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Peculiarities of the Influence of Metabolic Syndrome on the Course of Coronary Heart Disease

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Abstract: Cardiovascular diseases are the leading cause of death worldwide. Ischemic heart disease (IHD) dominates the scale of morbidity and is the main cause of disability of the population in Russia and other economically developed countries. The study of the causes of IHD group development leads to the isolation of a whole risk factor, most of which are included in the concept of "metabolic syndrome".

Keywords: coronary heart disease, metabolic syndrome, diabetes mellitus, heart failure, stenting.

Introduction: Cardiovascular diseases are the leading cause of mortality worldwide. This article provides an overview of the results of medical and experimental studies of various components of metabolic syndrome in CHD. The relationship of dyslipidemia, diabetes mellitus, arterial hypertension and obesity with the early onset of IBS, as well as the relationship of metabolic changes with the risk of myocardial infarction has been proved. The influence of different components of metabolic syndrome on each other is shown. Special attention is paid to the increased risk of early and subsequent complications of CHD in patients with metabolic disorders. The results demonstrating the peculiarities of coronary vascular lesions in patients with metabolic syndrome are presented.

Ischemic heart disease (IHD) dominates the structure of morbidity and is the main cause of disability in Russia and other economically developed countries. The study of the causes of the disease allowed us to identify a group of risk factors, most of which are included in the concept of "metabolic syndrome". The review is devoted to the results of clinical and experimental studies of the influence of various components of metabolic syndrome on CHD. The association of dyslipidemia, diabetes mellitus, arterial hypertension and obesity with the early onset of CHD, as well as the correlation of metabolic disorders and the risk of myocardial infarction is shown. The influence of different components of the metabolic syndrome on each other is noted. Special attention is paid to the risk assessment of early and late complications of CHD in patients with metabolic disorders. Examination results demonstrating the peculiarities of coronary artery lesions in patients with metabolic syndrome. One of the methods of IBS treatment is revascularizing surgery. The article contains references to foreign studies demonstrating the effectiveness and long-term prognosis of percutaneous coronary interventions in patients with metabolic syndrome. Cardiovascular disease (CVD) is the leading cause of mortality worldwide. In 2010, a WHO report was made in Geneva, according to which 17.3 million people died from

CVDs, which amounted to 30% of all deaths in the world [1]. Of this number, 7.3 million people died from coronary heart disease (CHD) and 6.2 million people died as a result of stroke. IHD dominates the scale of morbidity and is the main cause of disability in the population of Russia and other economically developed countries [3].

The study of various reasons for the development of groups of CHD leads to the identification of a whole risk factor, most of which is included in the concept of "metabolic syndrome". Thus, when studying metabolic syndrome in CHD, it was found that the risk of developing CHD is 2.9-4.2 times higher in patients demonstrating metabolic disorders [2]. Based on the results of the Fremingemetabolic Syndrome Study, a risk scale for the development of CHD was compiled. In this index of risk factor criteria, blood pressure and cholesterol levels are shown. Individual researchers noted that excessive body weight is a determi- nant of high cardiovascular risk: in patients with obesity of various degrees compared to the general population, IBS is 2-3 times more frequent and ischemic stroke is 7 times more frequent [5]. In more recent studies it has been shown that the risk of IBS is 1.5-2 times higher in obese individuals .In addition, a relationship between metabolic syndrome and early onset of IBS has been identified. In a study of 393 patients under 50 years of age and 393 control subjects, the relationship between early onset of CHD and metabolic syndrome was observed . The different components of metabolic syndrome not only influence the pathways of CHD but also aggravate each other. The simultaneous presence of obesity, diabetes mellitus (DM) and arterial hypertension (AH) has a worse clinical presentation of each disease. Obese people have a 50% higher chance of developing these diseases than people of normal body weight. According to the Fremingemetabolic Syndrome Study, men have an average systolic BP of 4.4 mmHg and women have an average systolic BP of 4.2 mmHg 4.5 kg higher than normal. In addition, obesity of different stages increases the risk of developing DM several times (at I degree - 3 times, at II degree - 5 times, at III degree - 10 times) [7]. Metabolic disorders influence the development of acute myocardial infarction (MI). According to the INTERHEART study, the risk of MI is 3.87 times higher in people with dyslipidemia, 3.08 times higher in people with DM, 2.48 times higher in people with AH, and 2.22 times higher in people with abdominal obesity [9]. However, some researchers note that only elevated glycemia during the critical period affects the course and prognosis of IM.

