficiency (VBI) caused by cervical dorsopathy (CD), mainly with cochleovestibular disorders, resistant to standard therapy, are shown. Analysis of the clinical and neurological characteristics of the patients' condition showed that the use of Mexidol by the pharmacopuncture method in combination with bioresonance therapy in patients with VBI with CD significantly and consistently reliably reduces the severity of cochleovestibular disorders (CI) and asthenic syndrome.

**Keywords:** cochleovestibular disorders, vertebrobasilar failure, cervical dorsopathy, adaptive bioresonance therapy, pharmacopuncture, mexidol.

VBI syndrome - circulatory failure in the system of vertebral and basilar arteries, leading to progressive hypoxia and cerebral ischemia, arising from arterial anomalies and degenerative processes in the cervical spine. The leading cause of the development of VBI is a violation of the patency of the vertebral arteries, while the extracranial section is more often affected. In most cases, stenosing lesions of large arteries of the vertebrobasilar system are caused by an atherosclerotic process and are located in the orifice of the vertebral artery, as well as in the region from the orifice of the artery to its entry into the bony canal of the transverse processes of the 5th and 6th cervical vertebrae [1]. All this contributes to a decrease in blood flow to the posterior parts of the brain with the subsequent failure of cerebral circulation, which leads to cochleovestibular, angiodystonic and psychopathological disorders [2]. More significant and emotionally experienced, in clinical terms, are cochleovestibular disorders (CI), observed with irritation of the sympathetic plexus of the vertebral artery. CIs are characterized by paracusia, otalgia, proprio- and exteroceptive dizziness. The leading mechanism of CI is dystonia in the area of blood supply to the internal auditory (labyrinth) artery - the first branch of the main artery formed from the fusion of both vertebral arteries [3]. In the structure of VBI, cochlear disorders are found in 14%, and vestibular - in 18%. Subjective vestibular impairments, on average, are combined with auditory impairments in 50%, and with visual impairments in 10%. Mental disorders in connection with VBI are mainly manifested by asthenic syndrome.

The main direction in the correction of neurological manifestations of degenerative lesions of the spine is currently conservative therapy [5]. Modern therapy of VBI in CD should be differentiated and complex, take into account the pathogenetic mechanisms of its development (nociceptive, neuropathic, psychogenic) both at the level of the central and peripheral nervous systems, the stage of the course of the disease, and include both drug and non-drug methods of correction. Rehabilitation of patients includes measures aimed at stopping directly both the vertebrogenic component of the process and progressive hypoxia and ischemia of the brain tissues. Despite the proven high efficiency of pharmaceuticals for the correction of cerebral circulation, in practice there are patients with VBI, especially with cochleovestibular disorders with CD, resistant to standard therapy. In the materials of previous conferences, we pointed out that currently the most effective method of treating patients with vertebrogenic syndromes is pharmacopuncture in combination with adaptive bioresonance therapy (BRT) [6]. In addition, studies on the proven effectiveness of the use of BRT in the rehabilitation treatment of cervical dorsopathies were taken into account [7]. Currently, for the prevention of progressive hypoxia and ischemia of brain tissues, antihypoxant preparations are used, under the influence of which post-hypoxic metabolic acidosis of various origins is significantly reduced or completely compensated. One of these drugs, the biochemical mechanism of which is aimed at shifting the pair "lactate-pyruvate" towards a greater accumulation of pyruvate used in the Krebs cycle, are the salts of succinic acid [8]. The main effect of drugs from the group of antihypoxants is the activation of anaerobic production of macroergs against the background of oxygen deficiency [10]. In this regard, it attracts attention

a combined action drug with antioxidant neuroprotection - Mexidol (2-ethyl-6-methyl-3-hydroxypyridine succinate), which has a multicomponent spectrum of pharmacological effects and a multifactorial mechanism of action. The mechanism of action of Mexidol is due to its antihypoxic, antioxidant and membrane-protective action, the energy-positive effect of succinate. Producer of Mexidol - "Farnasoft" (Russia), Release form 5% 5.0 ml for intravenous, 5% 2.0 ml for intramuscular injections. Mexidol is contraindicated during pregnancy and lactation (breastfeeding) due to insufficient knowledge of the drug's action. Side effects from the digestive system: nausea, dry mouth, allergic reactions, drowsiness.

The aim of the work was to study the dynamics of the state of patients with vertebrobasilar syndrome. Insufficiency, mainly by cochleovestibular disorders caused by cervical dorsopathy, against the background of the complex effects of adaptive bioresonance therapy and Mexidol by the method of pharmacopuncture.

