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ANALYSIS OF THE OCCURRENCE OF VARIOUS CARDIOVASCULAR EVENTS IN PATIENTS WITH MYOCARDIAL INFARCTION WITHOUT ST SEGMENT ELEVATION DURING 6TH AND 12TH MONTHS

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Abstract. Myocardial infarction remains one of the leading causes in the structure of general and cardiovascular morbidity and mortality worldwide. Despite significant progress in the treatment of acute myocardial infarction in most developed countries, the emergence and prevention of early and late complications is of great interest. Existing unified methods of diagnosis and treatment of NSTEMI significantly avoid adverse events in the rehabilitation period of the disease, however, the long-term prognosis of this category of patients remains unfavorable due to the development of myocardial dysfunction after postinfarction remodeling and prognostic adverse arrhythmias. The search for opportunities to predict the development of complications, study of remodeling processes and their impact on the development of electrical instability of the myocardium, which is currently considered a promising area of non-invasive diagnosis of myocardial infarction. With regard to NSTEMI, the unfavorable long-term prognosis is primarily due to the development of myocardial dysfunction, electrical instability of the myocardium or the development of recurrent coronary events.

Aim. To analyze the probability of occurrence of various cardiovascular events in patients with myocardial infarction without ST-segment elevation during 6 and 12 months of follow-up.

Materials and methods. We conducted a comprehensive study of 200 patients with acute myocardial infarction without ST-segment elevation aged 38 to 80 (mean 62.0 ± 0.71 , median 62 and interquartile range 55 and 70). A retrospective analysis of patients' condition during 6 and 12 months of follow-up was performed. Surveillance of patients was carried out in the mode of telephone contact with patients, assessment of the condition on scheduled visits (1st, 3rd, 6th and 12th month after hospitalization of patients with acute myocardial infarction) and recording of unscheduled and urgent requests of patients for medical help. We conducted a retrospective analysis of the condition of NSTEMI patients during 6 and 12 months of follow-up. Surveillance of patients was carried out in the mode of telephone contact with patients, assessment of the condition on scheduled visits (1st, 3rd, 6th and 12th month after hospitalization of patients with acute myocardial infarction) and recording of unscheduled and urgent requests of patients for medical help. During the observation of patients we recorded the cardiovascular events, such as cardiovascular death, myocardial infarction, stroke, heart decompensation, heart rhythm disorders.

Results. Analysis of cardiovascular events observed during the year in the examined group of patients revealed that during the first year after an acute coronary event the most common complications were the development of acute decompensation of chronic heart failure, acute heart failure de novo and atrial fibrillation paroxysms de novo. To a lesser extent, events such as episodes of unstable angina, non-fatal myocardial infarction and strokes, and sudden cardiac death have been reported. Time dependence was demonstrated only for the first two, namely an increase in the frequency of complications at a later date – from the 6th to the 12th month compared to the first 6 months of follow-up.

Conclusions. Manifestations of cardiac decompensation and arrhythmia in the delayed period of the disease are associated with manifestations of structural remodeling and electrical instability of the myocardium, while the reduction of fatal complications is a consequence of early invasive treatment strategy.

Keywords: non-ST segment elevation myocardial infarction, heart failure, structural remodeling.

Introduction. Myocardial infarction remains one of the leading causes in the structure of general and cardiovascular morbidity and mortality worldwide [1]. Currently, the priority of modern cardiology is to improve the diagnosis and treatment of myocardial infarction, especially its form, such as ST-segment elevation myocardial infarction (NSTEMI). However, despite significant progress in the treatment of acute myocardial infarction in most developed countries, many questions remain unanswered, especially regarding the occurrence and prevention of early and late complications [2]. The long-term prognosis of this category of patients remains disappointing, primarily due to the development of

myocardial dysfunction due to postinfarction remodeling and the development of prognostically unfavorable arrhythmias on the background of electrically unstable myocardium [3]. The search for opportunities to predict the development of complications, study of remodeling processes and their impact on the development of electrical instability of the myocardium, which is currently considered a promising area of non-invasive diagnosis of myocardial infarction [4]. With regard to NSTEMI, the unfavorable long-term prognosis is primarily due to the development of myocardial dysfunction, electrical instability of the myocardium or the development of recurrent coronary events [5].

Rationale for the study. Existing unified methods of diagnosis and treatment of NSTEMI significantly avoid undesirable adverse events in the rehabilitation period of the disease, however, do not take into account gender, age and individual characteristics of the disease. Also, in our opinion, awareness and prediction of certain complications will significantly improve long-term prognosis and prevent recurrence of cardiovascular events.

