

## EARLY MARKER AND LIMITED FACTORS OF FUNCTIONAL STATE IN PATIENTS WITH MYOCARDIAL INFARCTION IN COMBINATION WITH ARTERIAL HYPERTENSION

**Summary.** Cardiovascular disease remains the most common cause of death throughout the world. According to the Global Burden of Disease, they account for 31.5 % of all deaths and 45 % of deaths from non-communicable diseases, that exceeds twice the mortality rate of cancer, and also exceeds all infectious, maternal, neonatal and nutritional disorders taken together. Over 75 % of all cardiovascular deaths occur in low and middle income countries, and in Ukraine, cardiovascular mortality is 66.7 %.

**The aim of the study** – to learn the peculiarities of the clinical course of myocardial infarction (MI) with a comorbid pathology occurring on the background of arterial hypertension (AH), to identify the early marker and limiting parameters of the functional parameters of the body and stratification risks to control the effectiveness of the rehabilitation process.

**Materials and Methods.** 371 patients with a myocardial infarction with a comorbid pathology, which took place during the 90-year period of rehabilitation were studied. The basic functional indicators of the body of the patient with MI and their association with hypertension, as well as clinical markers of reduced exercise tolerance and the Charlson comorbidity index were studied.

**Results and Discussion.** Interrelations between arterial hypertension and general-clinical and special functional indicators in patients with MI were analyzed. A direct correlation between AH and age was found ( $r = 0.123$ ;  $P = 0.018$ ), between hypertension and systolic ( $r = 0.253$ ;  $P < 0.0001$ ) and diastolic ( $r = 0.215$ ;  $P < 0.0001$ ) arterial pressure in acute period of the MI, between AH and the comorbidity index ( $r = 0.133$ ;  $P = 0.01$ ), the direct correlation between the hypertension and the thickness of the walls of the left ventricle ( $r_1 = 0.173$ ;  $P_1 = 0.003$ ;  $r_2 = 0.149$ ;  $P_2 = 0.003$ ). There was also an inverse correlation between hypertension and the number of lymphocytes ( $r = -0.197$ ;  $P = 0.015$ ).

**Conclusions.** Indicators of systolic and diastolic blood pressure in the acute phase of MI development are highly sensitive markers of hemodynamic, morphological and functional changes in patients with MI with hypertension and adequately reflect the general functional state of the patient, and therefore should be constantly monitored during the rehabilitation process. The number of peripheral blood lymphocytes and the Charlson comorbidity index are important additional marker and limiting indicators for rehabilitation in patients with MI with AH.

**Key words:** myocardial infarction; arterial hypertension; cardio-rehabilitation; Charlson comorbidity index.

**INTRODUCTION** Cardiovascular disease remains the most common cause of death throughout the world. According to the Global Burden of Disease, they account for 31.5 % of all deaths and 45 % of deaths from non-communicable diseases, that exceeds twice the mortality rate of cancer, and also exceeds all infectious, maternal, neonatal and nutritional disorders taken together. Over 75% of all cardiovascular deaths occur in low and middle income countries, and in Ukraine, cardiovascular mortality is 66.7 %. [1–4].

During the last decade, the treatment of acute coronary syndromes has improved significantly, which has led to a significant reduction in stationary mortality and improvement of the medium- and long-term cardiovascular prognosis. However, the provision of full medical care to patients with myocardial infarction on the background of arterial hypertension (AH) with comorbid pathology (CP) remains a complicated medical problem, which is still not solved [5,6].

**The aim of the study** – to learn the peculiarities of the clinical course of the MI with CP, which occurs on the background of hypertension, to identify the early marker and limited parameters of the functional parameters of the body and stratification risks to control the effectiveness of the rehabilitation process.