#### Research methodology

We examined 60 patients (36–60.0% of women and 24–40.0% of men), aged 49 to 75 years (mean age  $66.35 \pm 8.11$  years). The study included patients with VBI on the background of CD in the stage of relative remission, and with a tendency to various kinds of crisis situations. In 92% of cases, a slow-progressive course of the process was noted. The main manifestations of the disease in patients were clinically cochleovestibular disorders that were difficult to respond to standard therapy. Patients with severe cognitive impairments and severe comorbidities in the stage of decompensation were excluded from the study.

The patients were divided into 3 randomized groups, each of 20 people. In addition to basic therapy, patients received: in the 1st group Mexidol by the method of pharmacopuncture (MF) No. 10, then 500 mg / day. inside for two months, in the 2nd group - Mexidol-pharmacopuncture No. 10 and BRT daily No. 10 (MF + BRT), then Mexidol 500 mg / day. inside for two months and BRT once a week, in the 3rd control group, a placebo effect was used, simulating the pharmacopuncture of Mexidol and BRT in the regimen of the 2nd group. Pharmacopuncture with Mexidol was carried out at trigger points. BRT - according to the modified method on the device "IMEDIS-BRT-A" (Russia), (Innovative patent No. 2010/1784, 2011, Astana, Eurasian application, No. 201101057/26, 2011, Moscow).

All patients underwent X-ray spondylography, ultrasound examination (ultrasound), and, if indicated, neuroimaging methods: CT or MRI of the spine. Comparative control of the effectiveness of the treatment was assessed on the basis of the dynamics of clinical and instrumental parameters. To objectify the level of pain, the VAS scale was used (R. Melzak, 1981, for the quantitative self-assessment of the state of pain intensity and painful paroxysms, as well as evoked sensory symptoms that limit daily activity) and for assessing the level of anxiety and possible depression, the Hamilton scale [11].

CT was performed on a CT Max 640 computed tomograph, manufactured by General Electric (USA), MRI - on a Magnetom Avanto machine, manufactured by Siemens, Germany. Spine ultrasound - using an expert class device Samsung Medison Accuvix XG (Medison, South Korea). Evaluation of changes in cerebral blood flow parameters was carried out using ultrasound Doppler (Doppler) of the vessels of the neck and brain. Ultrasound scanner VIVID 7 Dimension PRO UltraSound System (General Electric, USA). An integral assessment of the patient's condition was assessed at the beginning of therapy, 1 and 2 months after the initiation of therapy.

#### Research results

The patients complained mainly of noise, ringing, whistling in the head, hearing loss, as well as dizziness, headaches, unsteadiness when walking, fatigue, bad mood, sleep disturbances. Doppler ultrasonography of the main arteries of the head and neck diagnosed stenosis in the basin of the vertebrobasilar artery in 14% of cases. The data of X-ray spondylography and ultrasound of the cervical spine in all cases corresponded to the signs of osteochondrosis RII-III grade. In 14.4% of cases, MRI revealed signs of leukoaraiosis according to the periventricular, dotted subcortical, lacunar type. The level of constitutional anxiety and situational anxiety according to the Hamilton scale was initially at the level of moderate severity (18-24 points) in 29% of cases, and pronounced (25-31) in 9%.

During the treatment process, first of all, the dynamics of complaints that were difficult to treat were taken into account: noise, ringing, whistling in the head, hearing loss, dizziness. The dynamics of the main clinical manifestations is shown in table. 1.

Table 1

**Dynamics of the main clinical manifestations of VBI  
with cervical dorsopathy (in%)**

Patient groups	Before treatment			H-z 1 month			H 2 months		
	1st MF	2nd MF + BRT	3rd control	1st MF	2nd MF + BRT	3rd control	1st MF	2nd MF + BRT	3rd control
Loss of hearing	43.2	43,7	43.0	39.2	33.6	42.0	33.2	25.7 *	43.0
Noise in my head	79.9	79.4	78.1	72.6	52.9	78.1	66.5	46.7 *	78.1
Ringin, whistling	46.5	47.1	46.9	42.2	36.2	42.6	38.8	31.0 *	46.9
Dizziness	77.1	78.0	76.2	70.0	55,7	69.2	59.3	30.0 *	76.1
<u>Anxiety / depression</u>	98.9	99.2	99.0	83.1	76.3	90.0	90.2	62.0 *	90.1

