Assessment of the effect of bioresonance technologies on tissue microcirculation and endothelial dysfunction using high-frequency ultrasound Doppler ultrasonography in patients with coronary heart diseaseO. L. Bockeria, N.T. Salia, M.A. Sokolskaya, A.Sh. Krymshamkhalova

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Assessment of tissue microcirculation and vasoregulatory function of the endothelium is extremely relevant in modern clinical practice, since these indicators underlie the pathogenesis of cardiovascular diseases. High-frequency Doppler ultrasound allows you to assess tissue microcirculation and determine endothelial dysfunction, which is used for early diagnosis of diseases, monitoring the patient's condition, predicting the outcome of the disease, timely prescribing conservative therapy and monitoring the effectiveness of treatment (including bioresonance therapy). Our previous studies have shown the effectiveness of low-intensity electromagnetic fields of endogenous origin (bioresonance technologies) in the correction of endothelial dysfunction.

Purpose of the study: to assess the effect of bioresonance technologies on tissue microcirculation and endothelial dysfunction in patients with coronary heart disease using high-frequency Doppler ultrasound.

Material and research methods

The study included 20 patients with a diagnosis of ischemic heart disease, angina pectoris 2–3 FC, with preserved LVEF (more than 45%). Of these, 16 were men, 4 were women, whose average age was 64 ± 4 years. All patients were examined before performing surgical correction for cardiovascular pathology, and received drug treatment according to WHO recommendations. At the time of the study, blood pressure in patients was within 110–140 / 70–90 mm Hg. Art. The study excluded patients with a BMI of more than 35, the presence of concomitant pathology (diabetes mellitus, COPD, chronic renal failure), cardiac rhythm and conduction disturbances (VES, VT, AF, SSS), with multifocal lesions of the brachiocephalic arteries, arteries of the upper and lower extremities, as well as implanted pacemaker.

Tissue microcirculation was assessed using high-frequency ultrasound Doppler (Minimax-Doppler-K (Russia)). To assess endothelial dysfunction, an occlusion test (OP) was performed. The parameters were assessed: linear and volumetric blood flow velocities - Vs, Vm, Vd, Vam, Vakd (cm / sec.), Qam (ml / sec.), Peripheral resistance index - RI, pulsation index - PI. The assessment was carried out before and after the OP, 30 seconds, 1, 2, 3 minutes after rapid decompression. After the OP, the percentage of increase in cutaneous blood flow was calculated. Further, bioresonance therapy with captopril was carried out, the duration of the therapeutic effect was 15 minutes, followed by

assessment of microcirculation and conducting OP.

Statistical processing of the obtained results was carried out using the STATISTICA 7.0 program. Statistical significance was assessed using the Wilcoxon nonparametric test ($p < 0.05$).

Research results

As a result of the study, it was revealed that in the group of patients with coronary artery disease, an inadequate reaction from the vessels of the microvasculature was observed, which was manifested by an insufficient increase in the percentage of cutaneous blood flow after the OP, which confirmed the presence of endothelial dysfunction in this group of patients. After bioresonance exposure with captopril, statistically significant changes ($p < 0.05$) were observed in almost all parameters of microcirculation, which indicates a positive effect of BRT.

conclusions

The results obtained indicate a positive effect of low-intensity electromagnetic fields of endogenous origin on endothelial function. It is necessary to continue research in this direction.

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