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EVALUATION OF DIASTOLIC DYSFUNCTION IN PATIENTS WITH POSTINFARCTION CARDIOSCLEROSIS

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ABSTRACT

In the development of heart failure (chronic heart failure), they attach importance to the violation of the diastolic function of the heart. A decrease in myocardial compliance leads to an increase in the final diastolic pressure, which can be detected at an early stage of heart damage even before the appearance of systolic dysfunction.

We examined 219 men, patients with PIX complicated by heart failure, aged 40-60 years (mean age 53.42 ± 6.2 years).

LV remodeling in patients with CHF was characterized by a violation of the diastolic function of the heart, which is expressed to a greater extent by a violation of relaxation. An analysis of the prevalence of various types of left ventricular diastolic dysfunction showed that severe disorders of the left ventricular diastolic function — the pseudo-normal and restrictive type — were significantly more likely to occur in the group of patients with reduced systolic function of the left ventricle.

KEY WORDS: chronic heart failure, left ventricle, postinfarction cardiosclerosis, cardiosclerosis, cardiology, ejection fraction

INTRODUCTION

Chronic heart failure (CHF) remains one of the most common, severe, and prognostically unfavorable complications of all diseases of the cardiovascular system. The problem of chronic heart failure is caused by a steady increase in its frequency, continuing high morbidity and mortality, a large number of hospitalizations and the associated high financial costs, and the significant cost of treating decompensated patients. CHF in its prevalence is comparable to the most dangerous epidemiological diseases and it is expected that in the next 20-30 years its prevalence will increase by 40-60%. According to the Framingham study, the frequency of heart failure doubles every decade and one of the main reasons for the development of heart failure is coronary heart disease, which is more than 60% in the structure of heart failure. The average 5-year mortality rate for patients with heart failure is 57%, and in severe stages it is even higher. In this regard, the search for new innovative ways to prevent the development and progression of heart failure, cardiovascular death, including sudden cardiac death, which accounts for almost half of all deaths, is of great importance [2,7].

In the development of heart failure (chronic heart failure), they attach importance to the violation of the diastolic function of the heart. A decrease in myocardial compliance leads to an increase in the final diastolic pressure, which can be detected at an early stage of heart damage even before the appearance of systolic dysfunction. The mechanical properties of the myocardium, which are characterized by elasticity, suppleness and rigidity, affect the processes of filling the left ventricle (left ventricle): hypertrophy, fibrosis or myocardial infiltration increase its stiffness, which leads to a sharp increase in the pressure of filling the left ventricle. LV compliance decreases with dilatation. Violation of active relaxation is one of the earliest manifestations of myocardial dysfunction in most cardiovascular diseases. Ventricular myocardial fibrosis (increased collagen content) is the most important risk factor for worsening heart function. Clinical and anatomical comparisons and experimental data on hypertensive rats show that the severity of fibrosis and collagen development in the myocardium corresponds to the severity of heart failure. Fibrosis is a determinant of myocardial stiffness and its diastolic dysfunction, also favors systolic dysfunction and arrhythmogenicity. Fibrosis is at first an adaptive process for necrosis after a heart attack, ischemia, and inflammatory processes in the myocardium. [4.6].

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For a long time, CHF was primarily associated with a decrease in myocardial contractility, observed with its systolic dysfunction. However, clinical symptoms are often found in patients with preserved systolic myocardial function. The development of heart failure in them is more associated with a violation of the diastolic function of the heart.

The frequency of diastolic myocardial dysfunction as a cause of heart failure increases sharply with age. Along with the pathogenetic relationship, a relationship was established between the degree of violation of the diastolic function of the heart and the severity of heart failure, as well as exercise tolerance and quality of life [1,3].

The LV diastolic function depends on both myocardial relaxation and its mechanical properties. LV myocardial relaxation is an active process, depending on the functioning of the sarcoplasmic reticulum of cardiomyocytes. As a rule, the basis of such heart failure is a violation of the diastolic function of the left ventricle, i.e. his inability to adequately fill without increasing the average pulmonary venous pressure.

Three types of LV filling are distinguished, depending on the severity of diastolic disturbances - delayed relaxation, pseudonormalization, and restriction. The identification and analysis of variants of LV diastolic dysfunction are of great clinical importance, since they indicate the severity of diastolic disorders that contribute to the formation of heart failure [2,5].

Objective is to study the processes of remodeling of the left ventricle in patients with post-infarction cardiosclerosis complicated by chronic heart failure.

MATERIALS AND METHODS

We examined 219 men, patients with PIX complicated by heart failure, aged 40-60 years (mean age 53.42 ± 6.2 years). According to the New York classification of cardiologists, patients are divided into the following FC CHF: 31 (18.8%) patients with FC I, 92 (36.6%) patients with FC II and 96 (44.6%) patients with FC III CHF. Evaluation of indicators of diastolic function showed that patients with heart failure can have normal E / A values with increased values of isovolumic relaxation time (IVRT) and the time of deceleration of early diastolic filling (DT) of the left ventricle, which should be taken into account during diagnosis (Table 1).

