



## Influence of Diabetes Mellitus on the Clinical Course of Myocardial Infarction

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**Abstract:** Type 2 diabetes mellitus is a global problem of the entire healthcare system, not only in our country, but throughout the world. Diabetes mellitus is an independent factor risk factor that aggravates the course of cardiovascular pathology, in particular myocardial infarction myocardium. The clinical course of myocardial infarction in patients with diabetes in most cases proceeds without clear clinical manifestations. In this regard, a comparative assessment of the characteristics of the course of myocardial infarction in patients with or without type 2 diabetes mellitus was carried out. Myocardial infarction with type 2 diabetes is more common in women, associated with the presence of comorbid pathologies such as arterial hypertension (78.2%), coronary heart disease (69.4%), abdominal obesity (72.3%). In patients with type 2 diabetes, an atypical course of myocardial infarction with damage to all layers of the heart muscle is more common.

**Keywords:** diabetes mellitus, myocardial infarction, course, features.

**Introduction.** Diabetes mellitus (DM) remains one of the leading problems of modern medicine and is a highly costly chronic disease for the healthcare system in all countries of the world. In recent years, the number of patients with diabetes in the world has increased tenfold, according to the forecasts of the International Diabetes Federation (IDF), the total number of people with diabetes worldwide will increase from 537 million (8.8%) to 783 million (10.4%) by 2045 [1,2,7]. The main threat for patients with DM is macrovascular complications (primarily myocardial infarction (MI), whose share in the structure of total mortality reaches 65%. Patients with type 2 diabetes are twice as likely to die from cardiovascular events as without it, and 17 times more likely to suffer from amputations of the lower extremities due to peripheral macrovascular diseases. By the time the diagnosis is verified, 25% of patients with type 2 diabetes have retinopathy. Among those suffering from diabetes for 20 years, 40% of patients have nephropathy. In most developed countries, diabetes mellitus ranks third in the overall structure of mortality. Patients with type 2 diabetes have the same degree of risk of premature death as those who have had myocardial infarction without type 2 diabetes [16-18]. .

For patients with diabetes, an atypical course of myocardial infarction is characteristic, without pain and clear manifestations on the ECG. They are characterized by severe damage to the coronary vessels (which causes recurrent myocardial ischemia), low ability to develop collaterals, low rates of contractility of the left ventricular myocardium, the formation of congestive heart failure, electrical instability of the myocardium with the development of severe rhythm and conduction disturbances, as well as reduced fibrinolytic activity of the blood. and increased platelet aggregation [3,4,8-11,14,15]. The risk of complications in different periods of MI certainly increases the combination of DM with elevated blood pressure, insulin resistance, dyslipoproteinemia, and hyperfibrinogenemia [5,7,9,12,13].

**Purpose of the study:** to study the features of the clinical course of myocardial infarction in patients with type 2 diabetes mellitus.

**Materials and research methods.** The work was performed on the basis of the Bukhara branch of the Republican Scientific Center for Emergency Medical Care. Case histories of 100 patients with a verified diagnosis of myocardial infarction were analyzed (non-fatal MI), who were treated in the cardio intensive care unit of the center, aged 30 to 80 years. The patients were divided into 2 groups: the first (main) included 47 people with concomitant type 2 diabetes, of which 21 men (44,7%), 26 women (55,3%), the second group (comparison group) included 53 patients with MI without type 2 diabetes, including 32 men (60,4%), 21 women (39,6%). The mean age in the groups was  $65,2 \pm 5,73$  and  $67,1 \pm 7,24$  years, respectively. Patients with unstable angina and exertional angina were not included in the study.

Data obtained from the analysis of case histories and examination of patients, including the results of clinical examination, laboratory and instrumental studies, and treatment of patients, were recorded in a specially designed individual card. All patients received standard MI therapy, including: anticoagulants, antiplatelet agents, nitrates,  $\beta$ -blockers, angiotensin converting enzyme inhibitors/angiotensin II receptor antagonists, aldosterone antagonists, diuretics, calcium antagonists. Statistical data processing was carried out using the methods of variation statistics. To compare relative indicators, Student's t-test was used. Differences were considered statistically significant at  $p < 0.05$ .

**Results.** Analysis of the data obtained showed that most of the examined were aged 54–76 years (Table 1). The predominant gender among patients with concomitant DM was female (55,3%) compared with the group of patients without diabetes, where male patients prevailed (60,3%), respectively ( $p < 0.05$ ).

