



Neurac (Neuromuscular Activation) in cardio-vascular rehabilitation for patients with arterial hypertension

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Abstract: *The aim of the study:* Studying influence of Neurac method on control of blood pressure in patients with arterial hypertension. **Materials and methods:** For the group amount of 15 patients with arterial hypertension stage 1-2 the Neurac method was used like rehabilitation tool for treatment. **Results:** 65% of patients had positive response for provided treatment. For 30% of patients it was possible to reduce the dose of the medications. **Conclusions:** Providing of Neurac method as a non-drug treatment tool for patients with arterial hypertension helps to improve life quality of the patients, reduce the dose of antihypertensive drugs in non-invasive way. **Key words:** arterial hypertension, cardio-vascular rehabilitation, Neurac, Redcord, static-dynamic work, isometric load.

Introduction.

One of the most important reasons for the development of cardiovascular diseases is arterial hypertension (AH). It is the leading risk factor for coronary heart disease and cerebrovascular diseases, where the rate of adult cardiovascular mortality is 89% and that of the working-age population of Ukraine is 74%. [1]

Cardiac rehabilitation as a clinical specialty has gone a long way: not only the medical approach changed, the possibility of surgical intervention appeared, the aspect of physical recovery was radically revised. This approach has led to a decrease in the frequency of many complications. In addition to a more favourable prognosis, these patients noted an improvement in the psychological state [2].

Cardiac rehabilitation gets bigger recognition as an integral component of care for patients with cardiovascular diseases. Its use is a Class I recommendation in cardiology practice. Despite a sufficient evidence base of effectiveness, methods of physical rehabilitation in complex treatment of patients with cardiovascular diseases are not in use enough [2;3].

In recent years, the so-called Redcord slim method, which, in comparison with the usual one, is a more complex coordination type of motor activity, has become increasingly widespread in Ukraine and abroad. Thanks to the use of special tapes, Redcord is a suspension device with two ropes, to which a variety of tapes and equipment can be attached, the person is in zero gravity, and keeps the balance of the body himself, ensuring the involvement of more muscles in the movement, increasing the efficiency and safety of training for many categories involved. [4]

Neurac (Neuromuscular Activation) is a young rejuvenating concept in the field of medicine that is rising into fame due to its increasing benefits in treating diseases and injuries related to skeletal system and disorders associated with the nervous system (the vegetative or autonomic nervous system in specific). It is not yet a mobilized tool in cardiology for treating diseases like hypertension, however, it is reaching into attention after all of the noticed benefits if this new physical rehabilitation approach. [5]

The aim of the study.

Studying physiological and medical-biological effect of the Neurac method on patients with arterial hypertension stage 1-2.

To study the influence of dynamic and static modes of muscle work during using the Redcord simulator on pressure indicators in patients with hypertension.

The effect of using different modes of physical activity for the treatment of arterial hypertension.

Introduce the Neurac method and the Redcord simulator into the practical activities of the rehabilitation of patients with hypertension as an innovative method that has not been previously used in physical cardiovascular rehabilitation



Materials and methods.

On the basis of Alef-clinics (Kharkov), 15 patients aged 30 to 60 years old with grade 1-2 of hypertension were under observation.

Before undertaking Redcord, the patient was additionally examined: complete blood count (CBC), electrocardiogram (ECG), heart rate variability (HRV), Martine-Kushelevsky's test, ultrasound of major arteries of the neck.

The patients were divided into groups according to age and degree of hypertension.

The first stage of the study was carried out, which lasted 1 month and included aerobic load in the form of dynamic exercises and isometric load with breathing exercises on the Redcord simulator [6;7;8]. The patients visited the physical rehabilitation room 2 times a week. 1 session on the Redcord simulator lasted 60 minutes

The technique of the Redcord simulator is based on two separate modes of action: long-term maintenance of tension and power load (especially of the nervous system). [4;5] The muscles that lend themselves to the first method of action are the local muscles of the lumbar and cervical spine. If a sufficiently long time of maintaining tension (over 1 minute) does not cause pain, fatigue or discomfort, you can switch to another method of action, in which the activation of local stabilizing muscles is combined with the activation of superficial muscles, and cardiological training also occurs along the way[9]. Thanks to this, the state of various organs and systems is significantly improved: cardiovascular, respiratory, nervous.

Strength work included 3 exercises. The exercises were performed on the Redcord simulator. The technique required the following recommendations: 1) Absence of muscle relaxation is the main methodological requirement. This is achieved by a slow pace of movement, smoothness, with constant conscious maintenance of muscle tension. 2) Breathing during the entire complex is carried out strictly through the nose, deep with the maximum use of the muscles of the diaphragm (breathing with the abdomen). Whenever possible, when the muscles contract, exhale, when they relax, inhale. Rest between sets - 60 seconds. Between exercises - 180 seconds. Rest after exercise until heart rate is restored

Before and after each session, the patients were measured their blood pressure. It was noted that after the state of muscle relaxation, the blood pressure readings decreased in relation to the measurement of blood pressure before the procedure.

