ELECTROTHERAPY AND VACUUM EXPOSURE IN COMPLEX REHABILITATION OF PATIENTS WITH DIABETIC POLYNEURATHY

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The number of patients with diabetes mellitus is progressively growing and in the Russian Federation is about 3 million. One of the most common complications of diabetes is neuropathy and it is detected in 50% of patients. Almost all patients develop DPN at various times. The most common chronic sensorimotor polyneuropathy occurs, including in 7-10% of patients with newly diagnosed type 2 diabetes [1]. The pathogenesis of DPN is multifactorial, one of the established factors is hyperglycemia, which has a damaging effect on the nervous tissue. Along with the metabolic theory, the vascular theory is also considered. The defeat of Vasa nervorum as a result of glycation of endothelial cells and impaired endoneurial circulation leads to a decrease in blood flow in the nerve, axonal atrophy and degeneration of nerve fibers. Changes in the peripheral nerve are formed as a result of nerve ischemia, which develops in violation of the production of vasoactive relaxing agents (NO), endoneural hypoxia. [5]

According to the WHO definition, DPN is a disease characterized by progressive death of nerve fibers, leading to loss of sensation and development of a foot ulcer [4]. The main direction in the prevention and treatment of DPN is to achieve normoglycemia and maintain it for a long time. But this does not contribute to the rapid elimination of the manifestations of DPN, and to improve the quality of life of patients, it is necessary to use complex rehabilitation, with the inclusion of non-drug methods of treatment. Physiotherapeutic factors are widely used, including electrotherapy. [3] Stimulation with low-frequency currents accelerates the regeneration of peripheral nerves and improves the functional properties of the neuromuscular apparatus. A peculiar massaging effect of vacuum exposure promotes the release of toxic products from the intercellular space and reduces cellular hypoxia. [6]

Evaluation of the clinical effectiveness of including the technique of combined use of vacuum exposure and electrotherapy in the program of complex rehabilitation of patients with diabetic polyneuropathy was the purpose of this study.

Materials and methods: The patients under observation were divided into 2 groups matched by sex, age (mean age 56.5 ± 0.7 years), disease duration (mean value 9.8 ± 3.5 years). The study included men and women aged 20 to 65 years with an established diagnosis of type 2 diabetes mellitus, distal symmetrical polyneuropathy. Patients with diabetes mellitus in the stage of decompensation, pulmonary heart failure 2-3 stages, rhythm disturbances, and other general contraindications for physiotherapy were not included in the study. Patients of the control group (15 persons) underwent a rehabilitation program, which included a diet with a low content of fats and carbohydrates, pearl-pine baths, therapeutic exercises, drug therapy. In the main group (21 people), the combined use of vacuum exposure and low-frequency pulsed current on the lower limbs was additionally used. The method of applying electrodes is longitudinal, on the inner surface of the thigh and lower leg, the duration of the procedure is 10 minutes, 10 procedures per course. We analyzed the presence and severity of symptoms of neuropathy in accordance with the scale of the Neuropathic Symptomatic Score [2]. The vibration sensitivity threshold was determined using a graduated tuning fork, a 10-gram monofilament was used to assess tactile sensitivity, temperature sensitivity was studied using a Tip-term thermal tip, and a blunt needle was used to assess pain

sensitivity. Doppler ultrasound was used to study hemodynamics in the vessels of the lower extremities.

Statistical processing of the obtained results was carried out using the Statistica 10.0 program, the method was used with the calculation of the Wilcoxon test for small samples; reliability of differences in the results of the study (p).

Results and discussion: After the course of rehabilitation in the main group, there was a more pronounced positive trend in the form of a decrease in the total average score on the NSS scale by 62%, the dynamics of neuropathic symptoms in the control group was less pronounced and amounted to 42%. There was a disappearance of complaints of burning and tingling in the lower extremities, a decrease in the manifestations of pain (by 85%) and seizures (by 84%) in patients of the main group. Patients in the control group after the course of rehabilitation had no complaints of numbness, decreased complaints of convulsions (by 60%) (table 1).

Table 1 Dynamics of indicators of average values of sensitivity parameters in patients with diabetic polyneuropathy before and after rehabilitation (points)

Type ofsensitivity	Maingroupn=21		Control groupn=15	
	before	after	before	after
tactile	0,7± 0,3	0,14 ± 0,1*	0,6 ± 0,2	0,6 ± 0,2
painful	1,6±0,3	0,6 ± 0,2**	1,6 ± 0,4	0,6 ± 0,2*
temperature	2,0±0,3	0,7 ± 0,2*	1,2 ± 0,3	0,4 ± 0,1
HPV on the 1st toe	2,2±0,2	2,6 ± 0,1	2,0 ± 0,2	1,8 ± 0,3
HPV on the inner ankle	2,7±0,1	3,1 ± 0,2	3,0 ± 0,2	2,8 ± 0,2

** - $p < 0.05$; ** -$p<0.01$. PHF - vibration sensitivity threshold.*

Sensitivity indicators improved statistically significantly in the main group, which resulted in a change in temperature (from 2.0 ± 0.3 to 0.7 ± 0.2 points), pain (from 1.6 ± 0.3 to 0.6 ± 0.2 points) and tactile sensitivity (from 0.7 ± 0.3 to 0.14 ± 0.1 points). In patients of the control group, there was a tendency to improve the index of temperature (from 1.2 ± 0.3 to 0.4 ± 0.1 points) and pain sensitivity (from 1.6 ± 0.4 to 0.6 ± 0.2 points)

Conclusion: The inclusion of the combined use of vacuum exposure and electrotherapy in a comprehensive rehabilitation program leads to a statistically significant decrease in the manifestations of diabetic polyneuropathy (pain and numbness in the legs, reduction of cramps in the lower extremities) and an improvement in neurosensory sensitivity (temperature, pain, tactile).

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