CONTEMPORARY VIEW ON THE PROBLEM OF CHRONIC HEART FAILURE

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***Abstract*— Heart failure is a clinical syndrome characterized by typical symptoms (e.g., shortness of breath, fatigue) that may be accompanied by symptoms (e.g., jugular vein swelling, wheezing in the lungs and / or peripheral edema) caused by structural and/or functional cardiac pathology, resulting in decreased cardiac output and/or increased cardiac pressure at rest or during exercise. This article summarizes current view on the problem of chronic heart failure and its causes, pathology, clinical pictures and prognosis of the disease. Comprehensive review will give readers precise insights of the current problem to manage of this polyethiologic disease.**

Keywords*— *chronic heart failure, chronic heart failure with preserved ejection fraction, chronic heart failure with reduced ejection fraction.

I. INTRODUCTION

Chronic heart failure is a common cardiovascular disease among the population of Uzbekistan. The prevalence of heart failure increases annually, which is largely due to inadequate therapy of hypertension and coronary heart disease. Particular attention should be paid to the emergence of a significant number of patients with chronic heart failure and saved (PV>50 %) systolic function of the heart (HFprEF). It accelerates the development and aggravates the course of atherosclerosis, IHD, CHF, atrial fibrillation, cerebrovascular disease, chronic kidney disease [1]. It is known that timely diagnosis and adequate treatment play a major role in restraining the progression of heart failure, preventing complications, and also due to the fact that the main burden in the management of patients with heart failure is primary care physicians, it is important to assess the current situation with the quality of diagnosis and treatment of heart failure in a typical outpatient practice and develop recommendations for optimizing the management of patients with this pathology.

Despite new methods of diagnosis and treatment, the incidence of heart failure continues to grow. In the primary health care sector, there are many patients with heart failure of various genesis, while the management tactics of these patients at the outpatient stage in the initial stages of cardiac failure, which indicates the absence of clear criteria for the diagnosis of heart failure in the earliest period of its development on an outpatient basis. At the same time, practitioners in outpatient practice insufficiently use the diagnostic capabilities of echocardiography (echocardiography), although in many respects the choice of treatment for heart failure depends on the prevalence of systolic or diastolic LV dysfunction [2].

The deficit of using additional research methods in an outpatient setting forms some features of the management of patients with a diagnosis of heart failure and can lead to errors in diagnosis terminology in clinics doctors. With a high percentage of the incidence of the diagnosis of heart failure in patients with cardiovascular disease, there are few studies confirming this diagnosis, which paves the way for verification of the existing diagnosis of heart failure.

Assessment of the prognosis of survival from all causes, purposes the authors of various studies have repeatedly studied drugs in patients with a diagnosis of heart failure, however, the data obtained at the beginning of the 2010s are outdated, which emphasizes the importance of conformity assessment non-drug and drug therapy prescribed to patients with a diagnosis of CHF at the outpatient unit, international recommendations [3]. However, over the past five years, such data, especially on an outpatient basis, are scarce, which emphasizes the need for research in this direction. In addition, it is important to note that in none of the studies did we find an assessment of the effect of drugs on the prognosis and three-year mortality in patients with a diagnosis of heart failure in a real outpatient practice. Ease of Use

Chronic heart failure with preserved and reduced systolic function

The basic terminology used to describe CHF is a historical fact and is based on the measurement of LVEF. CHF includes a wide range of patients, from individuals with normal LVEF (usually regarded as ≥ 50%; HFprEF) to patients with reduced LVEF (usually considered less than 40%; HFrEF). Differentiation of patients with EF-based heart failure is important due to differences in etiology, demography, comorbidity, and response to therapy [4, 5]. For many decades, chronic heart failure (CHF) was perceived by practitioners as a clinical syndrome that occurs with various diseases of the cardiovascular system and is caused by impaired systolic function of the left ventricle (LV), as a result of which it is not able to provide the proper value of the minute blood volume necessary for adequate the functioning of organs and systems at rest and during physical exertion. From these positions, LV systolic dysfunction is characterized by a decrease in stroke volume of blood due to a decrease in its contractility. However, it is well known that the processes of

expelling blood from the LV during systole are closely interconnected with its filling during diastole. Even in the 70s of the last century, after a series of experimental works, the point of view was expressed and substantiated on the unity of systolic and diastolic disorders that underlie the development of heart failure [6]. In this regard, there was an assumption about a possible violation of the filling of the heart without reducing the stroke volume of the blood (lowering the ejection fraction of the left ventricle), that is, the diastolic function of this part of the heart may also be the root cause of the occurrence of heart failure. The fundamental possibility of such a mechanism of CHF development was confirmed in many works published in 2019 [7]. Using the methods of radionuclide ventriculography and Doppler echocardiography (Doppler echocardiography), these authors revealed the presence of clinical manifestations of CHF in a significant number of patients with preserved systolic LV function. The obtained results have largely refuted the prevailing role of systolic LV dysfunction for several decades as the only hemodynamic sign of the onset of clinical manifestations of this syndrome.

