

Modern strategies for optimizing the management of patients with myocardial infarction and atrial fibrillation

L. V. Levytska *^{1.A.C.E.F}, U. A. Dmyterko ^{1.2.B.C.D}

¹Ivan Horbachevsky Ternopil National Medical University of the Ministry of Health of Ukraine, ²Kyiv St. Michael Clinical Hospital, Ukraine

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*E-mail:
larlev752@gmail.com

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The aim of the study – to analyze and summarize information from the scientific literature on modern approaches to the management of patients with acute myocardial infarction and atrial fibrillation, as well as to identify promising directions for research in this category of patients.

Materials and methods. We searched in the scientometric systems of Google Scholar, PubMed, Cochrane Database, conducted a synthesis, comparison, generalization and system-structural analysis of modern scientific literary sources.

Results. The analysis of information in the modern scientific literature demonstrates that patients with combined cardiovascular pathology, in particular acute myocardial infarction with atrial fibrillation (AF), have a higher risk of mortality, a higher frequency of repeated cardiovascular events and a severe course of the underlying disease, which complicates the management of this category of patients. Despite all efforts to improve the AF management system, in the last decade the incidence of AF continues to grow, the age of patients is decreasing, the number of patients with two or more cardiovascular disease risk factors rises, which increases the frequency of AF-related complications. The use of mobile applications to solve clinical tasks in patients with AF has proven its effectiveness and is actively used in practice. Among the components of myocardial infarction and AF management, revascularization, drug treatment and rehabilitation have the highest level of evidence and significantly reduce mortality. It should be noted that existing rehabilitation protocols do not include restorative treatment programs for patients with combined cardiovascular pathology. Different rehabilitation strategies for myocardial infarction and atrial fibrillation create difficulties in managing these pathologies in combination.

Conclusions. Optimizing the management of patients with myocardial infarction and atrial fibrillation through the development of rehabilitation programs will help unify the approach to this category of patients. The use of telemedicine elements for rehabilitation treatment will expand the limits of patients' access to cardiac rehabilitation resources, increase their adherence and improve treatment effectiveness.

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Сучасні стратегії оптимізації ведення пацієнтів з інфарктом міокарда та фібриляцією передсердь

Л. В. Левицька, У. А. Дмитерко

Мета роботи – проаналізувати й узагальнити відомості наукової літератури щодо сучасних підходів до менеджменту пацієнтів із гострим інфарктом міокарда та фібриляцією передсердь (ФП), а також визначити перспективні напрями досліджень за участю таких хворих.

Матеріали та методи. Здійснили пошук у наукометричних системах Google Scholar, PubMed, Cochrane Database, а також синтез, порівняння, узагальнення й системно-структурний аналіз відомостей сучасних наукових літературних джерел.

Результати. Аналіз відомостей сучасної наукової літератури показав, що пацієнти з поєднаною серцево-судинною патологією, зокрема гострим інфарктом міокарда з ФП, мають більший ризик смертності, вищу частоту повторних серцево-судинних подій і тяжчий перебіг основного захворювання, що ускладнює їх менеджмент. Попри усі намагання покращити систему менеджменту ФП, впродовж останнього десятиріччя зберігається тенденція до збільшення кількості випадків захворювання на ФП, зниження віку пацієнтів, збільшення кількості хворих із кількома факторами ризику серцево-судинних захворювань. Це підвищує частоту ускладнень, що пов'язані з ФП. Застосування мобільних додатків для вирішення клінічних задач у пацієнтів із ФП довело свою ефективність й активно застосовується на практиці. Серед складових менеджменту інфаркту міокарда та ФП – ревазуляризація та медикаментозне лікування, а також реабілітація, що мають найвищий рівень доказовості та суттєво зменшують смертність. Чинні протоколи реабілітації не включають програм відновного лікування для пацієнтів із поєднаною серцево-судинною патологією. Різна стратегія реабілітаційних заходів окремо для інфаркту міокарда та фібриляції передсердь створює труднощі менеджменту у пацієнтів із поєднанням цих патологій.