**Table 1. Distribution of patients with myocardial infarction by sex and age**

Age	Patients with DM				Patients without DM			
	Men		Women		Men		Women	
	abs.	%	abs.	%	abs.	%	abs.	%
31-40	1	4,8	-	-	-	-	-	-
41-50	3	14,3	3	11,53	2	6,25	1	4,8
51-60	6	28,6	8	30,8	5	15,6	2	9,5
61-70	7	33,2	9	34,6	14	43,8	7	33,2
71-80	3	14,3	4	15,4	9	28,1	8	38,1
>80	1	4,8	2	7,7	2	6,25	3	14,3
Total	21	100	26	100	32	100	21	100

Of the comorbidities in patients with DM, 78.2% had arterial hypertension (AH) versus 61,3% in the comparison group ( $p < 0.05$ ). The second most common was coronary heart disease (CHD), observed in 69,4 and 58,7% of patients, respectively. The number of obese persons in the group of patients with MI and concomitant diabetes was significantly higher compared to the control group (59,7% and 29,6%, respectively). Of these, 72,3% of patients had abdominal obesity.

36,2% of patients with DM had concomitant chronic kidney diseases (urolithiasis, chronic pyelonephritis) and 20,6% of patients without carbohydrate metabolism disorders, respectively. Postponed acute cerebrovascular accident (CVA) was observed in 11 (23,4%) patients with diabetes, and 10 (18,9%) patients in the comparison group. Comorbidity was typical for patients with DM. 24 patients with DM (13 women and 11 men) had a history of 3 or more diseases, including coronary artery disease, hypertension, dyslipidemia, stroke, etc.), which, of course, cannot but affect the development and course of MI.

An analysis of the course of MI showed that atypical forms of MI prevailed in patients with concomitant DM (52,1%). Whereas in the comparison group, an atypical course of MI was observed in 20,3% of the examined. The pains were mostly non-intense or absent at all, and their topography was atypical. The painless form of MI was detected in 27,7% of the examined patients, asthmatic - in 12,8%, arrhythmic - in 10,6%, abdominal - in 8,5% and cerebrovascular - in 2,12%. Among patients without DM, the predominant variant of myocardial infarction was anginal (64,2%). The high

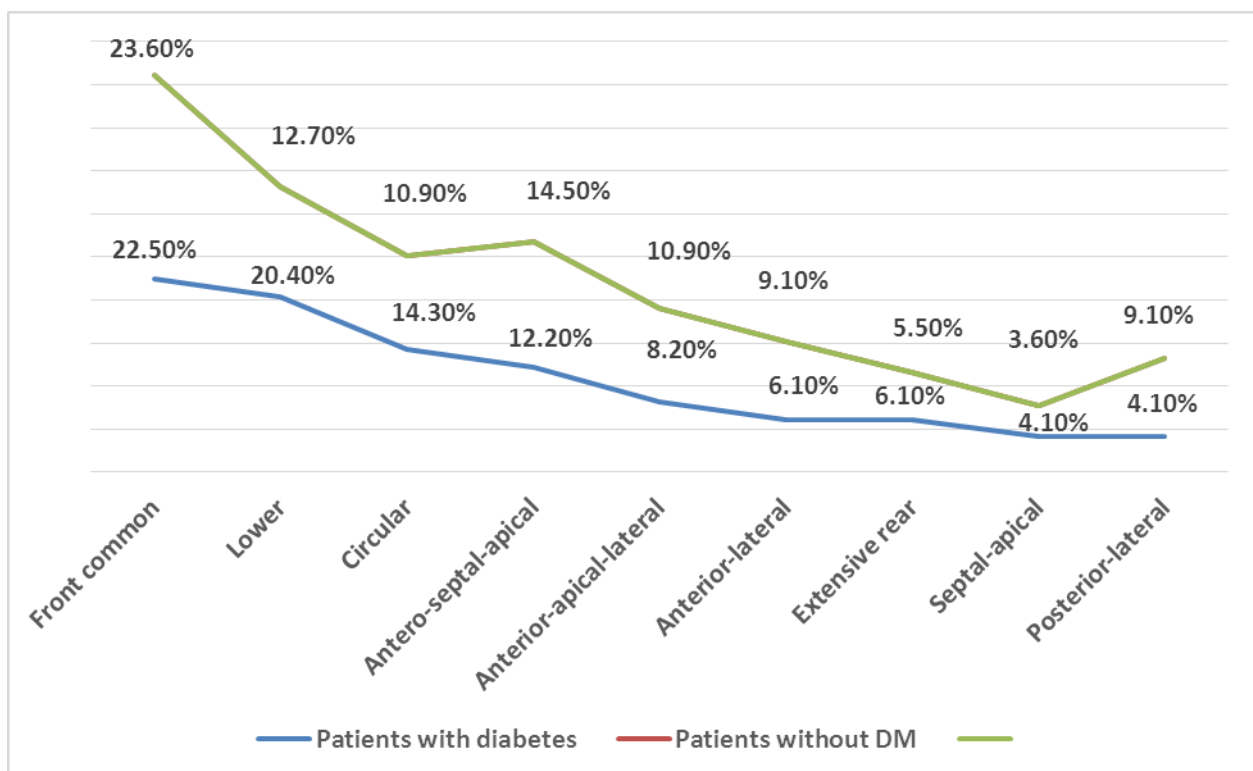
prevalence of painless variant of myocardial infarction in patients with diabetes can be explained by diabetic neuropathy, which causes low pain sensitivity.