Pathophysiology of the heart failure with preserved and reduced ejection fraction

The pathophysiology of heart failure with preserved LV systolic function is characterized by the fact that at the first stage, under the influence of various damaging agents (overload, ischemia, heart attack, LV hypertrophy, etc.), the process of active myocardial relaxation and early LV filling is disrupted, which at this stage is fully compensated activity of the left atrium and therefore does not appear in any way even with loads [7]. In the second stage, diastolic dysfunction occurs. The progression of the disease and increased stiffness of the LV chamber are accompanied by a forced increase in the filling pressure of the LV (because the left atrium can no longer cope), which becomes especially noticeable during exertion. There is an even greater difficulty in blood flow to the LV and a pathological increase in pressure in the pulmonary artery, which reduces the patient's tolerance to stress. The third stage (diastolic heart failure) is characterized by a further increase in filling pressure, a complete "atrophy" of the atrium. The inflow of blood to the ventricle (outflow of blood from the lungs) is critically reduced, which is accompanied by a drop in cardiac output, a sharp decrease in tolerance and congestion in the lungs (a detailed picture of heart failure). Numerous clinicians have reported that heart failure with preserved systolic function (diastolic heart failure) most often occurs in patients suffering from essential arterial hypertension, chronic forms of IHD (repeated episodes of myocardial ischemia, atherosclerotic or post infarction cardiosclerosis). The greatest probability of its occurrence is observed in patients with a combination of these diseases, as well as in patients with concomitant type II diabetes mellitus and / or obesity [8].In women, especially in old age, heart failure with preserved systolic LV function is more common than in men [9]. At the same time, information on the relationship between the frequency of detection of preserved LV systolic function and the age of patients is mixed. Some authors report that in middle-aged patients, preserved LV systolic function was observed in less than 10-15% of cases [10].

CLINICAL DIAGNOSIS OF THE HEART FAILURE WITH PRESERVED AND REDUCED EJECTION FRACTION

Clinical diagnosis of chronic diastolic heart failure, in contrast to systolic, is sometimes difficult, because it cannot be based only on the data of the collected medical history and physical examination of the patient. Already in one of the first works, it was retrospectively demonstrated that the clinical symptoms and signs with both forms of LV dysfunction are almost the same [11, 12]. It was found that in these patients no significant differences were detected clinically in the frequency and nature of congestive moist rales in the lungs, edema syndrome, swollen cervical veins, changes in heart size, and the presence of heart sounds III and IV. Therefore, all clinicians involved in this problem are united in that, in order to diagnose CHF with preserved systolic function of the LV, in addition to clinical manifestations, it is necessary to identify objective signs of LV diastolic dysfunction using various instrumental methods of investigation (radionuclide ventriculography, catheterization of the left heart, doppler -EchoCG, tissue doppler-EchoCG). In Russia and abroad, the most commonly used method is Doppler echocardiography with the determination of the transmitral diastolic flow (TMDP) [13]. With its help, it is possible to conduct a non-invasive, easily accessible and relatively quick assessment of systolic and diastolic LV function. LV diastolic dysfunction is judged on the basis of a patient's detection of normal or almost normal (more than 45 to 50%) PV and changes in a number of parameters of the velocity of the transmissible blood flow.

It should be noted that the detected changes in the parameters of TMDP are not strictly specific for a particular disease and CHF is no exception. Already in the first reports on the study of diastolic filling of the heart in patients with heart failure using this method, data on various types of TDM spectra are presented [14]. In later works [14], three main types of the spectrum of TMDP observed in patients with chronic heart failure in patients with initial, moderate, and severe LV dysfunction (hypertrophic, pseudo-normal, and decompensated) were reported. The revealed diversity of these types of TMDP spectrum in CHF is explained by the authors of the studies by the complex interaction of such factors as myocardial extensibility and its ability to actively relax, the transmissible pressure gradient and pressure in the left atrium, LV volume and its contractility. The nature of the transmissible Doppler spectrum in CHF can change as diastolic disorders progress and under the influence of drug therapy.