Висновки. Оптимізація менеджменту пацієнтів з інфарктом міокарда та фібриляцією передсердь шляхом розроблення програм реабілітації допоможе уніфікувати підхід до лікування таких хворих. Застосування елементів телемедицини під час заходів з відновного лікування розширить межі доступності пацієнтів до ресурсів кардіореабілітації, підвищить їхню прихильність та ефективність лікування.

Сучасні медичні технології. 2025. Т. 17, № 1(64). С. 46-50

Cardiovascular diseases (CVD) in Ukraine have long maintained a leading role among all causes of death (63.6 %), while coronary heart disease (CHD) occupies the largest share (70 %) in the structure of CVD mortality and is the main cause of disability among people of working age [1,2]. According to the statistical data of the European Society of Cardiology (ESC), the contribution of CVD to the indicator of potential years of life with disability caused by all non-communicable diseases is higher in Ukraine than in European countries. Countries with a high level of income are characterized by a decrease in the prevalence of CVD, in contrast to Ukraine, where these indicators are constantly increasing [3].

The introduction of modern technologies of medical and surgical treatment of CHD allowed to achieve a reduction in mortality, frequency and duration of hospitalization, and occurrence of repeated cardiovascular events. In recent decades, protocols for the treatment of CHD, including acute coronary syndrome (ACS), have been constantly updated. They provide a standard scheme of ACS treatment and an individual approach to patients with comorbid pathology. In this regard, recommendations for the management of patients with arterial hypertension, diabetes mellitus, chronic kidney disease, atrial fibrillation (AF), oncological diseases, anemia or thrombocytopenia are included in a separate section [4].

Among all comorbid conditions, AF is important, because its presence in patients with acute myocardial infarction (AMI) increases mortality, prolongs hospitalization and worsens the quality of life compared to patients without it [3,5], and the treatment process of combined cardiovascular pathology, in particular, AMI with AF, always has a worse course and prognosis and requires greater resource and economic costs.

Aim

The aim of the study is to analyze and summarize information from the scientific literature on modern approaches to the management of patients with acute myocardial infarction and atrial fibrillation, as well as to identify promising directions for research in this category of patients.

Materials and methods

We searched the scientometric systems of Google Scholar, PubMed, Cochrane Database, conducted a synthesis, comparison, generalization and system-structural analysis of modern scientific literary sources.

Results

The combination of AMI and AF is often found in medical practice and causes difficulties in the management of this category

of patients. The interaction of these pathological conditions results in a mutual aggravation and is associated with an increased risk of mortality [5]. According to observational studies, the frequency of AMI within a year in patients with AF ranges from 0.4 % to 2.5 %, and this rate increases in the presence of additional comorbidities: stable CHD – 11.5 % per year, vascular diseases – 4.47 % per year, heart failure – 2.9 % per year, surgical interventions on coronary arteries 6.3 % per year [6]. According to the study by E. Z. Soliman et al. (2020) the presence of AF doubles the risk of ST-segment elevation (STEMI) or non-ST elevation myocardial infarction (NSTEMI), especially in women and black people, although the prevalence of AF is higher among patients with NSTEMI [7]. Along with this, AF is one of the most frequent rhythm disorders complicating the course of ACS, its prevalence ranges from 2 % to 23 %.

Today, the prevalence of AF in the world increases in direct proportion to age. If only 1 % of people aged 50–60 years are diagnosed with AF, then in 70–80 years it is found in every tenth [8]. The population of AF patients is gender dependent and is more common in men [7]. More than 1.5 million people with AF are registered in Ukraine. According to data from cohort study, AF increases the risk of mortality by 1.5–1.9 times after adjustment for existing CVD, and also increases the risk of stroke, heart attack, and the incidence of heart failure [9].

