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VASCULAR REMODELING IN PATIENTS WITH CHRONIC HEART FAILURE

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Annotation: Studies of the parameters of remodeling of the heart and blood vessels in patients with postinfarction cardiosclerosis(PICS) complicated by CHF were carried out. The study involved 100 patients with PICS complicated by CHF: men aged 38-60 years (average age - 51.8±1.03 years). The prescription of what MI suffered was 2 months to 3 years. The patients were randomized according to FC CHF according to the New York Classification of Cardiologists, according to the six-minute walk test (SWT) and according to the clinical condition assessment scale (CCAS) of patients. All patients underwent ECG, the whole complex of clinical and biochemical examinations,EchoCG, assessed the clinical condition of patients (according to CCAS) and quality of life (according to questionnaires), dopplerography of the brachial artery with reactive hyperemia (RH) and nitroglycerin (NTG) test, study of platelet functional activity and the level of Willebrand factor in blood plasma. The level of VWF(Von Willibrand factor) was determined using the quantitative enzyme immunoassay method, using the reagents of the "RENAM" SPO, on the "Vidas" analyzer (France. Analysis of the results of heart remodeling indicators revealed that patients at the initial stages of CHF, as a result of the adaptation process, maintained normal ejection fracture(EF) and Fs indicators with an unreliable increase in ESS(End systolic size of LV), EDS(end diastolic size of LV), ESV(End systolic volume of LV) and EDV(End diastolic volume of LV) compared with normal values. With an increase in the degree of CHF,left ventricular ejection fracture and Fs progressively decreased as the main indicators of systolic function.

Keywords: chronic heart failure, heart remodeling, vascular remodeling, coronary heart disease, endothelial dysfunction factors

Chronic heart failure (CHF) is one of the most common, progressive and prognostically unfavorable diseases of the cardiovascular system, as well as one of the most frequent causes of hospitalizations. It is expected that in the next 20-30 years, the prevalence of CHF will increase by 40-60%.This pathology dramatically worsens the quality of life of patients and increases the risk of death by 4 times: within a year it can range from 15 to 50%. The risk of sudden death in patients with CHF is 5 times higher than in people who do not suffer from heart failure. The most common cause of CHF is coronary heart disease (CHD), which is 54-68.6%. The suffered myocardial infarction, being one of the main causes of the development of CHF, is characterized

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by postinfarction remodeling of the left ventricle (LV): structural and functional restructuring of the LV and violation of its systolic and diastolic functions. Markers of vascular remodeling are a decrease in endothelium-dependent vasodilation of vessels, a change in the content of regulatory peptides in the blood: endothelin-1, Willebrand factor. Most studies in this area are related to the assessment of vascular reactions in the method of endothelium-dependent vasodilation. The widespread use of functional and humoral markers makes it possible to optimize the early diagnosis of endothelial dysfunction in patients who have suffered a myocardial infarction.

In patients with PICS(post infaction cardiosclerosis), CHF, an increase in the level of VWF(Von Willbrand factor) from the norm was found. The results of a study by ESAT and Jansson (1991) showed that an increase in the level of VWF is associated with a high risk of coronary artery occlusion in patients with coronary artery disease, including after a myocardial infarction. All this makes it possible to consider the increased content of VWF as a possible risk factor for the development of atherosclerosis and thrombosis, since such an increase stimulates increased adhesion andplatelet aggregation and, thereby, increases thrombosis.

Also, a marker of developing vascular remodeling can serve as a change in the content of von Willebrand factor in the blood, the main source of which is the endothelium.

The purpose of the study. To study the remodeling of the heart and blood vessels in patients with postinfarction cardiosclerosis complicated by CHF.

The study involved 100 patients with PICS complicated by CHF: men aged 38-60 years (average age - 51.8±1.03 years). The prescription of what MI suffered was 2 months to 3 years. The patients were randomized according to FC(functional class) CHF according to the New York Classification of Cardiologists, according to the six-minute walk test (SWT) and according to the clinical condition assessment scale (CCAS) of patients.

To compare the indicators of dopplerography of the brachial artery with reactive hyperemia, functional activity of platelets and the level of von Willebrand factor in blood plasma, a group of healthy individuals (control group) in the number of 14 people, men aged 52.2 ± 7.2 years without pathology of the cardiovascular system, who were treated in other specialized departments of hospitals, were examined. All patients were hospitalized in the cardiology department of the 1st clinic of the Tashkent Medical Academy and were registered in the consultative polyclinic.

All patients underwent ECG, the whole complex of clinical and biochemical examinations, TSH, EchoCG, assessed the clinical condition of patients (according to CCAS) and quality of life (according to questionnaires), dopplerography of the brachial artery with reactive hyperemia (RH) and nitroglycerin (NTG) test, examination of the functional activity of platelets and the level of Willebrand factor in blood plasma. The

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level of VWF was determined using a quantitative enzyme immunoassay, using the reagents of the "RENAM" SPO, on the analyzer "Vidas" (France). Blood was taken without using a syringe with venopuncture in 0.11 mol/l trisodium citrate in compliance with the ratio of the volumes of the anticoagulant and the blood taken. The blood was centrifuged to produce plasma without platelets, then transferred to a plastic tube. The reagent for the determination of VWF is a solid phase carrier coated with monoclonal immunoglobulins against VWF.