In a number of studies that examined the correlation between the severity of heart failure and impaired systolic and diastolic function of the left ventricle, it was shown that the development of disorders of diastolic function has a greater effect on

the clinical manifestations of decompensation than a decrease in PV [15]. The authors of these studies explain their results as follows. LV dilatation of the LV cavity (with systolic dysfunction) and the associated decrease in PV should be considered as a compensatory process, and in the presence of hypertrophy and (or) LV myocardial fibrosis, a large tensile force (final diastolic pressure) is required for the development of dilatation of its cavity. In this case, the resulting increase in LV myocardial stiffness prevents compensatory dilatation of it and contributes to the clinical manifestations of heart failure. Obviously, it is for this reason that a violation of the diastolic function of the LV to a greater extent than a decrease in PV has an effect on the clinical manifestations of cardiac decompensation. In one of the works [16], it was reported that it is the violations of diastolic dysfunction of myocardial etiology in the absence of LV systolic dysfunction that not only lead to the occurrence of heart failure, but also determine the severity of congestive events. In many works [17] it was shown that FC, exercise tolerance and quality of life of patients with heart failure are more correlated with impaired diastolic dysfunction than with systolic. Some researchers [18] note the fact that with each CHF FC, the most typical features of the transmitral diastolic flow during Doppler echocardiography are often detected.

Prognosis of the heart failure with preserved and reduced ejection fraction

The prognosis of patients with CHF with preserved systolic LV function is assessed by clinicians ambiguously. Some of them believe that, in general, the prognosis of these patients is somewhat better compared to that in patients with systolic dysfunction [19]. So, in a number of works [20] information is provided that the annual mortality rate among patients with preserved LV systolic function ranged from 6 to 9% compared with 12-18% among patients with systolic heart failure. According to the authors of other studies, the annual mortality of these patients ranged from 1.6 to 18.7% [21].

Some clinicians report a better prognosis of patients with preserved systolic LV function only in the next one to three years after the diagnosis of heart failure [22]. However, in recent years, most clinicians, including those mentioned above, on the basis of many years of observation, note that the frequency of deaths in patients with preserved LV systolic function and systolic dysfunction practically does not differ [23]. Such a pronounced difference in the data on the frequency of an unfavorable prognosis in a patient with preserved systolic function is obviously due to three main reasons: the age of the patients, the diseases that caused cardiac decompensation, and the degree of its severity.

Data on the significance of the disease leading to the development of heart failure with preserved systolic function of the left ventricle, the prognosis of patients, are contradictory. Some researchers report a higher mortality rate for these patients with IHD [24]. Others did not reveal significant differences in the survival time of patients depending on the presence or absence of previously clinical manifestations of coronary artery disease [25]. The results of one of the multicenter studies indicate that in patients with chronic heart failure with preserved systolic function, the cause of which was hypertension, annual mortality (8%) was significantly lower than in patients (21%) with reduced LVEF [26]. Another study also reported that among elderly patients with heart failure with preserved LV systolic function, annual mortality was lower than that in patients with LV systolic dysfunction (31.2 and 39.9%, respectively) [27]. The works of individual authors provide evidence that progressive heart failure was the immediate cause of death of patients with heart failure to a lesser extent with preserved LV systolic function compared with that in patients with systolic dysfunction (17 and 22% and 32 and 43%, respectively) [28]. In a few studies, there is information about a higher frequency of sudden death in patients with heart failure with preserved systolic LV function (67%) than in patients with reduced systolic function (56%) [29]. Other clinicians did not reveal significant differences in the causes of death (acute myocardial infarction or sudden death) in patients with heart failure with preserved or decreased LV systolic function [30].

Observations of almost all clinicians [31] indicate that hospitalization (primary and repeated), as well as the length of hospital stay for patients with chronic heart failure with preserved systolic LV function, are comparable to those in patients with systolic dysfunction. The issues of drug treatment of patients with heart failure with preserved systolic function of the LV for a long time have not been the subject of such close attention as with systolic heart failure. It is possible that for this reason there are no modern clear recommendations and drug treatment regimens for patients with this form of cardiac decompensation.

Conclusion

Chronic heart failure is a polyethiologic syndrome with several clinical features. Thus, at present, echocardiography and BNP are the main methods for clarifying the diagnosis of heart failure with both preserved and reduced EF. Therefore, it is necessary to carry out an analysis of the use of these methods in patients with a diagnosis of CHF at the outpatient stage. The literature data indicate insufficient use of these methods in patients with a diagnosis of CHF on an outpatient basis. In this regard, it is necessary to verify the clinical diagnosis of heart failure in patients at the outpatient stage using these methods.

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