The triggering mechanism of AF paroxysms is the pathological automatism of the trigger foci of the atria, which are most often localized in the mouths of the pulmonary veins. According to the mechanism of re-entry, multiple circles of myocardial excitation are formed in the atria, which leads to remodeling of the atria, enlargement of the heart chambers, hemodynamic disturbances with the formation of wall blood clots in the auricle of the left atrium. Numerous mechanisms of myocardial remodeling associated with AF lead to left ventricular dysfunction and heart failure (HF) development, consequently increasing the prevalence and incidence of HF. AF and HF often coexist or can worsen each other's course, resulting in a significantly higher mortality than either disease alone [10].

The occurrence of AF can be the result of many pathological processes – hemodynamic disorders, ischemia, metabolic syndrome, exogenous or endogenous intoxication of the body [11]. Despite the fact that the risk of AF development increases with age and is more common in men, there are a number of comorbidities that, according to research, also affect the pathogenesis of AF initiation, including hypertension, diabetes, HF, CHD, chronic kidney disease, obesity and obstructive sleep apnea [11,12]. Along with this, a registry of patients with AF was analyzed and found to be at risk of HF, cardiogenic shock, stroke, acute kidney injury, vascular complications, need for blood transfusion, and gastrointestinal or retroperitoneal bleeding [12]. According to the ORBIT-AF study, non-cardiac causes (43 %) and bleeding (8 %) were the common reasons

for hospitalization of patients with AF, although cardiac causes retained their leadership (49 %) [13].

In an analysis of the Fushimi Atrial Fibrillation Registry, the most common causes of death among patients with AF were HF (14.5 %), malignancy (23.1 %), and infection / sepsis (17.3 %), while mortality related to stroke, was only 6.5 % [14]. The obtained research data demonstrate the fact that despite standard management of patients with AF, it is necessary to actively treat comorbidities, which will affect AF-related mortality [15].

To solve the complex problem of effective management of AF with various comorbidities, in particular the combination of AF with AMI, the European Society of Cardiology constantly updates protocols for patients with AF. The 2020 ESC Guidelines for the diagnosis and management of atrial fibrillation provide for individual tactics according to the presence of different forms of AF, namely paroxysmal, persistent, long-standing persistent, permanent, and newly detected [16].

Many studies are conducted to study the relationship between various forms of AF and AMI. In most of them, AF often occurs on the background of AMI and is associated with a higher combined cardiovascular risk, higher all-cause mortality, and the frequency of recurrent heart attack or stroke. At the same time, there was no significant difference in the results between the forms of AF and in the NSTEMI and STEMI cohorts [17, 18]. It has been repeatedly proven that patients with ACS and diagnosed AF of any duration have worse short- and long-term prognoses compared to patients with sinus rhythm [19]. There is evidence that AF first identified during a myocardial infarction can be a predictor of stroke during long-term follow-up [20]. In another study, first-onset AF (diagnosed during hospital stay during/after percutaneous coronary intervention (PCI) occurring within the first 4 days after AMI) was associated with a worse prognosis and a two-fold increased risk of death, congestive HF and stroke development [21].

A number of different studies have led to large prospective studies, such as OACIS, APEX-AMI, RISK-PCI, and HORIZONS-AMI, according to which the prevalence of newly detected AF in AMI ranges from 4.0 % to 7.7 % [22]. It should be noted that, according to the results of studies, first-onset AF always predicted a worse prognosis at short and long-term follow-up, namely, increased mortality from cardiac and non-cardiac causes, repeated heart attacks and strokes, longer hospital stays, and repeated hospitalizations. Frequent predictors of mortality in these studies were older age, hypertension, tachycardia, diabetes, post-infarction atherosclerosis, elevated blood pressure at hospitalization, left ventricular dysfunction and Killip class II or more, thrombolysis in myocardial infarction (TIMI) blood flow after PCI less than III, and infarct-related left descending artery [23].