Aim. To analyze the probability of occurrence of various cardiovascular events in patients with myocardial infarction without ST-segment elevation during 6 and 12 months of follow-up.

Materials and methods. We examined 200 patients with acute myocardial infarction without ST-segment elevation (NSTEMI) aged 38 to 80 (mean 62.0 ± 0.71 , median – 62 and interquartile range – 55 and 70) years, who were hospitalized in the Municipal Non-Profit Enterprise "Vinnytsia Regional Clinical Medical and Diagnostic Center for Cardiovascular Pathology" with urgent indications.

The criteria for including patients in the study were:

1. Verified NSTEMI, first diagnosed;
2. age up to 80 years;
3. the absence of contraindications to percutaneous coronary interventions and the use of the main groups of pharmacological agents included in the basic therapy of NSTEMI;
4. informed consent of the patient to participate in the study.

The criteria for exclusion from the study were:

1. STEMI, transferred in the past and recurrent acute myocardial infarction;
2. age of patients 80 years and older;
3. the presence of sinoatrial or atrioventricular block II-III degree, implanted or the need for implantation of an artificial pacemaker;
4. chronic heart failure (CHF) NYHA-III, IV before the incident of acute myocardial infarction;
5. diseases of the respiratory system, kidneys and liver, which were accompanied by signs of pulmonary, renal and hepatic failure; anemic conditions with a hemoglobin level below 110 g / L;
6. the presence of rheumatic and congenital heart defects, idiopathic and inflammatory myocardial lesions;
7. malignancies, severe neuropsychiatric disorders, alcohol abuse;
8. the presence of contraindications to percutaneous coronary interventions and the use of the main groups of pharmacological agents included in the basic therapy NSTEMI;
9. reluctance and refusal of the patient to participate in the study.

All patients were examined according to the NSTEMI protocol [6].

All of the research corresponds to the principles of the Declaration of Helsinki of the World Medical Association.

We conducted a retrospective analysis of the condition of NSTEMI patients (n = 200) during 6 and 12

months of follow-up. Surveillance of patients was carried out in the mode of telephone contact with patients, assessment of the condition on scheduled visits (1st, 3rd, 6th and 12th month after hospitalization of patients with acute myocardial infarction) and recording of unscheduled and urgent requests of patients for medical help.

During the observation of patients we recorded the following cardiovascular events:

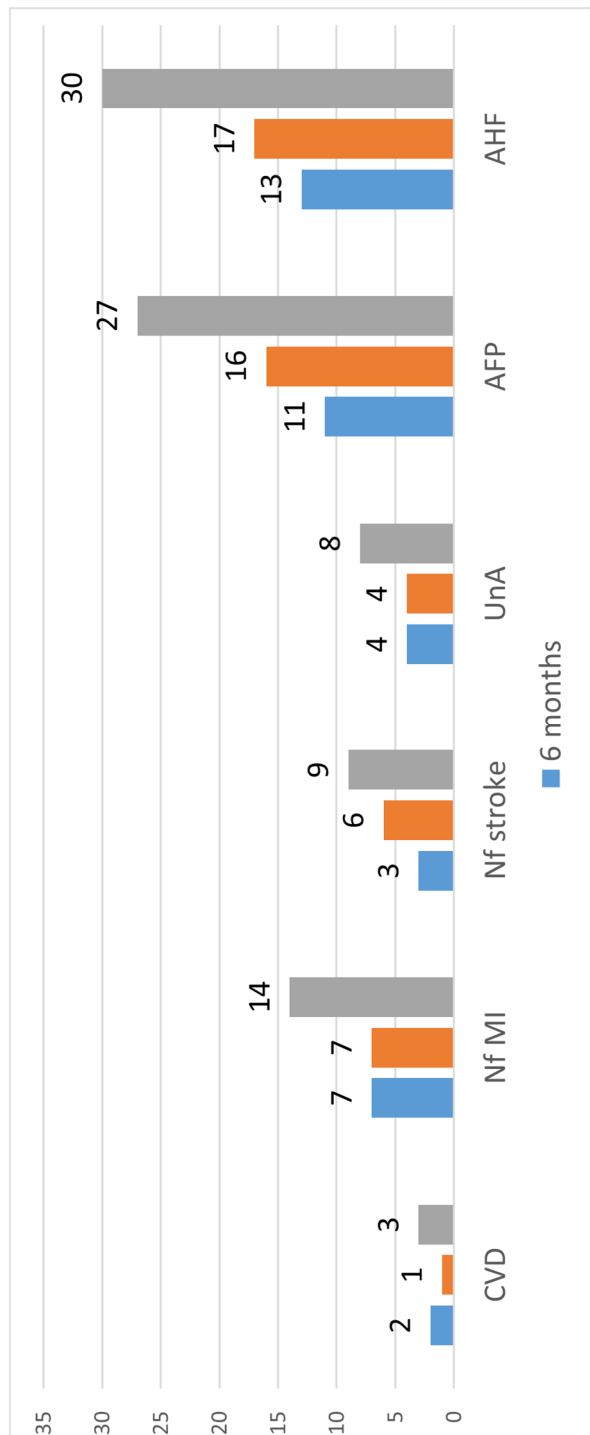
- cases of documented cardiovascular death;
- cases of documented recurrent non-fatal acute myocardial infarction and stroke;
- cases of unstable angina;
- cases of atrial fibrillation (AF) de novo or recurrent paroxysms that required medical attention (see a doctor; call an ambulance or hospitalization for the conversion of sinus rhythm);
- cases of acute CHF decompensation or acute heart failure (AHF) de novo.

