



COMPARATIVE ANALYSIS OF STRUCTURAL AND FUNCTIONAL INDICATORS OF THE HEART IN PATIENTS WITH ATRIAL FIBRILLATION DUE TO MYOCARDIAL INFARCTION OF DIFFERENT LOCATIONS

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Annotation: Large epidemiological studies have shown that AF is associated with high mortality and adverse events in patients with AMI. However, the answer of this association is still not clear. According to the literature, atrial fibrillation (AF) complicates the course of myocardial infarction (MI) in 1213% of patients. The appearance of arrhythmia is associated with a worsening prognosis of the disease. Against the background of tachysystole, which often develops with AF, coronary blood flow is depleted and acute heart failure appears. The absence of coordinated atrial systole during fibrillation plays an important role in the development of hemodynamic complications, because the atrial component of diastole provides up to 25% of left ventricular (LV) filling. One of the main reasons for the development of AF during myocardial infarction is considered to be an increase in the hemodynamic load on the atrium with the development of acute left ventricular failure. Against the background of pressure overload, overstrain and stretching of the atrial myocardium occurs, which significantly increases its electrical instability. In addition to acute hemodynamic overload, the causes of AF include ischemia and damage to the atrial myocardium in the case of thrombotic occlusion above the origin of the arteries supplying the atria. After the cessation of the arrhythmia attack, as a rule, hemodynamics and coronary blood flow improve. However, in the case of persistent dysfunction of the left atrium (LA), the risk of distant reversion thromboembolism of the systemic circulation

remains.

Key words: left atrium, Holter monitoring, acute myocardial infarction, atrial fibrillation.

Introduction: Atrial fibrillation (AF), developing against the background of acute myocardial infarction (AMI), is usually recorded with a frequency of 6–21 %.

Large epidemiological studies have shown that AF is associated with high mortality and adverse events in patients with AMI. However, the answer of this association is still not clear. One of the known mechanisms is thromboembolic complications [10,12,15]. Patients with in-hospital onset AF are older and also have a higher incidence of hypertension (HTN) and heart failure (HF), which may contribute to worse outcome. Atrial fibrillation may cause severe ventricular arrhythmias, which can lead to sudden death in these patients. A large number of studies have been conducted in patients with ST-segment elevation myocardial infarction (STEMI), but some studies have also included patients with non-ST - segment elevation myocardial infarction (NSTEMI). However, there are few studies that have examined the relationship between the development of in-hospital AF and clinical outcomes in patients with both STEMI and NSTEMI.

In addition, some studies did not observe an increase in mortality, either in hospital or during long-term follow-up, in patients with AMI and AF that developed during the hospital period, compared with individuals without this rhythm disorder.

Purpose: to conduct a comparative analysis of the structural and functional parameters of the heart in patients with atrial fibrillation against the background of myocardial infarction of various locations.

Materials and methods of research: Ectopic activity in the atria was assessed based on CM data using wearable monitors “Cardiotechnika-04-3”, “Cardiotechnika-04-08M”, “Cardiotechnika-04-AD-3M” (St. Petersburg,

Inkarnat”) and a personal computer with a program for processing records “KT- Result 2”. Electrocardiography (ECG) recording was performed before the start of treatment and was carried out for 24 hours, 72 hours or 7 days, in 12 leads.

Results of the study : On the basis of the Samarkand regional branch of the Republican Specialized Scientific and Practical Medical Center of Cardiology, 84 patients with myocardial infarction and various forms of atrial fibrillation, who made up the main group, were examined. The comparable group consisted of 44 patients with isolated coronary heart disease who had suffered myocardial infarction of various locations. It should be noted that the average age of patients from the main group was 60.8 ± 4.7 years, the average age of the comparison group was 59.2 ± 3.8 .

While conducting an ECG study, we discovered interesting facts. Of the 84 patients with AF+AMI, 52 patients had AMI of inferior localization and 32 patients had AMI of anterior localization. In patients with inferior AMI, the development of AF was often observed against the background of bradycardia. Before the onset of AF paroxysms, the average heart rate among these patients was 51.8 ± 4.6 beats/min. It should be emphasized that in 21 of 52 patients, attacks of AF occurred against the background of severe atrial bradysystole, which was caused by dysfunction of the sinus node. Sinus bradycardia was determined in 18 patients. In three patients, migration of the pacemaker through the atria was observed; the average duration of heart rate was 42.8 ± 2.6 beats/min. Atrial escape rhythm was detected in six patients. In 9 patients, paroxysmal AF developed against the background of the absence of any atrial activity. Idioventricular rhythm was recorded in 4 patients.

