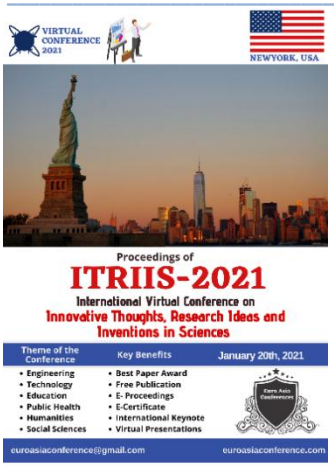

LEFT VENTRICULAR DIASTOLIC DYSFUNCTION IN PATIENTS WITH ACUTE MYOCARDIAL INFARCTION IN COMORBID CONDITION

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Annotation.

Changes in the diastolic function of the left ventricle in patients with myocardial infarction, in conditions of acute coronary syndrome, lead to a decrease in the pumping function of the left ventricle or precedes it. The severity of the clinical course and prognosis of congestive heart failure is associated with the occurrence of left ventricular diastolic dysfunction. The role of diastolic dysfunction in the development of the clinic and prognosis of congestive heart failure in patients with acute myocardial infarction with type 2 diabetes mellitus has been little studied [1, 7]. Our study included 55 patients aged 45 to 60 years (48.2±3.5 y.o.) who were admitted to the cardiac intensive care unit with a diagnosis of ACS with further transformation into acute myocardial infarction concomitant with type 2 diabetes mellitus. The patients were divided into two groups depending on the ejection fraction (1st-with EF 45%, 2nd — with EF<45%). The control group consisted of 30 healthy people aged 40 to 55 years (48.9±3.5 y.o.). In the hospital, patients received standard therapy-anticoagulants (heparin), beta-blockers. antiplatelet agents (aspirin), ACE inhibitors, nitrates, insulin therapy, potassium preparations.

Keywords:

Myocardial infarction, chronic heart failure, ischemic heart

disease, ejection fraction, diastolic dysfunction, echocardiography, diabetes mellitus, cardiovascular disorders, ejection fraction, risk factors.

Introduction.

The importance of diabetes mellitus type 2 in medicine is determined by the high disability and mortality of patients from cardiovascular disorders. The development of cardiovascular heart diseases in type 2 diabetes mellitus increases by 2-4 times, and acute myocardial infarction-by 6-10 times [9], while heart failure is established at the stage of severe complications such as sudden death or circulatory failure due to an atypical course. Myocardial infarction and diabetes mellitus are the main causes of disability and increase the risk of chronic heart failure. Diastolic heart failure is a form of heart failure with a normal ejection fraction, but with impaired relaxation and filling of the left ventricle [10]. The functional reserve of the heart and tolerance to loads is determined by the diastolic property of the myocardium; the absence of left ventricular dilatation and normal ejection fraction can develop with the progression of heart failure and type 2 diabetes mellitus [5]. A new method of treatment of acute myocardial infarction reduces early post-infarction remodeling, but the number of patients with chronic heart failure and preserved heart function increases. Although mortality from acute myocardial infarction and diabetes mellitus or without it has decreased, hospitalization due to chronic heart failure as a cause and mortality of patients who have suffered an acute myocardial infarction remains [2, 8]. There are three types of LV diastolic dysfunction – hypertrophic (delayed relaxation or abnormal relaxation), pseudonormal, and restrictive [3]. Restrictively type has the worst prognosis for the patients. The restrictive type is characterized by the fact that left ventricular remodeling in diastolic dysfunction reaches such an extent that systolic dysfunction does not play a major role, although in the initial stages its influence on the development of chronic heart failure was great [6]. The development of a restrictive type of left ventricular diastolic dysfunction leads to an increase in cardiovascular mortality and heart transplantation. The detection of a restrictive type of diastolic dysfunction, regardless of the state of systolic function, indicates a severe course of chronic heart failure. With the help of echocardiography of the heart, you can determine the dysfunction and its nature, as well as conduct a dynamic assessment of the state of the heart and hemodynamic. The main hemodynamic parameter is the left ventricular ejection fraction, which reflects the contractility of the left ventricular myocardium and allows differentiating systolic from diastolic dysfunction [3, 4].