Results. The analysis of cardiovascular events observed during the year in the examined group of NSTEMI patients (Fig. 1) showed that in 3 (1.5%) cases cardiovascular death was registered – in 2 patients within 6 (4th and 5th month) and in another – from the 6th to the 12th month (8th month) of observation. At the same time, 2 deaths occurred in an outpatient setting and one – in an inpatient setting (patient stay – 2 days). According to forensic documents (2nd case of outpatient death), the cause of death was repeated myocardial infarction and sudden cardiac death, and in another (according to the conclusion of the post-mortem examination – death in hospital) – repeated acute myocardial infarction.

Repeated myocardial infarction was registered in 14 (7.0%) NSTEMI patients during the first year of follow-up, of which 9 (64.3%) had elevated patients and 5 (35.7%) had no ST segment elevation, respectively. In 7 (3.5%) cases, the development of recurrent MI occurred before the 6th and in another 7 (3.5%) – from the 6th to the 12th month of follow-up. It should be noted that 8 (57.1%) patients in the hospital were repeated and 3 (21.4%) - primary percutaneous angioplasty CA. 2 (14.3%) patients due to the anatomical lesions of CA were offered coronary artery bypass grafting and 1 (7.1%) patient due to late treatment (after 24 hours from the onset of destabilization) received only conservative treatment.

In 9 (4.5%) cases during the 1st year of follow-up, the development of ischemic stroke was determined. At the same time, in 3 (33.3%) of them the cardioembolic genesis of stroke was established on the basis of the presence of permanent and paroxysmal forms of AF. In 3 (1.5%) cases, the development of stroke was registered before the 6th and in the other 6 (3.0%) - from the 6th to the 12th month of follow-up. 2 (22.2%) patients underwent thrombolytic therapy as pathogenetic treatment.

8 (4.0%) NSTEMI patients during the year were hospitalized for unstable angina – 4 (2.0%) of them for 6 and another 4 (2.0%) - from 6 to 12 months observation. At the same time, 6 (75.0%) patients underwent percutaneous interventions on CA with stent implantation, in 3 (37.5%) of them the procedure was repeated.



6	1,0%	3,5%	1,5%	2,0%	5,5%	6,5%
6-12	0,5%	3,5%	3,0%	2,0%	8,0%	8,5%
Total	1,5%	7,0%	4,5%	4,0%	13,5%	15,0%

Fig. 1. Number and frequency of various cardiovascular events in NSTEMI patients during 12 months of follow-up.

Notes: 1. The table shows the frequency (per 200 patients) of registered events for the 6th, 6-12th month and their total number for 1 year of follow-up;

2. CVD - cardiovascular death, Nf MI - non-fatal myocardial infarction, Nf stroke - non-fatal stroke, UnA - unstable angina, AHF - atrial fibrillation paroxysms, AHF - acute heart failure.

In 21 (10.5%) patients during the year of observation 27 episodes of AF were registered (in 3 patients the registered paroxysms of AF were repeated), while in 24 (88.9%) cases the arrhythmia was recurrent and in 3 (11.1%) - arose for the first time in my life (AF de novo). In 11 (5.5%) cases, AF paroxysms were recorded before the 6th and in 16 (8.0%) – between the 6th and 12th month of follow-up. In all cases, the restoration of sinus rhythm was performed by pharmacological (n = 18) and electrical cardioversion (n = 9).