The results of the analysis of 15 studies that examined the relationship between blood glucose levels and mortality showed an increase in the relative risk of mortality in MI in 3.9 times in patients without DM in the anamnesis and the level of glycemia in the acute period more than 6.1 mmol/l. [10]. At the same time, according to some authors, in patients with type 2 DM there is an increase in the relative risk of in-hospital mortality by 70% in case of glycemia more than 10.0 mmol/l [11]. Similar data were obtained in the prospective GRACE treatment: the prognosis of a patient with MI without type 2 DM in the anamnesis, but with glycemia in the acute period more than 11.1 mmol/L did not differ from that of a patient diagnosed with type 2 DM [10]. However, there are papers showing that metabolic syndrome does not increase the risk of mortality in the first year after IM, despite an increase in intrahospital mortality in such patients. A study of 1990 patients with metabolic syndrome hospitalized for inpatient MI produced higher rates of in-hospital mortality. But when mortality for a full year after the development of MI is taken into account, there are sporadic rates in different restriction groups. A number of authors believe that metabolic syndrome without DM in the history does not cause an increase in the incidence of mortality in patients undergoing MI [1,3].

Metabolic syndrome affects the risk of acute MI: acute heart failure and cardiogenic shock. It was shown that hyperglycemia and low value of high-density lipoproteins are independent predictors of the development of acute heart failure [14]. According to the study of P. Deedwania et al, acute heart failure of different classes (Kilip classification) occurs in patients with METABOLIC SYNDROME in 46%, and in the control group - in 20% of cases. On the contrary, among all components of the metabolic syndrome, it is hyperglycemia that has the greatest relationship with the development of heart failure [15].