The second most common symptom was shortness of breath, which occurred with the same frequency in all patients (in 63,2 and 61,5%, respectively). Such symptoms like nausea, vomiting, sweating, fever to subfebrile numbers were also observed in all examined patients in a low percentage of cases, no differences in frequency of occurrence were obtained. Loss of consciousness was recorded only in one patient with MI with diabetes, which is 2,1%. It was associated with clinical death.

Undoubtedly, the asymptomatic course of MI complicates the timely detection of the disease. Thus, in 9 (19,1%) patients with DM, myocardial infarction was diagnosed only retrospectively, based on the detection of cicatricial changes in the myocardium on the ECG and echocardiographic examination data. 12 (24,5%) patients with concomitant DM required additional ECG leads to establish myocardial infarction.

According to the ECG, patients with type 2 DM were significantly more likely to have Q-wave MI (65,2%). Among patients without carbohydrate metabolism disorders, myocardial infarction both with Q wave and without Q wave was detected equally often (in 49 and 48,3%, respectively. Anterior widespread, inferior, circular, and anterior-septal-apical MI (Fig 2). In patients with DM, the frequency of recurrent MI was high ( $p < 0,01$ ). Previously MI occurred in 15 patients, which is 30,6%. At the same time, the presence of one myocardial infarction in the anamnesis it was noted in 11 people (22,4%), more than two - in 7 (14,3%).

From laboratory tests, hypertriglyceridemia, characteristic of 67% of patients with DM and 39% of patients without DM, drew attention to itself ( $p < 0,05$ ). Glycemic indices in 80% of the examined on the first day were above the norm. Starting from the 2nd day, the elevated level of glycemia persisted only in patients with DM. Normalization of blood sugar occurred by the 7th day. Persistence of hyperglycemia for more than 7 days was an unfavorable sign, causing high mortality. An elevated sugar level for more than a week was noted in one patient who was diagnosed with clinical death.



**Figure.1. Localization of MI in examined patients (according to ECG data)**

The most frequent complications of MI in the group of patients with concomitant DM compared with the comparison group were hypostatic pneumonia (30.6% and 20.0%, respectively), pulmonary edema, cardiac asthma (22,4% and 14,5%, respectively). Cardiogenic shock was observed in 6,1% of

patients with DM and 1,8% of patients without DM. Atrial fibrillation was registered in 18,3% of patients with DM and 12,7% of patients without impaired carbohydrate metabolism. With a frequency (10,2 and 12,7%, respectively), blockade of the legs of the bundle of His and ventricular extrasystole were noted. Left ventricular aneurysm developed in 6,1% of patients from the main group and 1,8% of patients from the comparison group. The rarest complication was clinical death, which was observed in one patient with DM (2,1%).

### Conclusions.

1. Myocardial infarction with type 2 diabetes is more common in women, associated with the presence of comorbid pathologies such as arterial hypertension (78.2%), coronary heart disease (69.4%), abdominal obesity (72.3%).
2. In patients with type 2 diabetes, an atypical course of myocardial infarction with damage to all layers of the heart muscle is more common.
3. The course of myocardial infarction in patients with type 2 diabetes mellitus is more often complicated by the development of hypostatic pneumonia, pulmonary edema, cardiac asthma, and cardiac arrhythmias.

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