In 22 (11.0%) patients during the observation period, 30 cases of acute decompensation of CHF and AHF de novo were registered. It should be noted that in 8 patients repeated episodes of AHF were recorded at different follow-up times. In 13 (6.5%) cases, AHF occurred in the early period (up to 6 months) and in 17 (8.5%) – in the period from 6 to 12 months of follow-up. In almost all cases, this was accompanied by a rapid (within 1-2 weeks) increase in shortness of breath, a significant decrease in exercise tolerance and the appearance or increase of edema syndrome. In 11 (36.7%) cases, acute heart AHF failure was eliminated in an outpatient setting against the background of correction of basic treatment and in 19 (63.3%) – in an inpatient setting.

Thus, the analysis showed that in NSTEMI patients during the first year after an acute coronary event, the most common complications were the development of acute decompensation of CHF and the development of AHF de novo (detected in 11.0% of patients and 8 of them again) and paroxysm AF and de novo arrhythmias (recorded in 10.5% of patients and in 3 of them repeatedly). Of interest was the fact that only for these complications time dependence was registered, namely some increase in the frequency of complications at a later date – from the 6th to the 12th month compared to the first 6 months of follow-up.

Discussion. The problem of predicting the risk of recurrence of adverse cardiovascular events in the long term NSTEMI still remains poorly understood. Thus, a number of studies on this problem have also focused on the lack of awareness about the predictors of heart attack, stroke or cardiovascular death after acute coronary syndrome [7, 8]. We found that during the year after NSTEMI, the most common complications were acute heart failure, paroxysmal AF, and, to a lesser extent, non-fatal myocardial infarction, strokes, angina progression, and sudden cardiac death. To some extent, our findings support existing evidence of a likely high risk of recurrence of cardiovascular events after acute coronary syndrome, however, we noted the lowest number of sudden cardiac deaths, probably due to early invasive treatment strategy.

Conclusions.

1. Acute heart failure and paroxysmal atrial fibrillation have been found to be the most likely complications after 6 and 12 months of follow-up, which are manifestations of structural remodeling and myocardial electrical instability.

2. For these complications there is a pattern of occurrence in a later period – from 6 to 12 months.

3. The lowest number of cardiovascular deaths at 6 and 12 months is likely due to early invasive NSTEMI treatment.

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АНАЛІЗ ВИНИКНЕННЯ РІЗНИХ СЕРЦЕВО-СУДИННИХ ПОДІЙ У ПАЦІЄНТІВ З ІНФАРКТМ МІОКАРДА БЕЗ ЕЛЕВАЦІЇ СЕГМЕНТУ ST УПРОДОВЖ 6-ТИ І 12-ТИ МІСЯЦІВ СПОСТЕРЕЖЕННЯ

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Резюме. Незважаючи на значний прогрес у лікуванні гострого інфаркту міокарда, великий інтерес викликає виникнення і профілактика ранніх та пізніх

ускладнень. Найвні уніфіковані методи діагностики та лікування інфаркту міокарда без елевачії сегмента ST (ІМбелST) суттєво дозволяють уникнути небажаних подій в реабілітаційному періоді захворювання, проте віддалений прогноз цієї категорії пацієнтів залишається несприятливим через розвиток дисфункції міокарда внаслідок післяінфарктного ремоделювання.

Мета. Проаналізувати ймовірність виникнення різних серцево-судинних подій у пацієнтів з інфарктом міокарда без елевачії сегменту ST упродовж 6-ти і 12-ти місяців спостереження.

Матеріали та методи. Нами було проведено комплексне дослідження 200 пацієнтів з ІМбелST у віці від 38 до 80 (середнє значення $62,0 \pm 0,71$, медіана – 62 та інтерквартильний розмах – 55 та 70) років. Проведений ретроспективний аналіз стану пацієнтів упродовж 6-ти і 12-ти місяців спостереження.

Результати. Аналіз серцево-судинних подій, які спостерігались упродовж року в обстеженій групі

хворих виявив, що впродовж першого року після перенесеної гострої коронарної події найбільш частими ускладненнями були розвиток гострої декомпенсації хронічної серцевої недостатності, розвиток серцевої недостатності de novo та виникнення пароксизмів ФП de novo. В меншій мірі, реєструвались такі події, як епізоди нестабільної стенокардії, не фатальні інфаркти та інсульт, випадки раптової серцевої смерті.

Висновки. Прояви серцевої декомпенсації та порушення ритму у відтермінований період захворювання пов'язані з проявами структурного ремоделювання і електричної нестабільності міокарда, в той час як зменшення фатальних ускладнень є наслідком ранньої інвазивної тактики лікування.

Ключові слова: ІМбелST, серцева недостатність, структурне ремоделювання.

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