

## **Effect of Glycemia on Early Prognosis of Patients with a History of Myocardial Infarction without 2 Type Diabetes**

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**Abstract:** Goal. To determine the effect of glycemic levels recorded during hospitalization for myocardial infarction (MI) on the early prognosis of patients without previously diagnosed diabetes mellitus (DM - 2).

**Material and methods.** A prospective examination of 296 patients was performed. Three groups were formed according to the level of glycemia at admission: I -  $\leq 4.0$  mmol/l (7.4%); II - 4.01–7.79 mmol/l (69.9%); III —  $\leq 7.8$  mmol/l (22.6%). The frequency of carbohydrate metabolism disorders and development of MI complications in the hospital period was studied.

**Results.** In 2/3 of patients with glycemia  $\leq 7.8$  mmol/l at admission, later according to the standard glucose tolerance test (CTG) carbohydrate metabolism disorders were detected: prediabetes (36.9%) and type 2 diabetes (32.3%). Patients III in group III were more likely to have three-fold increase in coronary artery disease (41.8%) and MI complications: congestive left ventricular failure - 52.2% vs 27.3% in group I and 34.1% in II group II ( $p=0.017$ ), cardiogenic shock - 26.9% vs 4.5% and 6.8% ( $p<0.001$ ), conduction disturbances — 27.3% vs 9.1%

and 11.7% ( $p=0.006$ ), hospital mortality — 13.8% vs 4.5% and 4.4% ( $p=0.025$ ). The risk of death in patients with glycaemia  $\leq 7.8$  mmol/L was 3.48 (95% CI: 1.41–8.60) times higher than in patients with normal glycaemia ( $p=0.007$ ). The glycemic index at admission was independently associated with the development of MI complications in the hospital period — OR=1.128; 95% CI: 1.005–1.266 ( $p=0.042$ ), along with age, depth of myocardial damage, and systolic blood pressure at admission.

**Conclusion.** Early MI complications were more common among patients without a history of DM-2 who had a glycemic index at admission of  $\leq 7.8$  mmol/l (22.6% of patients), more frequent early complications of MI, and the risk of hospital mortality was 3 times higher than in other patients. The glycemic index at admission was an independent predictor of an unfavorable prognosis for MI in patients without previously diagnosed DM-2 and should be used in secondary prevention measures.

**Keywords:** admission glycemia, hyperglycemia, myocardial infarction, early prognosis.

### **Introduction**

For several decades, the problem of glycemic variability in response to acute maladaptation of the body in myocardial infarction (MI) has been studied [1-2]. To date, specialists have not come to a consensus on the limits of acceptable glycemic

values  $y$  in patients with ИМ MI in the first days of treatment that do not require correction, which makes it difficult to monitor such conditions and treat them [1-3].

Most researchers evaluated hypoglycemia (GG) in ИМ MI in patients with сахарным диабетом (DM - 2) [2, 4-5]. It has been proven that in such patients ГГ практически, GH almost twice doubled - the state mortality rate, as well as the probability of other complications, such as фибрилляция ventricular fibrillation, cardiogenic shock, and congestive left ventricular failure [6, 7]. In the presence of DM-2, a U-shaped mortality curve was revealed, indicating том, that both low так and high levels of glycemia  $y$  in patients with MI are associated with a high frequency of adverse outcomes [3, 9].

Повышенные уровни гликемии у пациентов без According to other researchers, elevated glycemic levels in patients without DM-2 данным других исследователей недоста- are often poorly diagnosed and corrected in a timely коррекции manner [3, 8]. However, published studies that suggest том, that the prognosis of patients with GH with a history of MI по поводу ИМ without diabetes mellitus (DM) в анамнезе may be even worse than  $y$  in patients with DM [3] require close attention and further шегостudy. In patients without previously verified до- DM - 2, researchers identified both a U- ную shaped mortality curve and a direct linear relationship with the level of diabetes.

However, hypoglycemia at admission and its impact на оно-prognosis in MI in this group of patients крайне are rarely evaluated, and conclusions are contradictory [4, 10]. Таким Thus, monitoring of glycemia  $y$  in patients without СД-2 a history of DM-2 анамнезе is an important goal for determining the management of patients with ИМ MI.

The aim of the study was to determine the effect уровней of glycemic levels recorded during hospitalization for MI on early  $y$  prognosis in patients without previously diagnosed DM-2.