Analysis of the dynamics of the main clinical manifestations of VBI in CD showed that the pharmacopuncture of Mexidol in combination with BRT significantly reduces the severity of complaints in patients resistant to standard therapy ( $p < 0.05$ ). It should be noted that regression of the degree of complaints, especially headache, dizziness, asthenic state, is noted already from the 2nd or 3rd session. Significant and persistent changes in indicators were observed two months after the start of therapy. So, the indicator "dizziness" in the 2nd group decreased from 78.0 to 30.0 by 2.6 times, when in the control there were no changes; "Noise in the head" from 79.4 to 46.7 by 1.7 times and no changes in control, respectively. Some positive changes in the control group after 1 month from the start of treatment are explained by the reflex effect through the trigger points on the pathologically altered tissues. From the scientific literature, regression of indicators of dizziness and noise in the head with intravenous drip administration of Mexidol is noted 3.2 and 1.7 times, respectively [9]. The dynamics of regression of the impaired function of the vestibular analyzer with the help of the usual and sensitized Romberg posture was clearly observed in the 2nd group, where complex therapy was applied after 2-3 weeks. High efficiency of analgesic stimulation on the VAS scale two months after the start of therapy was reliably ( $p < 0.05$ ) observed in group 2, decreasing from 6.5 to 1.5 units, versus the control group, where the indicators remained the same. Similar tendencies were noted in the decrease in the level of anxiety according to the Hamilton scale. So, in patients of the 2nd group, the indicator of the average severity of anxiety significantly decreased after one month of treatment by 1.3 times, and after two months - by 2 times, 5 ( $p < 0.05$ ) versus the control group, where there was practically no dynamics. Doppler ultrasonography of the vessels of the neck and brain after 2 months of treatment in patients of the 2nd group revealed a significant increase in the linear velocity of blood circulation in the basin of the vertebrobasilar artery from 59.3% upon admission to 71, 2% by 1.2 times ( $p < 0, 05$ ). And the indicators of the linear velocity of blood flow in the veins of the brain confirmed the presence of venous discirculation, which significantly decreased 1.9 times in the group with complex therapy from 39 cm / s (average -  $25.78 \pm 4.89$  cm / s) to 20.9 cm / s versus no change in the control group ( $p < 0.05$ ). Doppler ultrasonography of the vessels of the neck and brain after 2 months of treatment in patients of the 2nd group revealed a significant increase in the linear velocity of blood circulation in the basin of the vertebrobasilar artery from 59.3% upon admission to 71, 2% by 1.2 times ( $p < 0, 05$ ). And the indicators of the linear velocity of blood flow in the veins of the brain confirmed the presence of venous discirculation, which significantly decreased 1.9 times in the group with complex therapy from 39 cm / s (average -  $25.78 \pm 4.89$  cm / s) to 20.9 cm / s versus no change in the control group ( $p < 0.05$ ). Doppler ultrasonography of the vessels of the neck and brain after 2 months of treatment in patients of the 2nd group revealed a significant increase in the linear velocity of blood circulation in the basin of the vertebrobasilar artery from 59.3% upon admission to 71, 2% by 1.2 times ( $p < 0, 05$ ). And the indicators of the linear velocity of blood flow in the veins of the brain confirmed the presence of venous discirculation, which significantly decreased 1.9 times in the group with complex therapy from 39 cm / s (average -  $25.78 \pm 4.89$  cm / s) to 20.9 cm / s versus no change in the control group ( $p < 0.05$ ).

#### Discussion and conclusions

Thus, the method of correcting the condition of patients with VBI with CD mainly with cochleovestibular disorders, resistant to standard therapy, including the combined use of adaptive BRT and pharmacopuncture Mexidol (ethylmethylhydroxypyridine succinate), leads to an early and sustained regression of neurological and neuropsychological signs of venous blood flow, restoration of the functional activity of patients. This phenomenon can be explained by the positive summation of the effects of medication and reflex methods of exposure (O.P. Kuzovlev, 2005; M.Yu. Gotovsky, 2012) and specific stimulation of trigger zones (L.G. Agasarov, 2012). The mechanism of action of bioresonance therapy, according to a number of authors (I.L. Blinkov, V.G. Zilov, K.V. Sudakov, OI Epshtein, Yu.V. Gotovsky, M.Yu. Gotovsky), is explained by the development of the biological resonance effect, leading to the synchronization of wave processes. In addition, the effect of imposing the structural and functional organization of the organism on the frequency of external influences, in particular the antioxidant Mexidol, develops here. And the mechanism of the pharmacopuncture of Mexidol is explained by the nonspecific irritation of the trigger point itself and its specific targeted stimulation, which leads to new therapeutic effects.

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