**MATERIALS AND METHODS** 371 patients with myocardial infarction who were undergoing acute rehabilitation period in the Cardiology Department of the Ternopil University Hospital were examined and were sequentially included in the local registry. The diagnosis was established in accordance with the effective protocols of treatment and rehabilitation [7–9]. Criteria for involving patients in the study were confirmed by the diagnosis of MI and written informed consent of patients to participate in the study. Acute infectious and mental illnesses, decompensation of concomitant pathology, presence of hemodynamically significant heart defects and

surgical revascularization of the infarct-dependent vessel were the criteria for non-involvement of patients in the study.

In order to assess the degree of comorbidity in patients with MI with concomitant pathology, Charlson comorbidity index [10] was used. The morphometric parameters of intracardiac hemodynamics were evaluated using an echocardiographic method on a Philips HD11XE (USA) device, in accordance with the recommendations for the ultrasound examination of the American Society for Echocardiography and the European Association for Echocardiography (ASE/EAS 2015). Electrocardiograms were registered with the help of ECG device UTAS. Laboratory methods were performed according to standard methods and included a general blood test, a coagulogram, a biochemical blood test (glucose, bilirubin, transaminase, creatinine, urea, uric acid, blood plasma lipid spectra: total cholesterol, triglycerides, high and low density lipoprotein).

Functional reserves of the cardiovascular system were determined by the method of point scoring of its individual parameters: with the size of the left ventricular ejection fraction more than 55 % – 1 point, 45–55 % – 2 points, 30–45 % – 3 points and less than 30 % – 4 points. In the same way, according to NYHA evaluation of heart failure was performed: FC I – 1 point, FC II – 2 points, FC III – 3 points and FC IV – 4 points and the status of the risk of cardiovascular events according to the rehabilitation classification (Nikolaeva L.F., Aronov D.M., 1988): FC I – 1 point, FC II – 2 points, FC III – 3 points and FC IV – 4 points. Post-infarction patients were divided into groups of small, medium and high risk, with the corresponding assignment of 1, 2 and 3 points according to GRACE scale and the risk of cardiovascular events (AHA) [11]. The six-minute walk test [12] was performed and evaluated on the 10th, 30th and 90th day after the patient's admission at the clinic.

Statistical analysis was performed using MS Excel 2000 and EViews 5.1 software. For quantitative variables average values and standard deviations were calculated, absolute variables and percentage shares for each category were calculated for categorical variables. For quantitative variables, the statistical significance of the differences between groups of patients with concomitant pathology and non-concomitant pathology was investigated using the Student t-criterion for independent samples. The analysis of the comparability of the distribution of qualitative (categorical) characteristics in the groups was carried out using criterion  $\chi^2$  (categorical variables are presented as absolute numbers for each category). In the analysis of the relationships between quantitative indicators, the standard Pearson correlation coefficient was calculated; between the quantitative and categorical (in 2 categories) indicators were used point biserial correlation coefficient, between quantitative and categorical (more than 2 categories) – dispersion ANOVA analysis and coefficient (eta-square), while the analysis of the relationships between the two categorical indicators is the ratio of the Yule's coefficient association (the connection was considered as confirmed, when the coefficient of association according to the module exceeded 0.5). When using all other statistical criteria and means of analysis, the differences and relationships were statistically significant when  $P < 0.05$  [13,14].

**RESULTS AND DISCUSSION** Anamnesis of AH is often found in patients with acute myocardial infarction, and the combination of hypertension with females, diabetes, elderly

age, vascular pathology, and rarely smoking is a risk profile that is quite characteristic of a comorbid hypertensive patient with myocardial infarction. Antecedent hypertension is associated with higher rates of mortality and morbidity both during the acute period and in the remote period of MI, especially in the case of complications of left ventricular dysfunction and/or congestive heart failure [15].

