

PREVALENCE OF DISORDERS OF CARBOHYDRATE METABOLISM IN PATIENTS IN THE ACUTE PHASE OF MYOCARDIAL INFARCTION AND AFTER DISCHARGE FROM THE HOSPITAL

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ABSTRACT

Perceptions of the adverse prognostic role of stress hyperglycemia in the acute myocardial infarction (AMI) regardless of the presence or absence in patient's diabetes mellitus (DM) are commonly used. In the survey of 310 patients with AMI without diabetes history who admitted in the cardiology department of an emergency hospital and had stress hyperglycemia and 30.9% revealed impaired glucose tolerance (IGT), and 32, 1% - DM. The frequency of occurrence of violations of carbohydrate metabolism in patients with AMI who have not previously had DM together with 4.5% of new-onset DM amounted to 67.5%.

Relevance

The prevalence of diabetes mellitus (DM) among patients hospitalized with acute myocardial infarction (AMI), ranges from 10% to 20% and is continuously growing. Type 2 diabetes is a significant risk factor for adverse outcomes in patients with AMI.

Aim

To determine the frequency of hidden abnormalities of carbohydrate metabolism in patients without diabetes mellitus in anamnesis coming from acute coronary syndrome in the cardiology Department

Materials and Methods

We examined 310 patients with AMI without diabetes history admitted in the cardiology department of emergency medical care hospital immediately after the onset of his symptoms. We examined the level of glycemia in venous plasma daily three times per day in acute and subacute periods of the AMI. 3 months after discharge from hospital all patients were investigated HbA1c and when the level is higher than 5.7% of them were carried out oral glucose tolerance test with 75g load of glucose.

Results

Disorders of carbohydrate metabolism became extremely common among patients after AMI.

Conclusions

All patients when admitted to hospital because AMI without type 2 diabetes in both acute and subacute periods it is necessary to investigate the glycemie profile 3 times a day for the exception of diabetes mellitus. 3 months after discharge from the hospital is recommended to reclassify patients who had stress hyperglycemia - HbA1c to investigate and conduct oral glucose tolerance test with 75 g of glucose with HbA1c \geq 5.7 per cent. Treatment of diabetes in such

patients will help reduce the rate of relapse, mortality and mortality.

KEYWORDS: AMI, Stress Hyperglycemia, IGT, DM

INTRODUCTION

Relevance

The prevalence of diabetes mellitus (DM) in patients hospitalized with acute myocardial infarction (AMI) is from 10% to 20% and increases continuously. Type 2 diabetes is a significant risk factor for adverse outcomes in patients with acute myocardial infarction. The concept of adverse prognostic role of stress hyperglycemia in the acute phase of MI, regardless of the presence or absence in patients with DM, is common. A number of studies reported an association of hyperglycemia on admission to hospital and the rate of complications in patients with acute coronary syndromes (ACS) with rises or without ST-segment elevation diagnosed with diabetes or without [C. Lazzeri et al, 2013.; Anjan K. et al, 2012.; Mansour AA et al., 2011]. Hyperglycemia > 11.2 mmol / L at admission adversely affect the outcome of treatment of patients with AMI, regardless of the presence of diabetes. Among patients with stress hyperglycemia was detected, dominated by women. The latter refers to the older age group, the white race, more likely to have concomitant cardiovascular disease. [Suzanne V. Arnold et al., 2014]

The prognostic value of initial glucose levels demonstrated for patients receiving reperfusion therapy of MI [Loomba R. S. and Arora R., 2010; Lazzeri C., et al. 2010; Takara et al., 2010]. It is shown that the initial hypoglycemia, possibly due to an inadequate response to stress, and worsens the prognosis of patients with myocardial infarction [Dilip G, 2013; Yang S. et al, 2010.; Frier B. et al., 2011]. However, the concept of maximum metabolic support during acute ischemia and infarction found no clinical evidence in studies with a mixture of glucose-insulin-potassium [C. Apstein et al., 2005].

Retrospectively found to decrease hyperglycemia initial level during the first days of infarction per 0.6 mmol / L (10 mg / dl) accompanied by a reduction in risk of death by 9% after 30 and by 8% after 180 day respectively. This may explain the reduction in mortality achieved in DIGAMI study [K. Malmberg et al., 1995], while reducing hyperglycemia by 1.9 mmol / L, and the absence of a positive effect on prognosis DIGAMI 2 [K. Malmberg et al., 2005] at the reducing hyperglycemia only 0.9 mmol / L.

Perhaps the level of glucose continues to play an important prognostic role not only in the acute phase of myocardial infarction, but also in the long post-MI. The potential harm of hyperglycemia in these patients without previously diagnosed DM at least comparable in comparison with patients who are diagnosed with diabetes. Studies evaluating disorders of carbohydrate metabolism in these patients both in the hospital during the treatment of myocardial infarction, and after discharge from the hospital, is not enough.

