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Diabetes Mellitus and Ischemic Heart Disease, Role of Glycosilated Hemoglobin

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Abstract

One of the serious complications of diabetes mellitus (DM) is macrovascular, based on atherosclerotic vascular lesions. According to literature, patients with diabetes are exposed to two to fourfold increase in the risk of developing cardiovascular disease compared with non-diabetic patients. Many authors indicate that in patients with diabetes, the incidence of latent, asymptomatic myocardial ischemia increases. Acute coronary syndrome can be manifested by autonomic dysfunction - nausea, sweating, dizziness - in the absence of a painful cardiac component that can lead the doctor away from the correct diagnosis. Between diabetes mellitus and ischemic heart disease, equal sign can be put. Thorough control of glycosylated hemoglobin level allows reducing the incidence of microvascular complications, which ultimately leads to a reduction in lethal macrovascular complications.

Keywords: diabetes mellitus; ischemic heart disease; glycosylated hemoglobin; microvascular pathology; macrovascular complications; glycemia.

INTRODUCTION

In the world there is a global epidemic of diabetes, which is explained by the rapid increase in the prevalence of overweight, obesity and lack of physical activity. According to WHO, a total of 347 million people worldwide have diabetes. 90% of all cases occur in type II diabetes mellitus (DM). It is assumed that in the next 10

years the total number of deaths from diabetes will increase by more than 50%. Most of the deaths in patients with type 2 diabetes are due to the development of macrovascular pathology, namely myocardial infarction and stroke. At the time of diagnosis of type 2 diabetes, as a rule, patients already have cardiovascular pathology, which developed long before the manifestation of overt diabetes. Features of chronic ischemic heart disease with diabetes:

• The course of IHD in the background of diabetes is determined not so much by severity as by the duration of diabetes;

• IHD on the background of diabetes is often asymptomatic: up to painless myocardial infarction;

• CHD on the background of diabetes is often complicated by unstable angina, threatening rhythm disturbances;

• With CHD on the background of diabetes, cardiac insufficiency develops more rapidly, including in the post-infarction period;

• In CHD on the background of diabetes on coronary angiography, diffuse lesions of the coronary arteries with involvement of distal sites are often detected, which makes surgical myocardial revascularization difficult [1].

The combination of diabetes and cardiovascular diseases is one of the most urgent problems today. Relationship of diabetes with the level of glycosylated hemoglobin. Glycosylated hemoglobin (HbA1c) is formed as a result of a slow non-enzymatic reaction of glucose with hemoglobin A in erythrocytes. The increase in glycemia significantly accelerates this reaction, which leads to an increase in the level of HbA1c in the blood, so its level reflects the average level of glycemia for three months (mean lifetime of erythrocytes). Glycosylated hemoglobin is not only an indicator of the level of hyperglycemia. Possessing increased affinity for oxygen, HbA1c causes a decrease in oxygen supply to the tissue. This is manifested by hypoxia of peripheral tissues, partial shunting of blood flow and metabolic disorders in various tissues.

In accordance with the recommendations of the WHO, this test was found to be optimally necessary for monitoring DM at least once a quarter. Glycosylated hemoglobin is also used as an indicator of the risk of complications of diabetes.

What is the convenience of this test? The level of HbA1c does not depend on food intake and short-term nuances (colds, stress), shows how well the diabetic was controlled glycemia, and also allows for early diagnosis of diabetes. In addition, compared to a 2-hour glucose tolerance test, the HbA1c level measurement wins in terms of time taken. The level of glycosylated hemoglobin, especially exceeding 6%, is a better predictor of long-term cardiovascular risk than fasting blood glucose level [2].

Data from the study on the control and complications of diabetes (DCCT) and the British Prospective Study of DM (UKPDS) showed a consistent relationship between increased HbA1c and microvascular complications, without a distinct threshold level. The level of glycemia, in which the cardiovascular system is in favorable conditions, is not known, since there have been no studies with this particular issue [1]. The growth rate of risk of microvascular complications is higher than that of macrovascular complications [3].

The meta-analysis of cardiovascular outcomes, based on the ACCORD protocols (Study on Control of Cardiovascular Risk in Diabetes) and ADVANCE (the Test for Action in Diabetes and Vascular Diseases), suggested that a 1% decrease in HbA1c was associated with a relative decrease risk by 15% for non-fatal MI, but without the benefits of stroke and overall mortality. Each 1% improvement in HbA1c reduces the rate of development of late complications: cataracts by 19%, microvascular complications by 37%, and amputations by 43% [4] Specific target hemoglobin A1c values to be sought for are not determined individually, taking into account the condition of the individual patient and the response to hypoglycemic therapy (in particular, side effects such as hypoglycemia or weight gain). However, it is obvious that the closer to normal the concentration of hemoglobin A1c, the better. The relationship between the level of glycosylated hemoglobin and the risk of death has a J-shaped dependence curve, where the minimum and maximum values are predictors of death: both high and extremely low levels of glycosylated hemoglobin are dangerous [2].

In particular, in the ACCORD study in people with diabetes in the group receiving intensive hypoglycemic treatment, the risk of cardiovascular deaths (three deaths more per thousand people each year) was higher than in the group receiving traditional treatment. Because of these unexpected results, the ACCORD study of the reduction in blood sugar levels had to be stopped eighteen months before its

completion, and all participants were transferred to a group receiving traditional treatment. With intensive glycemic control, most likely, the increase in severe hypoglycemic conditions is associated. The goal for the level of HbA1c - achieving <7.0% - is generally accepted for minimization of microvascular complications [1], but an individual approach to each patient with diabetes should be followed.

CONCLUSION

In fact, between the type 2 diabetes and cardiovascular pathology, an equal sign can be put. Thorough control of the level of glycosylated hemoglobin allows reducing the frequency of microvascular complications, which ultimately leads to a reduction in lethal macrovascular complications.

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