According to the study, patients with a history of myocardial infarction were (66.2±10.4) years old, the time from the appearance of the first symptoms of the disease to the moment of hospitalization was an average of (20.3±15.1) hours. Among all patients, there were 249 (67.12 %) men and 122 women (32.88 %); 73 (19.7 %) patients were residents of the city and 298 (80.3 %) were residents of the village. In the overwhelming number of the patients (93.8 %), concomitant pathology was detected. The basic functional parameters of patients with MI (Table 1) reflected metabolic disturbances, changes in the activity of the indicators of the congestive system and markers of myocardial necrosis of various severity degrees, as well as the presence of moderately-expressed hyperdynamic syndrome of cardiovascular system functioning, which was compensatory in nature in the examined patients. In patients with MI, which developed on the background of concomitant pathology, the levels of glycemia and the smaller number of lymphocytes in the peripheral blood were significantly higher in comparison with patients without comorbidity, indicating the severity of metabolic changes and rate of strain of the adaptive capacity of the body.

**Table 1. Basic functional parameters in patients with acute myocardial infarction (M±m)**

Factor	Patients without CP (M±SD)	Patients with CP (M±SD)	P-value (T-test)
HR in the acute phase of MI, bpm	79.773±22.467	84.716±25.925	0.383
SBP in the acute phase of IM, mm Hg	127.045±20.797	133.994±30.644	0.295
DBP in the acute phase of IM, mm Hg	77.955±11.303	82.464±16.093	0.197
LVEF, %	51.500±6.048	45.817±7.620	0.001
RR br/min	18.409	20.464	1.593
Erythrocytes, $\times 10^{12}/l$	4.631±0.455	4.306±0.697	0.032
Hemoglobin, g/l	135.773±25.396	130.406±21.783	0.268
Leukocytes, $\times 10^9/l$	8.874±2.738	9.317±3.745	0.586
Lymphocytes, %	27.773±15.430	20.257±11.751	0.005
Thrombocytes, $\times 10^9/l$	162.833±56.747	195.099±87.633	0.380
ESR, mm/h	13.182±9.752	17.732±14.576	0.150
Glucose, mmol/l	5.635±1.304	8.921±4.687	0.002
Bilirubin, mg/l	13.386±11.326	10.760±6.931	0.101
Creatinine, $\mu\text{mol}/l$	83.864±23.234	106.834±89.725	0.232
Troponin T, ng/ml	1040.351±322.958	1257.691±887.421	0.014
TC, mmol/l	5.211±1.689	4.832±1.463	0.245
HDL, mmol/l	1.209±0.394	1.166±0.633	0.768
LDL, mmol/l	3.749±1.547	3.228±1.282	0.098
Fibrinogen, g/l	4.245±1.092	4.939±4.403	0.462
INR, u/l	1.111±0.115	1.101±0.290	0.866
SpO <sub>2</sub> , %	96.000±1.569	94.199±4.155	0.107
CCI, points	2.259±1.324	4.714±1.765	<0.0001
6MWT <sub>10</sub> , m	128.769±24.032	72.32±32.79	<0.0001
6MWT <sub>30</sub> , m	201.154±46.07	128.742±46.054	<0.0001
6MWT <sub>90</sub> , m	307.308±79.594	200±67.868	<0.0001

Note. CP – comorbid pathology, HR – heart rate, SBP – systolic blood pressure, DBP – diastolic blood pressure, LVEF – left ventricular ejection fraction, RR – respiratory rate, INR – international normalized ratio, TC – total cholesterol, HDL – high-density lipoproteins, LDL – low-density lipoproteins, INR – international normalized ratio, SpO<sub>2</sub> – arterial oxygen saturation, CCI – Charlson comorbidity index, 6MWT<sub>10</sub> – six-minute walk test on the 10th day of rehabilitation, 6MWT<sub>30</sub> – six-minute walk test on the 30th day of rehabilitation, 6MWT<sub>90</sub> – six-minute walk test on the 90th day of rehabilitation

Exercise tolerance test (6MWT on the 10th, 30th and 90th days of rehabilitation) and left ventricular ejection fraction reflecting the degree of disturbance of systolic function of the heart were also relatively lower in patients with AH. The functional class according to NYHA was high ( $2.9 \pm 0.7$ ), and the risk according to GRACE and AHA (American Heart Association) – high and very high ( $2.9 \pm 0.3$ ) and ( $2.7 \pm 0.6$ ) respectively. Rehabilitation and hemodynamic potential, which are reflected by the functional class for rehabilitation classification and parameters of the systolic function of the left ventricle, measured during echocardiography, indicated a significant depletion of the functional reserves of the cardiovascular system. Thus, the functional class according to the echocardiography was ( $2.9 \pm 0.8$ ) points, and the class according to the rehabilitation classification was ( $3.3 \pm 0.7$ ).