Table 1. The state of diastolic function of the left ventricle of the heart in patients with heart failure (M ± SD)

Indicators	Control group (n=34)	CHF (n=219)
E, sm · c^{-1}	72,3±8,1	55,6±10,1**
A, sm · c^{-1}	60,9±9,8-	54,3±10,2**
E/A, units	1,4±0,21	1,19±0,13
Ejection fraction, %	64,8±8,9	50,4±10,5*
Relative wall thickness	0,43±0,04	0,49±0,03

Note: a significant difference from the control: * P <0.05; ** P <0.01

An analysis of the results revealed the following types of LV diastolic function disorders: out of 219 patients with heart failure, relaxation disorders were determined in 48.4% of cases, pseudonormalization in 23.7%, restrictive changes in 15.1% of cases, and normal diastolic function parameters were determined in 12 , 4% (28) patients.

Patients, depending on the severity of diastolic dysfunction of the left ventricle, were divided into 3 groups: I (n = 106) - with impaired relaxation, II (n = 52) - with a pseudo-normal type, III (n = 33) - with a restrictive type of filling. To assess the relationship between disorders of the contractile function of the left ventricle and diastolic dysfunction of the left ventricle, 191 patients with CHF were divided into 2 groups (Table 2.): a group with preserved systolic function of the left ventricle (ejection fraction≥50%) and a group with a reduced ejection fraction (<50%).

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Table 2. The structure of the types of diastolic dysfunction of the left ventricle in patients with heart failure with different contractility of the left ventricle

Diastolic dysfunction	EF LV>50% (n=72)	EF LV <50% (n=119)	P
Impaired relaxation	49/106(46,2%)	57/106(53,8%)	0,18
Pseudo-normal	18/52(34,6%)	34/52 (65,4%)	0,014
Restrictive	5/33(15,2%)	28/33(84,8%)	0,001

An analysis of the prevalence of various types of left ventricular diastolic dysfunction showed that severe disorders of the left ventricular diastolic function — the pseudo-normal and restrictive type — were significantly more likely to occur in the group of patients with reduced systolic function of the left ventricle. An analysis of the main indicators of myocardial contractility and LV geometry in the examined patients depending on the type of diastolic dysfunction revealed that the volumetric indicators of the left ventricle — the end-diastolic volume and end-systolic volume in the group with the pseudo-normal and restrictive type were significantly higher compared to a group of patients with impaired relaxation. The PV index was also significantly lower in the group of patients with a restrictive type of LV diastolic dysfunction.

The LV diastolic function depends on both myocardial relaxation and its mechanical properties. LV myocardial relaxation is an active process, depending on the functioning of the sarcoplasmic reticulum of cardiomyocytes. As a rule, the basis of such heart failure is a violation of the diastolic function of the left ventricle, i.e. his inability to adequately fill without increasing the average pulmonary venous pressure.

RESULTS AND DISCUSSION

The results of recent epidemiological studies have shown that in 30-50% of patients with a clinically confirmed diagnosis of CHF, systolic heart function is preserved and, on average, from 3 to 20 people per thousand people have asymptomatic left ventricular dysfunction. According to the European Society of Cardiology (EOC), systolic myocardial dysfunction (without clinical signs of heart failure) can reach 5-6% in a population, which is another 20 million in Europe with a population of about 900 million people [8.9]. According to F.T. Ageeva [4], the prevalence of I-FC CHF is 4 times greater than II-IV FC and more than 55% of patients with heart failure have almost normal myocardial contractility and the number of such patients will increase steadily. An analysis of the prevalence of various types of left ventricular diastolic dysfunction showed that severe disorders of the left ventricular diastolic function — the pseudo-normal and restrictive type — were significantly more likely to occur in the group of patients with reduced systolic function of the left ventricle. An analysis of the main indicators of myocardial contractility and LV geometry in the examined patients depending on the type of diastolic dysfunction revealed that the volumetric and geometric parameters of the left ventricle in the group with pseudo-normal and restrictive type were significantly higher compared to the group of patients with impaired relaxation. The results are consistent with the data of multicenter studies of PEP-CHF, CHARM, Aldo-DHF, which show the prognostic significant role of diastolic dysfunction in patients with heart failure.

CONCLUSIONS

Post-infarction cardiosclerosis leads not only to structural restructuring of the LV, accompanied by dilatation of the cavity, thinning of the wall, decreased contractility of the myocardium, but also to a change in the geometric shape of the LV. LV remodeling in patients with CHF was characterized by a violation of the diastolic function of the heart, which is expressed to a greater extent by a violation of relaxation. An analysis of the prevalence of various types of left ventricular diastolic dysfunction showed that severe disorders of the left ventricular diastolic function — the

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pseudo-normal and restrictive type — were significantly more likely to occur in the group of patients with reduced systolic function of the left ventricle. With the progression of the disease, an increase in the number of patients with an eccentric type of remodeling, as well as a restrictive type of LV diastolic dysfunction, was noted.

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