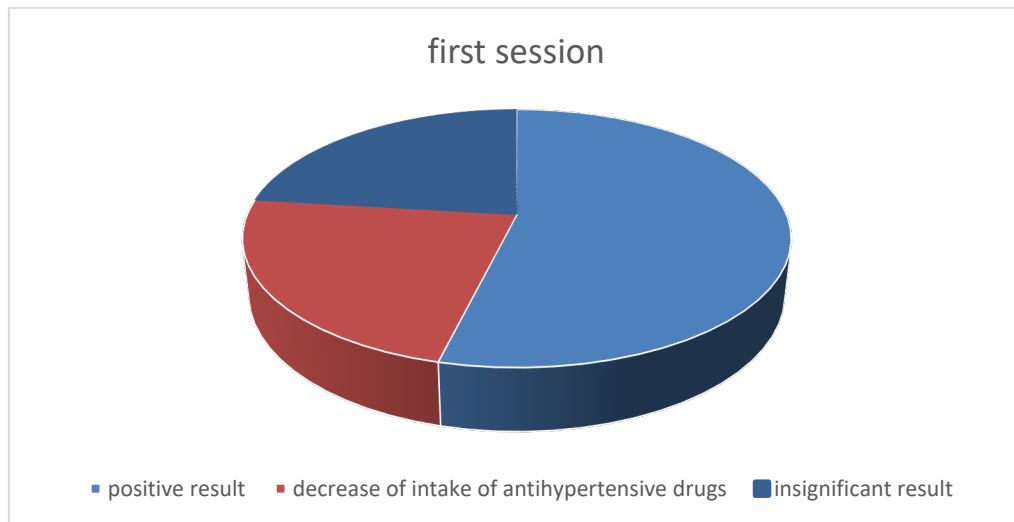
With this method, the exercise time will be less important, and more important - the number of repetitions (4-5) with a significant load of the nervous system, which occurs due to the work of many muscle groups, vibration, and an unstable base. During one therapeutic session, it is necessary to achieve the maximum time for performing the exercises (over 1 min), which the patient can overcome, (performing the exercises correctly, without pain or discomfort.

Results.

Before treatment: Complaints of headaches, apathy, recurrent pain in the neck (especially in patients with sedentary work) with increased blood pressure (BP), average BP is 150-160 / 100mm Hg., CBC - no changes, ECG sinus rhythm, regular, left axis deviation, HRV prevalence of sympathetic nervous system. Martin-Kushelevsky's test – hypertonic reaction. Ultrasound of the main arteries of the neck - decrease of blood supplement in vertebral artery

After treatment: BP-140-130 / 90-80 mm Hg. Art., Complete blood count - no changes, ECG - sinus rhythm, correct, deviation of the axis to the left. HRV - increased influence of the parasympathetic nervous system. Martinet-Kushelevsky's test - hypertonics reaction. Ultrasound of the main arteries of the neck - increasing the blood supply to the vertebral artery.

Patients also state that muscle tone has apparently changed and that the neck pain has completely stopped without any flare-ups. In addition, the patients' blood pressure returned to normal and neurological symptoms (especially headaches and apathy) decreased, which made it possible to reduce the dosage of antihypertensive drugs (tablets) used in the treatment of hypertension.(pic.1)



Pic.1 Results of the first session

A comparative analysis of the methods of physical rehabilitation of patients with arterial hypertension showed that the technique with the use of cyclic loads and the static-dynamic mode of muscle work in strength work more effectively affects the increase in the aerobic potential of patients with arterial hypertension, the psychological profile, improve their functional capabilities and also significantly improved the quality of life of patients with arterial hypertension.

We did not receive a complete result on the application of the method of physical rehabilitation, combining aerobic and static-dynamic loads in strength work for patients with arterial hypertension, since the study is not completed, but only the first session has passed. This method will possibly allow to obtain a more pronounced effect of recovery and rehabilitation measures, since even after the first session we see positive dynamics.

Discussion.

With the variety of factors leading to the increase in BP, we can talk about a single mechanism of its regulation with violations at different levels. BP is determined mainly by two parameters: cardiac output (CO) and total peripheral vascular resistance (TPR).

The autonomic nervous system is decisive for changes in the heart's pumping function. The main trigger at early stages of arterial hypertension is the sympathetic nervous system. Hypersympathicotonia reflects the inability of the circulatory system to adapt to increased loads. It initiates a whole cascade of regulatory disorders affecting the blood pressure.

The muscular system has a huge impact on the whole organism, being the most reactive and responsive structure connected to all systems of the body through viscera-motor and motor-visceral connections described in the works of M. R. Mogendovich [10;11;12;13]

When the proprioceptors of several functionally related muscle groups are excited, their influence mutually facilitates each other. Therefore, in the gravitational technique for dorsopathies, normalization of the tone and training of not only the muscles directly involved in the movements of the spinal column, but also the muscle chains, ensuring a horizontal position and body movement in space, are widely used. The inclusion of associative muscles of the cervicothoracic spine as a result of the integrated use of special training techniques, body position and equipment has a reflex effect on the body in full, as well as on neurotrophic processes in the myocardium. Extracardial mechanisms of the influence of physical exercises provide high efficiency in the rehabilitation of the heart, since during the training process the reserves of the cardiovascular system increase: shock and minute volumes of the heart, physical performance, exercise tolerance, maximum increase in oxygen consumption, heart rate and decrease in blood pressure.

Thus change of muscle tone and the overall induction of muscle relaxation helps bring down any associated irregularity of the vegetative nervous system.

The patient, who had been admitted with hypertension and who had complained about pain in her neck and some other associated psychological disorders alongside that, demonstrated a great relief after successive sessions of muscle relaxation by Redcord slim



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