Most researchers [16–18] emphasize that the presence of comorbid pathology can significantly reduce functional reserves and rehabilitation potential in patients with MI and, accordingly, requires special, not described in modern protocols approaches to their rehabilitation. Our previous studies [19–22] also confirmed the depletion of functional capabilities of both cardiovascular and other systems of the body of a comorbid patient, which was reflected by different degrees of deviation from the norm of marker indices.

As a result of the statistical analysis of the relationship between arterial hypertension and general-clinical quantitative functional indicators (Table 2), a direct correlation between AH and age, between AH and the levels of SBP and DBP in the acute MI period, between AH and comorbidity index was recorded. The obtained data on the moderate correlation between hypertension and the age of patients in the sample studied were consistent with the general trends in increasing blood pressure levels with age in general in the human population. The same applies to the levels of SBP and DBP in the acute phase of MI development.

According to scientific sources, in contrast to the negative effects associated with previous hypertension, higher systolic pressure at the beginning of breast pain is associated with a lower mortality for 1 year from coronary occlusion, whereas high blood pressure, recorded after hemodynamic stabilization from acute ischemic event, has incongruous relationships with recurrent coronary events

in the long-term observation period. The presence of hypertension in the acute period in patients with MI prevents further ischemic relapse. Excessive reduce in diastolic pressure may endanger coronary perfusion and lead to new acute coronary events, although the exact cause-and-effect mechanisms underlying this phenomenon need further evaluation. [15].

In the study of comorbidity quantitative assessment, a reliable correlation between the comorbidity index in patients with MI with the presence of AH was established, which is confirmation of the results of other researchers [10,16] about the possibility of using this coefficient as a marker of the degree of comorbidity precisely in cardiological patients.

Analysis of the interdependence between arterial hypertension and changes in morpho-functional indexes of the heart (Table 3) showed a direct correlation between the hypertension and the thickness of the interventricular septum, between the hypertension and the thickness of the back wall of the left ventricle. There was also an inverse correlation between hypertension and pulmonary hypertension. It should be noted that the levels of pulmonary hypertension in the examined patients did not go beyond the reference norm. The results of our study coincide with the scientific data of other authors regarding the mentioned hemodynamic and structural changes of the left ventricular myocardium and associated with the mechanisms of adaptation of systemic hemodynamics to prolonged increase in blood pressure [24–25], which manifests itself as a violation of the remodeling processes of the cardiac cavities from the influence of multi-directional factors – necrosis of the myocardium and myocardial hypertrophy. That is precisely why it is possible to explain the preservation of the index of the LVEF release at a rather high level.

In studying the dependence of laboratory quantitative indicators on the presence or absence of arterial hypertension (Table 4), an inverse correlation between hypertension and the number of lymphocytes was detected. Negative dynamics of the number of lymphocytes in peripheral blood in patients with MI was confirmed today by a small number of studies [26–28] and may indicate a depletion of the reserves of the immune system as a result of a long systemic inflammatory process, which is considered systemic atherosclerosis. Therefore, the detection of lymphocytopenia or

**Table 2. Dependence of general-clinical quantitative factors in patients with myocardial infarction due to arterial hypertension**

