DIABETES MELLITUS AND DISEASES OF THE CARDIOVASCULAR SYSTEM.

Negmatova Gulnoza Shukhratovna
Head of Endocrinology Department.
Samarkand State Medical University
Juraeva Zilola Aramovna
Scientific leader: assistant.
Samarkand State Medical University
Isokova Muslimakhon Olimovna
Boynazarov Subkhon Sherzod ugli
Students of Samarkand State Medical University

Annotation: *The pathogenesis and treatment of CHF in patients with DM have certain features that should be taken into account when conducting rational therapy. Treatment of HF in patients with DM is generally consistent with generally accepted principles of CHF therapy. However, an indispensable feature of the treatment of such patients is a thorough dynamic monitoring of the main metabolic parameters.*

Keywords: *myocardial infarction, angina pectoris, painless myocardial ischemia, macrovascular complications.*

Diabetes mellitus (DM) is recognized by WHO experts as a non-communicable epidemic and is a serious medical and social problem. In 2010, about 6.4% (285 million) of the world's inhabitants suffered from DM. By 2030, the number of patients is expected to increase to 7.7% (439 million people). Ischemic heart disease is the main cause of death in patients with DM, with 90% of these patients suffering from type 2 DM.The presence of DM is associated with the occurrence of all forms of coronary artery disease — angina pectoris, painless myocardial ischemia (MIM), myocardial infarction (MI), and sudden cardiac death. At the same time, macrovascular complications, including coronary artery disease, stroke, peripheral vascular disease, are the cause of death in DM patients in 67% of cases . Based on the available data, DM can be considered as a kind of CVD . In 50% of cases, the increased risk of developing cardiovascular lesions in type 2 diabetes is explained by the greater frequency and severity of traditional risk factors in patients with diabetes. Risk factors in patients with diabetes are considered: dyslipidemia, arterial hypertension (AH), smoking, hereditary predisposition to coronary artery disease, the presence of micro- and macroalbuminuria.

The Framingham study quite convincingly confirmed the increased risk of developing heart failure (HF) in patients with DM - in men by 4 times, in women - 8 times more often than in people without DM. According to the Russian EPOKHA study, the presence of HF is a significant predictor of the development of DM in the future. In the general population, the prevalence of DM is 2.9%, and among patients

with FC III-IV FC - 15.8%. In CHF, the presence of insulin-independent DM significantly worsens the prognosis of patients, especially women (by 45%).

In diabetes, the myocardium is affected regardless of the presence of atherosclerosis of the coronary arteries (diabetic cardiomyopathy). Changes in the vessels of the heart are manifested in the form of microangiopathies, microcirculation is disturbed, morpho functional changes in the myocardium are noted. The bioelectrical activity of the myocardium is disturbed, its contractility decreases with a tendency to the development of circulatory decompensation. With a long course of diabetes, especially type 2, atherosclerotic changes affect not only the main arteries, but also the arteries of medium and small caliber. Also, in patients with type 2 diabetes, myocardial hypertrophy is pronounced, which contributes to impaired coronary circulation. The progression of hypertrophy and dilatation of the left ventricle reduces contractile function, there is wall tension during systole, which contributes to an increase in myocardial oxygen demand and the development of cardiosclerosis. In DM, a hyperkinetic variant of central hemodynamics often develops with an increase in circulating blood volume and tachycardia.

Diabetic cardiomyopathy is manifested by hypertrophy of cardiomyocytes, myocardial fibrosis. The increased content of collagen in the myocardium, LV hypertrophy lead to a loss of elasticity with the appearance of stiffness, rigidity of the heart muscle.

Thus, a decrease in myocardial contractility in DM and IHD is due to cardiac and non-cardiac factors. Diabetic myocardial dystrophy is basically associated with impaired cardiomyocyte metabolism; diabetic vegetative neuropathy and microangiopathy are also important . Cardiac disorders in patients with type 2 diabetes are also characterized by impaired LV diastolic function. A number of pathogenetic mechanisms are involved in the formation of heart damage in DM: macroangiopathy with atherosclerosis of the coronary arteries, myocardial metabolism disorders, microcirculation disorders in the form of diabetic microangiopathy. Cardiac damage in DM requires preventive and therapeutic effects.

Correction of dyslipidemia in DM is carried out according to the same principles as in patients with coronary artery disease. Statins are the drugs of first choice. At the same time, one should not forget that improving the prognosis in patients with diabetes, coronary artery disease and heart failure requires mandatory strict metabolic control of target glucose and blood pressure levels. Glycemic control is an important basis for the treatment of patients with diabetes. Clinical studies have shown that improved glycemic control is accompanied by a steady decrease in the risk of retinopathy, nephropathy, as well as a significant decrease in the risk of microvascular complications by 25% and an insignificant trend towards a decrease in the risk of MI by 16%.

The goal of lipid-lowering therapy in DM is to achieve a level of total cholesterol <4.5 mmol/l, LDL cholesterol <2.6 mmol/l. The optimal level of HDL cholesterol is 1.02

mmol/l in men and > 1.28 mmol/l in women, TG concentration is < 1.7 mmol/l. In terms of lowering the level of LDL cholesterol, the leading role belongs to statins; fibrates (fenofibrate, gemfibrazil, ciprofibrate, etc.) are especially effective in reducing TG levels and increasing HDL cholesterol levels. Patients with mixed hyperlipidemia are shown to be prescribed combination therapy (statins + fibrates).

Several recent meta-analyses have established a diabetogenic effect of statin therapy, which is dose-dependent and directly related to the presence of CVD risk factors. The issue of prescribing statins to patients with diabetes has many nuances, requiring an individual approach. There is no doubt about the positive effects of prescribing statins. In patients with diabetes, preference should be given to the appointment of statins with the most pronounced lipid-lowering effect - rosuvastatin and atorvastatin. The largest meta-analysis assessing the effect of lowering LDL levels on the risk of developing cardiovascular events was performed in 2010 and included 26 clinical studies involving 170,000 patients. The mean follow-up time was 5.1 years. The analysis showed that a 1 mmol/L reduction in LDL levels resulted in a 10% reduction in the risk of total death, a 20% reduction in the risk of cardiovascular mortality, and an 11% reduction in the risk of cardiovascular events. In 2015, the recommendations of the American Diabetes Association (ADA) were adopted, the main provisions of which largely repeat the provisions set forth in the IAS and ACC / AHA. When prescribing statin therapy, the level of CVD risk is taken into account.

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