### Material and methods

A continuous sample of patients возра- creaged <80 years who were hospitalized for MI in the First вую City Clinical Hospital named after Е. Е. вич Volosevich in Arkhangelsk for one year was examined. The study included 364 patients (63.4% men). The diagnosis  $y$  of MI in patients was verified according to the universal definition of the European Society of Cardiology from 2007. г. Of these  $y$ , 68 patients had a history был of DM-2, and therefore they were excluded from subsequent analysis; - лиза, выборка the prospective study sample consisted of 296 patients. собрана Information was collected on the time of admission to the hospital, the primary and localization of MI, the presence of concomitant diseases: obesity, arterial hypertension, кровообраща history of acute cerebrovascular accident- (ACVI), smoking, systemic го thrombolysis, coronary angiography and balloon angioplasty (BAP) of the coronary arteries with stenting- нием, the presence of complications, as well as the outcome of MI. The тывались data on systolic blood pressure (SBP) and heart rate at admission and the results of laboratory examination were taken into account: the level of creatine phosphokinase а- тинфосфокиназы (СРК) and its MV fraction.

Patients with stabilization of the state after MI for 10-14 days. In the absence of м- anaesthetic or first выявленных - time signs of diabetes в утренние часы, a standard тест толерантно- glucose tolerance test (CTG) was performed in the morning hours after hospitalization. Glucose levels were measured on an empty stomach and 2 hours after exercise. Criteria for the diagnosis of impaired tolerance to глюглауcoma козе and newly diagnosed DM - 2 (CHD-2) were used according to WHO (1980, revised 2006).

Statistical analysis was performed using программы the SPSS for Windows v. 13.0 program. Quantitative при- signs with a different distribution from the normal distribution are presented in the form of median (Me) and percentile ranking- вания (25 and 75 percentiles). The differences between the study groups were estimated using nonparametric (U - кри-



## According to the results of coronary angiography , patients with glycemia >4.0 mmol/l were significantly more likely

имели трех- compared to patients with reduced glycemia, - мии 13.6 % of patients in i group I, 41.5% in ii group II, and 41.8% in group III had cardiovascular damage to the coronary arteries в iii группе (p=0.036). However , no было найдено intergroup differences were found in the tactics of restoring coronary blood flow, в including. the frequency of using thrombolytic therapy - 22.7%, 30.2% and 29.9%, respectively (p=0.763) and BAP with stenting— 27,3%, 42,0%, 44,8%, соответ- accordingly, (p=0.341). Conservative лечение treatmenty-was carried out according to the existing standards of therapy. In 34 (50.9%) patients iii of group III значения , glucose values at admission were >10.0 mmol/ l, у in 30.9% of patients in this group проводилась , insulin therapy was performed и- нотерапия in the hospital to correct GH.

У Patients iii of group III were поступлении significantly a- more likely to have major complications of the MI hospital period ИМ (Table 2). У 79.1% of patients in this group had Killip Killip ii–iV OS, у 35.8% — нарушения ритма had cardiac arrhythmias, у and 27.3% — нару шения had conduction disorders. Such rare MI complications as gastrointestinal bleeding, разви ONMC development, and стент thrombosis стента, were observed only in patients from the normoglycemic group— 1,0%, 2,4%, 5,6%, accordingly, however, no statistically significant intergroup differences were found in these indicators (p=0.646, p=0.534, p=0.223, соот- respectively ответственно).

The hospital mortality rate of the total sample of patients was 7.1%. The level of hospital mortality (Table 2) in patients with hypertension и □ кеми 7.8 mmol/ l (13.8%) was 3 times higher тако- вой у than in patients with reduced уровнем glycemia and с normoglycemia at admission (p=0.025). Glycemia at admission in deceased patients was significantly higher than in discharged patients — 7.5 (6.6–12.3) vs 5.9 (5.1–7.4) mmol/ l (p<0.001).

### Risk of летального death in case of glycemia

>7.8 mmol/ L was 3.48 (95% CI: 1.41–8.60) times higher than при normal значениях glycemic values (p=0.007).

The frequency комбинированной of the combined endpoint among all patients was 61.6%. Многофакт Multivariate торный analysis showed (Table 3) that the level of glycemia at admission was an independent predictor of the development of an unfavorable prognosis, and with an increase in the value of glycemia by 1 mmol/l , the risk of complications during госпитализа- ции hospitalization increased by 12.8% (p=0.042). Blood glucose и- levels at admission у in patients with наличием MI complications were also higher than пациен- in patients without complications during период the hospitalization period — 6.3 (4.9–6.5) vs 5.8 (5.3–8.1) mmol/ l (p=0.002). Factors that independently affected the prognosis were also the patients ' age, Q wave presence, and о- вень SBP level at admission.

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