Factor	Average value in patients with AH	Average value in patients without AH	Standard deviation	Share of patients with AH	Share of patients without AH	Point biserial correlation	P-value
Age, years	66.698	63.143	10.407	0.849	0.151	0.123	0.018
HR in acute phase of MI, bpm	83.632	88.875	25.733	0.849	0.151	-0.073	0.160
SBP in acute phase of MI, mm Hg	136.791	115.536	30.174	0.849	0.151	0.253	<0.0001
DBP in acute phase of MI, mm Hg	83.635	74.107	15.874	0.849	0.151	0.215	<0.0001
RR br/min	20.473	19.607	3.505	0.847	0.153	0.0889	0.089
SpO <sub>2</sub> , %	94.146	95.065	4.092	0.856	0.144	-0.079	0.159
CCI, points	4,671	3,993	1,830	0,849	0,151	0,133	0,010

**Note.** AH – arterial hypertension, MI – myocardial infarction, HR – heart rate, SBP – systolic blood pressure, DBP – diastolic blood pressure, RR – respiratory rate, SpO<sub>2</sub> – arterial oxygen saturation, CCI – Charlson comorbidity index.

Table 3. Dependence of morpho-functional indexes of heart in patients with MI from the presence of arterial hypertension

Factor	Average value in patients with AH	Average value in patients without AH	Standard deviation	Share of patients with AH	Share of patients without AH	Point biserial correlation	P-value
Aorta size, cm	3.514	3.407	0.427	0.855	0.145	0.088	0.121
Left atrium size, cm	3.694	3.734	0.496	0.845	0.155	-0.029	0.619
End-diastolic diameter, cm	4.993	5.051	0.577	0.849	0.151	-0.036	0.533
Interventricular septum thickness, cm	1.210	1.036	0.460	0.853	0.147	0.149	0.010
Left ventricular posterior wall thickness, cm	1.128	1.051	0.159	0.855	0.145	0.173	0.003
LVEF, %	46.4	44.844	7.649	0.857	0.143	0.071	0.207
Right ventricle size, cm	2.473	2.3	3.223	0.853	0.147	0.019	0.752
Pulmonary hypertension, mm Hg	13.713	20.022	20.113	0.855	0.145	-0.111	0.050

Table 4. Dependence of laboratory quantitative indicators in patients with MI on the presence of arterial hypertension

Factor	Average value in patients with AH	Average value in patients without AH	Standard deviation	Share of patients with AH	Share of patients without AH	Point biserial correlation	P-value
Leucocytes, $\times 10^9/l$	9.300	9.239	3.691	0.847	0.153	0.006	0.910
Stab, %	9.952	9.143	8.198	0.847	0.153	0.036	0.497
ESR, mm/h	17.550	16.946	14.363	0.847	0.153	0.015	0.773
Lymphocytes, %	20.057	24.321	12.110	0.847	0.153	-0.127	0.015
Glucose, mmol/l	8.8795	7.972	4.626	0.844	0.156	0.071	0.178
Bilirubin, mg/l	11.022	10.333	7.283	0.854	0.146	0.033	0.529
Creatinine, mcmol/l	108.129	90.571	87.348	0.848	0.152	0.072	0.166
Fibrinogen, g/l	4.815	5.35	4.279	0.847	0.153	-0.045	0.391
Troponin, ng/ml	1274.545	1059.548	916.162	0.853	0.148	0.040	0.508
TC, mmol/l	4.864	4.805	1.478	0.859	0.141	0.014	0.794
HDL, mmol/l	1.183	1.088	0.621	0.848	0.152	0.055	0.319
LDL, mmol/l	3.264	3.213	1.301	0.859	0.141	0.014	0.805
INR	1.099	1.113	0.282	0.855	0.145	-0.017	0.750
Thrombocytes, $\times 10^9/l$	195.689	116	85.795	0.961	0.039	0.181	0.115

**Note.** AH – arterial hypertension, ESR – erythrocyte sedimentation rate, TC – total cholesterol, HDL – high-density lipoproteins, LDL – low-density lipoproteins, SpO<sub>2</sub> – arterial oxygen saturation, INR – international normalized ratio.

an acute negative dynamics of this indicator should serve as a criterion for the temporary restriction of rehabilitation measures.