AIM

To determine the frequency of undiagnosed earlier carbohydrate metabolism disturbances in patients without diabetes, a history of coming with acute coronary syndrome in the cardiology department, to reduce the incidence of myocardial infarction complications and mortality

MATERIALS AND METHODS

The study involved 310 patients with acute myocardial infarction (AMI) without a history of DM admitted to cardiology department of emergency hospital immediately after the onset of his symptoms. In 154 cases, the results of electrocardiography stated MI with tooth Q, 156 - infarction without tooth Q. The criteria for the diagnosis of AMI is to increase after 6 hours and decreased in 1-2 weeks cardiac troponin levels and /or a relatively more rapid dynamics of MB-fraction of creatine phosphokinase blood in combination with at least one of the following: clinical signs of myocardial ischemia, the occurrence of pathological tooth Q, as well as depression or ST-segment elevation on the electrocardiogram, and their removal with coronary intervention. We studied the glucose levels in the venous plasma daily three times a day in acute and subacute MI periods. Depending on the level of glycemia during hospital stay of all patients were divided into four groups: Group 1 consisted of patients (N = 39) had glycemia at admission from 2.0 to 3.3 mmol /L, 2nd (N = 80) - from 3.4 to 14.9 mmol /L, the third (N = 163) - from 15.0 to 23.0 mmol /L, 4-th (N = 28) - 2.0 to 16.0 mmol /L of fasting and postprandial respectively. Of the excluded studies 4.5% of patients (n = 14), in which a stationary phase at admission were diagnosed with new-onset type 2 diabetes. The diagnosis of "new-onset diabetes" is supported by studies of glycated hemoglobin (HbA1c), defined by high performance liquid chromatography $\geq 6,5\%$. $HbA1c \leq 6,4\%$ level eliminates overt "newly diagnosed with type 2 diabetes." In all other cases, both basal and postprandial hyperglycemia in normal HbA1c level exhibited symptomatic or diagnosed with stress hyperglycemia.

These patients were prescribed high protein diet. If postprandial glycemia in the first day was higher 7,8mmol /L, the patient was administered subcutaneously once a short-acting insulin 1 unit of calculation per 2,2mmol /L higher 7,8mmol /L. The need for each subsequent administration solved endocrinologist and dependent on blood glucose. After 3 months after discharge of the patient from the hospital, all patients studied HbA1c and oral glucose tolerance test was carried out with a load of 75g of glucose.

RESULTS

All patients HbA1c and performed oral glucose tolerance test (OGTT) at the level of $\geq 5,7\%$ at 3 months after discharge from hospital was investigated. Disorders of carbohydrate metabolism were extremely common among patients with acute myocardial infarction. As a result of OGTT at 30.9% revealed impaired glucose tolerance (IGT), and even at 32.1% - DM (Table 1). If we add 4.5% overt type 2 diabetes, first diagnosed on admission to hospital, with a total frequency of occurrence of various forms of carbohydrate metabolism disturbances in patients with acute myocardial infarction admitted to hospital without which took place earlier DM was 67.5%.

Interestingly, a number of patients with hypoglycemia and normoglycemia on admission to hospital in the later stages of the hospital treatment of hyperglycemia were detected (Table 1). Conversely, in patients with hypoglycemic states on admission in the subsequent periods of acute and subacute myocardial infarction detected hyperglycemia. Hypoglycemic conditions often recorded in patients older than 75 years who had a shortage of protein supply in the prehospital phase.

Table 1: The Frequency and Nature of Violations of Carbohydrate Metabolism in 3 Months after Hospital Discharge in Patients after Myocardial Infarction

A Group of Patients	Type of Violation of Carbohydrate Metabolism at 3 Months Post-MI			
	Impaired Glucose Tolerance		Diabetes	
	n	HbA1C*	n	HbA1C*
Myocardial infarction with Q wave:				
1-я (n=21)	2	4,90±0,13	4	4,01±0,11
2-я (n=54)	18	5,40±0,29	10	8,25±1,40
3-я (n=63)	3	5,20±0,13	6	8,93±3,12
4-я (n=16)	11	5,69±0,16	2	6,98±0,55
Myocardial infarction without Q wave:				
1-я (n=18)	-	5,20±0,13	2	4,30±0,12
2-я (n=26)	16	5,40±0,32	9	8,50±1,47
3-я (n=100)	-	5,40±0,32	8	10,13±1,08
4-я (n=12)	2	5,60±0,12	2	6,89±1,26

Noteworthy is the absence of a correlation level of HbA1c and blood glucose numbers characteristic of IGT or diabetes. Apparently, one cannot ignore the glycaemia 1 hour after taking 75g of glucose (half that of the patients with impaired glucose metabolism was higher than 10mmol /L).

CONCLUSIONS

- In all patients on admission to hospital with acute myocardial infarction without the presence of type 2 diabetes in both acute and sub-acute in periods necessary to investigate the glycemc profile 3 times a day to avoid DM.
- When the stress hyperglycemia, the patient should be assigned to high-protein diet. If blood glucose is stored >7, 8 mmol /L in plasma of venous blood several times during the day, it is recommended that administration of short-acting insulin 1 unit of calculation per 2,2mmol /L higher 7,8mmol / l. If the glucose level in the patient is maintained at ≤ 7, 8 mmol /L, the patient did not need insulin injections.
- Within 3 months after discharge from hospital is recommended to reclassify patients who had stress hyperglycemia in the acute and subacute periods MI - explore HbA1c and hold an oral glucose tolerance test with 75 g glucose level HbA1c≥5, 7%. Treatment of diabetes in these patients to help reduce the rate of recurrence of myocardial infarction, prevent early development of diabetes complications.

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APPENDICES

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Abbreviations

HbA1c - glycated hemoglobin

MI - myocardial infarction

IGT - impaired glucose tolerance

OGTT - oral glucose tolerance test

AMI - acute myocardial infarction

ACS - acute coronary syndrome

DM – diabetes mellitus