In addition to the association with minor limitations of MI, metabolic syndrome also have an impact on long-term prognosis. It was found that the presence of metabolic syndrome significantly increases the risk of mortality within three years by 29%, cardiovascular events - by 23% [15]. In the case of diagnosed type 2 DM as part of the metabolic syndrome, the rates increase to 68% and 47%, respectively [16]. There is another opinion: the presence of metabolic syndrome without diabetes does not increase the risk of cardiovascular events and mortality, while in the presence of diabetes they are significantly higher [12]. A late complication of CHD in patients with metabolic syndrome is the development of chronic heart failure (CHF). The frequency of CHF development in patients with metabolic disorders is significantly higher than in patients without metabolic syndrome. According to the Swedish prospective study, which included 2314 men aged 50 years without heart failure, MI and diseased heart valves, the overall incidence of CHF 20 years, from the beginning of the study through the formation of 2.3 per 1000 person-years. It was higher among those with metabolic syndrome than patients without metabolic syndrome: 5.3 and 1.7 per 1000 person-years, respectively [1,7]. According to the study of W. Doehner et al., the prognosis of CHD in patients with metabolic syndrome is worse, the incidence of CVD increases by 46% even with preserved left ventricular ejection direction [1,8]. Some researchers note that heart failure in patients with metabolic syndrome is more severe than in patients without metabolic syndrome: according to questionnaires, such patients have significantly lower quality of life [1,9]. In addition, patients with metabolic syndrome are more likely to develop CHF in higher expected NYHA classes [2,10]. "Gold" standard for assessing the volume of atherosclerotic lesion of the coronary arteries worldwide is coronary ventriculography (CVG). Introduction of this imaging method into clinical practice started active study of human metabolic syndrome and its individual components throughout the atherosclerotic process [2,11]. It has been shown that metabolic syndrome directly affects the number and volume of venous artery lesions. According to the data of foreign and domestic authors, patients with metabolic syndrome are characterized by multiple distal vascular lesions [1,12]. In the study of A. B. Bakhshaliev traced the relationship of multivessel lesion (lesion of two or three vessels) and multiple lesions and the same vessels, patients with metabolic syndrome [8]. Since the emergence and widespread use of intravascular methods of IHD treatment, there have been studies showing that RS not only affects the number and volume of coronary lesions, but is also a risk for the development of late stenting conditions. To this issue include the development of restenosis and increased incidence of fatal outcomes after revascularizing interventions. Several authors believe that metabolic syndrome increases mortality and mortality from cardiovascular disease in stented patients. According to the analysis of different studies conducted by D. Xu et al, patients with MS and coronary artery stenting have 2.17 times higher mortality risk than controls. The risk of mortality from MI in the group with metabolic syndrome is 1.35 times higher [2,11]. These data are confirmed by other works. According to Bin Hu, during the study of complications development after stenting in 1224 patients during 35.4 months, the statistical value of the increase in the incidence of mortality and mortality from cardiovascular events in MS patients was determined [2,13]. It should be noted that there are works that show that the presence of metabolic syndrome does not affect major cardiovascular events and the risk of late restenosis. Japanese researchers in a 12-month follow-up of 158 patients with and without metabolic syndrome did not obtain statistical differences in the restenosis rate and risk of total mortality and cardiovascular mortality in the restriction groups [4]. A number of observations consider that total mortality after stenting is influenced not so much by the presence of metabolic syndrome as by the severity of insulin resistance and blood glucose levels. Thus, patients with type 2 DM have a significantly worse prognosis than patients with metabolic syndrome but without DM. When considering 563 patients divided into three groups: without metabolic syndrome, with metabolic syndrome but without DM, and with metabolic syndrome and diabetes mellitus, the following data were obtained: patients with metabolic syndrome had a higher risk of all-cause mortality than patients without metabolic syndrome and a lower risk than patients holding the group (4.2%, 10.1%, and 15.3%, respectively). The risk of stent thrombosis was marginally higher in patients with metabolic

syndrome and significantly higher in patients with DM (0.3%, 0.6%, and 6.1%, respectively) [2,5]. Until now, there has been debate about behavioral tactics for patients with CHD and metabolic disorders.

In the mid-1990s, a study (BARI) was conducted, which involved the use of aorto-coronary bypass (ACB) and coronary angioplasty (CA). In this work, 25,200 patients were evaluated and 1829 (7.3%) patients with multiple venous artery lesions were included in the study. No statistically significant five-year survival rates were found in the ACS and CA groups. Repeated myocardial revascularization was required in 8% of patients in the ACS group.

8% of patients in the ACS group and 54% of patients in the CA group required repeat myocardial revascularization. In addition, the BARI trial analyzed a subgroup of 353 patients with diabetes who received insulin or oral hypoglycemic drugs; their five-year survival rate was higher after ACS than after CA (80.6% and 65.5%, respectively; p = 0.003) [26]. Similar findings were reported in the ARTS, DIABETES, EPILOG studies, et al. [27-29]. They lead to unsatisfactory long-term outcomes of percutaneous coronary interventions in patients with metabolic disorders compared to ACS (the highest incidence of thrombosis, stents, restenosis, cardiac events, fatal outcomes), which casts doubt on the efficacy of intramedical treatment of such patients.

The presentation of drug-eluting stents in percutaneous coronary interventions has changed since the present moment. According to the study by P. Canibus et al, the incidence of restenosis does not increase with the use of drug-eluting stents [3,10].

Conclusions: Thus, despite the large number of works devoted to metabolic effects on the prognosis of percutaneous coronary interventions and "major" operations, there is still no unequivocal opinion on the way to treat such patients. metabolic syndrome is one of the most urgent problems. There are still many unresolved questions about the influence of metabolic syndrome and its individual components on CHD. Only further study of this problem will make it possible to prevent metabolic-associated diseases and to develop recommendations for individual such patients.

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