In patients with anterior AMI, paroxysmal AF appeared against the background of sinus

tachycardia. The average heart rate was 75.6 ± 10.2 beats/min, ranging from 84 to 140 per minute; in comparison with patients with lower localized AMI and paroxysmal AF, it was significantly higher ($p < 0.0001$). In this group of patients, no rhythm disturbances were found,

which were recorded among patients with damage to the lower myocardial wall. In this group, we recorded only 3 cases with sinoatrial block with atrial replacement rhythm.

Table 1. Holter monitoring among patients with AMI of various locations and with AF

Index	AMI of the inferior wall + AF, (n = 52)	AMI of the anterior wall + AF, (n = 32)	AMI without AF, (n = 44)	P -value
Max. Heart rate	114.3 ± 28.5	124.1 ± 30.3	98.7 ± 24.5	$p < 0.001$
Min. Heart rate	47.8 ± 10.8	49.8 ± 12.1	54.2 ± 13.2	$p < 0.05$
Avg. Heart rate	81.5 ± 15.4	87.3 ± 17.3	77.5 ± 15.3	$p < 0.05$
Isolated PVCs	4 (7.6%)	5 (15.6%)	2 (4.5%)	$p < 0.05$
Insulated PE	32 (61.5%)	23 (71.8%)	4 (9.1%)	$p < 0.0001$
Paroxysms of AF	52 (100%)	32 (100%)	0	$p < 0.0001$

And so, the results of 24-hour Holter monitoring showed that among patients with MI localized in the anterior wall, isolated ventricular and atrial extrasystole and paroxysms of AF were significantly common, it should also be emphasized that among this group the maximum heart rate was 124.1 ± 30.3 , then as among patients with lower myocardial infarction, the maximum heart rate was 114.3 ± 28.5 .

In a comparative echocardiographic analysis of LA sizes between inferior and anterior MI with AF, we found that the volume of the left atrium increases in both groups, but among patients with damage to the anterior myocardial wall, the LA increases more (Table 2).

Table 2. Analysis of the size and volume of the left atrium among patients with AMI of various locations and with AF

Index	AMI of the inferior wall + AF, (n = 52)	AMI of the anterior wall + AF, (n = 32)	AMI without AF, (n = 44)	P -value
LP size (mm)	41.3 ± 5.4	42.2 ± 5.8	37.2 ± 4.6	$p < 0.001$
LA volume (ml)	54.8 ± 11.8	58.9 ± 12.7	48.8 ± 10.8	$p < 0.001$

The LA volume among patients with lesions of the lower myocardial wall averaged 54.8 ± 11.8 , while the LA volume among patients with AMI with lesions of the anterior wall was 58.9 ± 12.7 . In the group of patients with isolated MI, the LA volume was 48.8 ± 10.8 . This increase in LA volume among patients with anterior MI may indicate acute structural remodeling due to hemodynamic overload.

When studying LVEF parameters, no significant differences were observed between the groups. But when

comparing these indicators with the indicators of patients with isolated AMI, it was still reduced.

Thus, LVEF among patients with damage to the lower myocardial wall was 51.5 ± 10.2 , among patients with damage to the anterior wall - 50.8 ± 10.1 , among patients with isolated MI - 56.8 ± 11.3 .

When studying ESV, LV EDV, the average value of these indicators in patients of the second group was higher and amounted to $37.4 \pm$ and $50.9 \pm$, respectively; the data were significantly more

significant than in other groups, $p < 0.0001$. This indicated a more extensive area of myocardial damage in patients of this group, which correlated with a more severe course of the disease. The main differences between the groups were the dynamics of global LV contractility.

Conclusions : Thus , the above data indicate that patients with anterior wall AMI have a high risk of developing both thromboembolic complications due to a significant increase in LA volume, which may indicate acute structural remodeling against the background of hemodynamic overload, and other cardiovascular complications.

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