In 2021 population-based CREDO-Kyoto AMI Wave-2 study, 6,228 patients with myocardial infarction who underwent PCI participated. According to its results, it was reliably proven that newly detected AF increases overall mortality, the frequency of hospitalization for HF, and the incidence of major bleeding compared to patients without AF and patients already diagnosed with AF. However, there are controversial views, according to the EPICOR Registry, newly detected AF was associated with lower mortality compared to previously diagnosed AF. At the same time, all studies agreed that AF was an independent predictor of mortality [24].

In the AF management protocol, the standard diagnostic methods are electrocardiogram, Holter monitor, echocardiography, general blood count, study of renal function and thyroid hormones [25]. Today, there are various modern options for monitoring heart rhythm disorders: mobile applications, smart watches, ECG patches and implanted ECG monitors. However, their use in practice is controversial, as many of them are not clinically proven. Thanks to the Apple Heart study and the Huawei Heart study, in which more than a million people participated, the use of mobile applications has become available to confirm AF with a sensitivity and specificity of more than 90 %. Along with the indisputable benefit of these methods, there are usually risks, consisting in a high probability of overdiagnosis, leading to excessive treatment [26]. There are also additional technical tools for optimizing the management of AF, based on clinical decision support systems. It is a type of artificial intelligence system that digitizes data from a patient and provides personalized, timely recommendations according to protocols and guidelines. The MobiGuide project and several integrated applications have been used to improve patient education and communication between patients and cardiologists. Currently, the study of these technologies continues, one of them is CATCH-ME, during which tablets and smartphones were used. According to a Cochrane review, these mobile applications help patients to make decisions, but there are conflicting results, which demonstrate the need for more carefully designed studies, including the evaluation of the impact of the intervention on clinical events.

Among the various approaches to the treatment of AF with the highest level of recommendations is the ABC algorithm, which provides for "A" – Avoiding stroke with anticoagulants, "B" – Better symptom management, "C" – Cardiovascular risk factor and other comorbidities management. This algorithm facilitates the integration of care for AF patients at all levels of health care and between different specialists. In the mAFA-II randomized trial, it was reliably confirmed that, compared to conventional management, the ABC algorithm was significantly associated with a lower risk of all-cause mortality, a reduction in the incidence of stroke, major bleeding, and other cardiovascular events [27, 28].

Because AF increases the risk of stroke by five times, the CHA₂DS₂-VASc risk scale was developed for the prevention of this event and the use of anticoagulant therapy. The use of anticoagulants depends on the presence of specific stroke risk factors according to the CHA₂DS₂-VASc scale. The effectiveness of this technique was reliably confirmed in a systematic review by PCORI and included in the protocol with a high level of recommendation. In this systematic review, 61 studies were analyzed to determine the diagnostic accuracy and clinical relevance of different methods for predicting embolic stroke and bleeding risk. According to the conclusions, the CHA₂DS₂-VASc and ABC scales are the best options for evaluating both conditions. Despite all efforts to improve the management system of AF, in the last decade, the trend of increasing incidence of AF has persisted – decreasing the age of patients, increasing the number of patients with two or more CVD risk factors, which increases the frequency of AF-related complications [28].

For more effective treatment of combined cardiovascular pathology, namely ACS with AF, the 2023 ESC Guidelines for the

management of acute coronary syndromes was updated, which includes revascularization, drug treatment and rehabilitation. Each of these components is interchangeable, but the value of cardiorehabilitation is the greatest and is that by rehabilitating 37 patients, the lives of 27 people per 1000 people can be saved. The cardiorehabilitation program includes various methods, including aerobic exercises, strength training, and exercises for flexibility and stretching with the appropriate frequency, intensity, and duration according to the proposed adaptation system FITT (frequency, intensity, time – duration – and type of exercise) [29,30].

The process of selecting a rehabilitation program includes many factors (patient compliance, cardiovascular risk factors, prescribed drugs, response to exercise and physical endurance), therefore, in digitalization, a clinical decision-making system EXPERT tool was created to simplify and speed up this stage [31].