Until today, diastolic dysfunction is one of the most understudied problems in modern medicine, although the prevalence is up to 50% among the population. The development of pathology occurs before the development of the appearance of the clinic and symptoms, as well as therapeutic effects on the mechanisms, which complicates the study, due to insufficient information [3]. Numerous studies [1, 7, 11] argue that the following risk factors predominate for the development of intact heart failure against the background of ischemic heart disease, such as female sex, the presence of concomitant pathology in the form of diabetes mellitus, obesity, arterial hypertension, metabolic syndrome, etc. Hiroyuki Okura et al, who studied the gender characteristics of diastolic indices, argue that changes in the parameters of diastolic functions of the heart differ mainly among older women and that mortality due to cardiovascular problems of the same age and sex increases. In addition, all this is associated with the interruption and beneficial effect of natural sex hormones, estrogens in the postmenopausal period, which increases HF with preserved EF in women than in men of the same age [4, 5]. Some studies show that the incidence of LVDD in patients with type 2 diabetes mellitus (DM) without cardiovascular symptoms is 75%. Type 2 diabetes

with concomitant disease arterial hypertension (AH) increases the risk of developing macro- and microvascular complications of diabetes and increases the prevalence of LVPD among patients with type 2 diabetes [4, 5, 7]. According to studies by other scientists, LV diastolic dysfunction in patients with type 2 diabetes without coronary artery disease, AH ranges from 50% to 75%. Therefore, the study by Poirier et al. is determined by the diastolic function of the LV in patients with type 2 diabetes, in addition to the standard echocardiography, the Valsalva test was used to determine patients with pseudonormalization of the transmitral spectrum. As a result, it was found that the prevalence of LVDD with type 2 diabetes mellitus without cardiac symptoms has a higher prevalence than 50% [12]. Another study showed that LVDD indeed has a high incidence in patients without cardiac disease. [4].

Preserved dysfunction of the left ventricle is one of the most characteristic manifestations of structural and functional disorders in HCM. Studies have shown that in HCM patients with or without a clinic, the prevalence is 90% [5, 6, 7]. The influence of other factors on the diastolic function of the left ventricular myocardium has been studied less than the above risk factors. For example, this group includes connective tissue dysplasia (CTD). But the study of DST is not unimportant, since the prevalence of DST among the world's population is 35%, and in ecologically unfavorable regions - 50% [2, 3]. In addition, the question of the influence of DST on the course of myocardial infarction (MI) development remains open. In the materials of Yevseviev ME et al. [2], common signs of connective tissue dysplasia include: multiple caries, diastema of the teeth of the upper jaw, grooves on the earlobes, varicose veins of the lower extremities, and the time of appearance of gray hair. Early appearance of gray hair (21.3 ± 2.7 years) was noted in patients with myocardial infarction with concomitant DST disease (21.3 ± 2.7 years) than in patients with MI but without DST (37.5 ± 3.6 years), $p < 0.05$. They also differed in terms of multiple caries, which was 48.7% than in the main group and 30.7% in the control group. During the study of patients with myocardial infarction against the background of DST, when analyzing the transmitral flow, it showed that LVLD differs (pseudonormal and restrictive types), which is more severe in which it is 25 (64%) than in persons without DST-20 (38.4%). Patients without CTD have a greater number of types with impaired relaxation and normal blood flow (61.5% versus 35.8%). These studies have shown that persistent LV dysfunction in patients with MI with CTD indicates hereditary features of the organization of the connective tissue frame of the heart in the formation of pathophysiological mechanisms of adaptation in postinfarction cardiosclerosis [2].

Main part.

The aim of the study was to study left ventricular diastolic dysfunction in patients with myocardial infarction and concomitant diabetes mellitus according to EchoCG data.

Our study included 55 patients aged 45 to 60 years (48.2±3.5 y.o.) who were admitted to the cardiac intensive care unit with a diagnosis of ACS with further transformation into acute myocardial infarction concomitant with type 2 diabetes mellitus. The groups were divided into two groups depending on the ejection fraction (1st-with EF 45%, 2nd — with EF<45%). The control group consisted of 30 healthy people aged 40 to 55 years (48.9=3.5 years old). The diagnosis was made on the basis of the disease clinic, ECG data, determination of necrosis biomarkers-troponin I, CPK-MV, EchoCG (determination of hypokinesis zones, EF). In the hospital, patients received standard therapy - ACE inhibitors, antiplatelet agents (aspirin), anticoagulants (heparin), insulin therapy beta-blockers, nitrates, potassium preparations.