The initial results of the study of exercise tolerance showed that in the examined patients with PICS complicated CHF I FC, the SWT indicators were 478.3 ± 13.87 meters. In patients with CHF II FC, there was a decrease in exercise tolerance by 26.9% compared with the SWT indicators of patients with CHF I FC, and amounted to 347.7 ± 11.10 meters, respectively. In patients with CHF III FC, this indicator was - 240.9 ±27.40 meters, which was 49.6% lower, respectively, compared with the SWT indicators in patients with CHF I FC.

Analysis of the results of heart remodeling indicators revealed that patients at the initial stages of CHF as a result of the adaptation process maintained normal EF and Fs indicators with an unreliable increase in ESS, EDS, ESV and EDV compared to normal values. With an increase in the degree of CHF, left ventricular EF(ejection fracture) and Fs progressively decreased as the main indicators of systolic function. In patients with II FC CHF, there was a decrease in FV by 19.9%, compared with the indicators of FV in patients with I FC CHF, which was also accompanied by a decrease in Fs by 24%, respectively, compared with the indicators of Fs in patients with I FC CHF.

In patients with I FC CHF, the systolic blood flow rate (Vs) in the PA was initially lower by 19.5%, and the diastolic velocity (Vd) by 38.8% compared to the control group. The baseline level of the average blood flow rate was 46.7±1.85cm/s versus 60.8±3.59cm/s, i.e. 23.2% lower than the data of the control group. In patients with I FC CHF at rest, the BA(Brachial artery) diameter is 0.43±0.023 cm versus 0.41±0.02 cm in healthy individuals. In patients with I FC CHF, the diameter of the PA was 4.8% smaller compared to the control group. Changes in the diameter of the PA on the RH(Reactive hypertermia) in the control group occur with an increase in the diameter of the vessel, in contrast to patients with CHF, in whom, after a compression test, the diameter of the vessel decreases. In patients with CHF, in response to an increase in blood flow rate by 123.3±6.0cm/s, the BA diameter increased by 8.5±1.7% versus 11.4±1.76% in healthy individuals. Endothelium-dependent vasodilation(EDV) was 11.4±1.7% in the control group, and in patients with I FC, this indicator decreased by 25.4% compared with the control group.The indicators of EDV(Endothelium dependent vasodilation) were 14.8±2.4% versus 17.8±2.4% in healthy

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individuals.Initially, the pulsative index (Pi) in patients with CHF I FC exceeded the control by 18.3%, and the resistive index (Ri) by 11.7%, respectively.

Assessing the relationship between the severity of CHF and the severity of endothelial dysfunction, we found that all patients with CHF had endothelial dysfunction, and its severity increased with the progression of CHF.

A study of the functional activity of platelets in the first FC of CHF showed that in patients, the platelet aggregation activity index (PAA) was significantly lower by 2.5 times than in healthy individuals, amounting to 1.85±0.94 mmol of ADP versus 4.72±0.22 mmol of ADP. The platelet aggregation rate (Vagr) in was 1.79±0.52cm/min versus 0.34±0.5cm/min in healthy individuals, i.e. there was a significant increase in the aggregation rate by 5.3 times compared to the control. The maximum aggregation amplitude (Amax) was also significantly high, 4.9 times higher than in healthy individuals and amounted to 2.43±0.46 cm versus 0.5±0.21 cm.

In patients with FC II CHF, the decrease in PAA was more pronounced - 2.7 times from conrol. There was an increase in Vagr by 5.8 times ($P<0.01$) than the indicators of the control group, amounting to 1.89±0.13 cm/min versus 0.34±0.5 cm/min. There was also an increase in Amax by 5.6 times ($P<0.01$) and was 2.94±0.55cm, versus 0.5±0.07 cm in healthy individuals.

An integral marker in the formation of vascular remodeling is the activity of von Willebrand factor. Its initial level in patients with CHF I FC was higher than the control by 14.5%, amounting to 128.7±7.32 versus 112±13.9% in healthy individuals. In patients with FC II CHF, there was a significant increase in the level of FFV, compared with the indicators of the control group by 40.5%. The initial level of FFV with II FC CHF was 158 ± 3.46%.

In patients with III FC CHF, this indicator was significantly higher by 51.4% ($P<0.001$) than in the control group, amounting to 170.2±6.37%. Consequently, the level of FFV determined in blood plasma in patients with CHF depends on the degree of functional class, its greatest values are observed in patients with III FC.

Thus, we found that endothelial function is impaired in patients with I-III FC CHF. This is expressed by a decrease in EDV(Endothelium-dependent vasodilation), blood flow velocity indicators, paradoxical vasoconstriction, a decrease in endothelial sensitivity to shear stress, as well as an increase in vascular tone, platelet aggregation ability and the level of VWF in blood plasma. In addition, an increase in vascular tone and vascular resistance, deterioration of vasorelaxing properties of the endothelium and, as a consequence, a decrease in the ability of the artery to vasodilation, is directly related to LV remodeling processes, which are especially pronounced in patients with III FC CHF.

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