The analysis of the relationship between the risk of cardiovascular events with the presence of hypertension in the acute phase of the development of MI neither on the GRACE scale, on the AHA risk scale, nor on the basis of the traditional rehabilitation classification did not reveal a reliable correlation, therefore it is inappropriate to use them as stratification for the distribution of comorbid patients in rehab programs. Instead, indicators of exercise tolerance in different rehabilitation periods (6MWT<sub>10</sub>, 6MWT<sub>30</sub>, 6MWT<sub>90</sub>), as well as the left ventricular ejection fraction and the Charlson comorbidity index, were sufficiently sensitive to blood pressure levels in the acute phase of MI development. Therefore, **the prospect of further research** is the study of markers and limiting possibilities of these indicators in patients with MI with hypertension.

**CONCLUSIONS** 1. Indicators of systolic and diastolic blood pressure in the acute phase of MI development, which are highly sensitive markers of hemodynamic, morphological and functional changes in patients with MI with hypertension, adequately reflect the general functional state of the patient during the rehabilitation program, and therefore should be constantly monitored during the rehabilitation process.

2. Negative dynamics of the number of lymphocytes in peripheral blood in patients with MI with AH indicates the boundary tension of the functional reserves of the immune system, which can serve as a criterion for the temporary restriction of rehabilitation measures.

3. The comorbidity index reliably reflects the functional state of the patient's body on the MI with AH, determines the degree of changes in the main limiting factors of the functional capabilities of the patient's body, therefore it is expedient to include it in the functional diagnosis for stratification of the risks of cardiopulmonary rehabilitation.

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## РАННІ МАРКЕРНІ ТА ЛІМІТУЮЧІ ПОКАЗНИКИ ФУНКЦІОНАЛЬНОГО СТАНУ У ХВОРИХ НА ІНФАРКТ МІОКАРДА В ПОЄДНАННІ З АРТЕРІАЛЬНОЮ ГІПЕРТЕНЗІЄЮ

**Резюме.** Серцево-судинні захворювання залишаються найпоширенішою причиною смерті в усьому світі. За даними Global Burden of Disease на них припадає 31,5 % від усіх смертей і 45 % смертей від неінфекційних захворювань, що вдвічі перевищує смертність від раку, а також усі інфекційні, материнські, неонатальні та харчові порушення разом узяті. Понад 75 % усіх серцево-судинних смертей відбуваються в країнах із низьким і середнім рівнями доходу, в Україні серцево-судинна смертність становить 66,7 %.

**Мета дослідження** – вивчити особливості клінічного перебігу інфаркту міокарда (ІМ) із коморбідною патологією, який відбувається на тлі артеріальної гіпертензії (АГ), виявити ранні маркерні й лімітуючі параметри функціональних показників організму та стратифікаційні ризики для контролю за ефективністю реабілітаційного процесу.

**Матеріали і методи.** Досліджено 371 хворого на інфаркт міокарда з коморбідною патологією, які проходили 90-денний період реабілітації. Вивчено основні функціональні показники стану організму пацієнта із ІМ та їх зв'язок з АГ, а також із клінічними маркерами зниженої толерантності до фізичного навантаження та індексом коморбідності Чарльсона.

**Результати досліджень та їх обговорення.** Проаналізовано взаємозв'язки між артеріальною гіпертензією і загальноклінічними та спеціальними функціональними показниками у хворих на ІМ. Виявлено пряму кореляцію між АГ і віком ( $r=0,123$ ;  $p=0,018$ ), між АГ і рівнями систолічного ( $r=0,253$ ;  $p<0,0001$ ) та діастолічного ( $r=0,215$ ;  $p<0,0001$ ) артеріального тиску в гострий період ІМ, між АГ та індексом коморбідності ( $r=0,133$ ;  $p=0,01$ ), прямий кореляційний зв'язок між АГ і товщиною стінок лівого шлуночка ( $r_1=0,173$ ;  $p_1=0,003$ ;  $r_2=0,149$ ;  $p_2=0,003$ ). Просліджувався також обернений кореляційний зв'язок між артеріальною гіпертензією та кількістю лімфоцитів ( $r=-0,127$ ;  $p=0,015$ ).