Results and discussions.

The state of diastolic function of the left ventricle (LV) was evaluated according to EchoCG and Doppler EchoCG data performed on the Mindray device (China) in accordance with the recommendation of the American Association of Echocardiography.

The tests were carried out according to medical records. In patients with systolic dysfunction, hospitalization was observed more due to repeated AMI (36% vs. 13%). In patients with diastolic dysfunction, anterior MI was more often observed (65% vs. 45%). In the group of patients with diastolic dysfunction, hemodynamic parameters were better: SBP 125.6±10.4 mmHg vs. 110.6±11.4 mmHg; heart rate 65±9 beats per minute vs. 75±10 beats. per minute, the index of local contractility disorders in left ventricular systolic dysfunction (1.5±0.5 vs. 1.30±0.19). In the study, the ratio of peak rates of transmitral flow E/A was: in patients with preserved LVEF 1.08±0.40, in the group with reduced LVEF 1.30±0.89.In patients with diastolic dysfunction, nosocomial mortality and mortality from MI on the GRACE scale was lower. Total hospital mortality in group 1 at admission was 5.94 ±5.07% vs. 11.19±14.84%, and the risk of hospital mortality from MI was 17.98±6.73% vs. 25.25±13.09%. At discharge, patients with CHF FC I were diagnosed in the group with diastolic dysfunction in 43% of cases versus 16 %. With CHF FC II in both groups were almost no different (40% vs. 41%;), CHF FC III-IV was more often diagnosed in the group with reduced LVEF (37% vs. 19%;).

Conclusions.

The study showed that in patients with AMI with DM2 complicated by heart failure, it is necessary to assess the severity of left ventricular diastolic dysfunction. Aggravation of hemodynamic changes play an important role in the development of heart failure in patients with post-infarction cardiosclerosis and type 2 diabetes mellitus. All this points to the importance of pathogenesis in the progression of acute myocardial infarction.

In the acute period of myocardial infarction, more than half of the patients show signs of LVDD, which are manifested in 51.4% of patients with impaired active relaxation and in 15.7% - increased myocardial stiffness. In the posthospital period of the disease, the incidence of the restrictive type of LV diastolic dysfunction decreases (6.08%) with a slight increase in patients with impaired active relaxation processes (56.5%).

In patients with MI, an improvement in the processes of active relaxation of the LV is manifested by an increase in the integral rate of early filling and a decrease in the atrial contribution to filling the LV. A decrease in myocardial stiffness is manifested in the positive dynamics of the time of isovolumetric relaxation and the time of slowing down the early filling of the LV.

After myocardial infarction, the main clinical and anamnestic factors influencing the development of the restrictive type of LV diastolic dysfunction are the age, size and localization of the infarction, as well as the formation of LV aneurysm in the acute period of the disease. In the restrictive type of diastolic dysfunction, LV remodeling occurs according to the eccentric type, the clinical course of myocardial infarction is often complicated by the development of CHF, ventricular extrasystole of I-II gradation.

After myocardial infarction, the stage and FC of CHF are most often associated with the parameters of diastolic function, characterizing late filling (maximum, integral velocity, deceleration time) and the total duration of LV filling. With this indicator, LVEF is most closely and variably correlated with the FC of CHF.

After MI, FC CHF correlates most closely with the parameters of diastolic function in patients with a restrictive type of LV filling. The longer the time of acceleration of early filling, the time of deceleration of late filling and the shorter the time to reach the maximum

speed of peak A, the total duration of LV filling, the more likely the appearance of pronounced signs of CHF is.

The identification of clinically pronounced signs of CHF (II-IV FC) in patients with recovered LV systolic function 6 months after MI should not be assessed only as a manifestation of diastolic dysfunction (an increase in the delay time of late filling), since they have normal , but significantly lower indicators of systolic function.

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