In the meta-analysis Grace O. Dibben et al. the exercise-based care rehabilitation (EBCR) program reliably confirmed its effectiveness, reducing cardiovascular mortality, the frequency of recurrent cardiovascular events and hospitalizations in all patients with CHD, regardless of the method of cardiorehabilitation, the intensity and duration of exercise, and the place of rehabilitation [32]. This study allows the use of an outpatient (home) method of cardiorehabilitation using telemedicine, which is actively implemented in protocols. Recent randomized studies Fit@Home study and Telerehab III confirmed that home rehabilitation using telemedicine has the same effectiveness as classical rehabilitation [33].

Cardiorehabilitation protocol includes a combination of regular aerobic physical activity and resistance exercises with a certain regularity and intensity for all patients with myocardial infarction, but without regard to comorbid conditions. One of these important ones is atrial fibrillation, because it contributes significantly to increased cardiovascular risk and reduced cardiac reserve, which requires an individual approach [34]. After analyzing the 2023 ESC Guidelines for the management of acute coronary syndromes, there is no separate rehabilitation program for AF patients. This prompts a scientific search for a solution to this problem. In the 2021 ESC Guidelines on cardiovascular disease prevention in clinical practice, rehabilitation for patients with AF is singled out, which provides benefits from moderate-intensity exercise and recommends avoiding exercises with excessive load and endurance. Importantly, the use of exercise-based cardiac rehabilitation (EBCR) programs for patients with AF has not demonstrated benefits, whereas this program is one of the main ones for patients with myocardial infarction [35]. The last update 2021 of position paper from the Secondary Prevention and Rehabilitation Section of the European Association of Preventive Cardiology includes rehabilitation programs for 7 main nosologies (acute and chronic coronary syndromes, after coronary artery bypass graft surgery and valve replacement, after heart transplantation, for patients with heart failure, diabetes and atherosclerosis of the arteries of the lower extremities). In addition, programs were further allocated to patients of the older age group, after the installation of a resynchronization pacemaker or a device for mechanical support of the heart ventricles, and with oncology. Existing guidelines offer rehabilitation programs for more than twelve clinical conditions, while none exist for patients with AF. The

search for optimal rehabilitation programs for comorbid patients is limited, especially for patients with AF.

Conclusions

1. The combination of myocardial infarction and atrial fibrillation is associated with a higher combined cardiovascular risk, higher mortality from all causes and the frequency of recurrent infarction or stroke, therefore it requires a special approach in the management of this category of patients.

2. Optimization of rehabilitation programs for patients with myocardial infarction and atrial fibrillation is one of the main components of improving the management of this category of patients.

3. Implementation of the latest telemedicine technologies for the rehabilitation of patients with myocardial infarction and atrial fibrillation will increase compliance and treatment efficiency.

Prospects for further research. Given the dominant impact of cardiac rehabilitation on the reduction of mortality in patients with myocardial infarction and atrial fibrillation, the development of rehabilitation programs for this category of patients is promising.

Information about the authors:

Levytska L. V., MD, PhD, DSc, Professor of the Department of Emergency Medical Care, Ivan Horbachevsky Ternopil National Medical University of the Ministry of Health of Ukraine.

ORCID ID: 0000-0002-1327-441X

Dmyterko U. A., MD, PhD student, Cardiologist, Kyiv St. Michael Clinical Hospital, Ukraine.

ORCID ID: 0009-0004-9072-2628

Відомості про авторів:

Левицька Л. В., д-р мед. наук, професор каф. невідкладної медичної допомоги, Тернопільський національний медичний університет імені І. Я. Горбачевського Міністерства охорони здоров'я України.

Дмитерко У. А., здобувач ступеня доктора філософії, лікар-кардіолог, КНП «Свято-Михайлівська клінічна лікарня м. Києва», Україна.

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