**Висновки.** Показники систолічного та діастолічного АТ в гострому періоді розвитку ІМ є високочутливими маркерами гемодинамічних, морфологічних та функціональних змін у хворих на ІМ з АГ і адекватно відображають загальний функціональний стан хворого, тому повинні постійно контролюватися в процесі реабілітації. Кількість лімфоцитів у периферичній крові та індекс коморбідності Чарльсона є важливими додатковими маркерними та лімітуючими показниками при проведенні реабілітаційних заходів у хворих на ІМ з АГ.

**Ключові слова:** інфаркт міокарда; артеріальна гіпертензія; кардіореабілітація; індекс коморбідності Чарльсона.

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## РАННИЕ МАРКЕРНЫЕ И ЛИМИТИРУЮЩИЕ ПОКАЗАТЕЛИ ФУНКЦИОНАЛЬНОГО СОСТОЯНИЯ У БОЛЬНЫХ ИНФАРКТОМ МИОКАРДА В СОЧЕТАНИИ С АРТЕРИАЛЬНОЙ ГИПЕРТЕНЗИЕЙ

**Резюме.** Сердечно-сосудистые заболевания остаются самой распространенной причиной смерти во всем мире. По данным Global Burden of Disease на них приходится 31,5 % от всех смертей и 45 % смертей от неинфекционных заболеваний, вдвое превышает смертность от рака, а также все инфекционные, материнские, неонатальные и пищевые нарушения вместе взятые. Более 75 % всех сердечно-сосудистых смертей происходят в странах с низким и средним уровнем дохода, в Украине сердечно-сосудистая смертность составляет 66,7 %.

**Цель исследования** – изучить особенности клинического течения инфаркта миокарда (ИМ) с коморбидной патологией, который происходит на фоне артериальной гипертензии (АГ), выявить ранние маркерные и лимитирующие параметры функциональных показателей организма и стратификационные риски для контроля за эффективностью реабилитационного процесса.

**Материалы и методы.** Исследовано 371 больного инфарктом миокарда с коморбидной патологией, которые проходили 90-дневный период реабилитации. Изучены основные функциональные показатели состояния организма пациента с ИМ и их связь с АГ, а также с клиническими маркерами пониженной толерантности к физической нагрузке и индексом коморбидности Чарльсона.

**Результаты исследований и их обсуждение.** Проанализированы взаимосвязи между артериальной гипертензией и общеклиническими и специальными функциональными показателями у больных ИМ. Выявлена прямая корреляция между АГ и возрастом ( $r=0,123$ ;  $p=0,018$ ), между АГ и уровнями систолического ( $r=0,253$ ;  $p<0,0001$ ) и диастолического ( $r=0,215$ ;  $p<0,0001$ ) артериального давления в острый период ИМ, между АГ и индексом коморбидности ( $r=0,133$ ;  $p=0,01$ ), прямая корреляционная связь между АГ и толщиной стенок левого желудочка ( $r_1=0,173$ ;  $p_1=0,003$ ;  $r_2=0,149$ ;  $p_2=0,003$ ). Проследивалась также обратная корреляционная связь между артериальной гипертензией и количеством лимфоцитов ( $r=-0,127$ ;  $p=0,015$ ).

**Выводы.** Показатели систолического и диастолического АД в остром периоде развития ИМ являются высокочувствительными маркерами гемодинамических, морфологических и функциональных изменений у больных ИМ с АГ и адекватно отражают общее функциональное состояние больного, поэтому должны постоянно контролироваться в процессе реабилитации. Количество лимфоцитов в периферической крови и индекс коморбидности Чарльсона важны дополнительными маркерными и лимитирующим показателям при проведении реабилитационных мероприятий у больных ИМ с АГ.

**Ключевые слова:** инфаркт миокарда; артериальная гипертензия; кардиореабілітація; індекс коморбідності Чарльсона.

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