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Features of physical rehabilitation and quality of life in patients with ischemic heart disease who underwent percutaneous coronary intervention

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(Literature review)

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Annotation

Ischemic heart disease (IHD) poses a significant health challenge globally, leading to various cardiovascular complications, including myocardial infarction and sudden death. Effective medication aims to slow atherosclerosis and improve patient outcomes through surgical interventions like CABG and PCI. Rehabilitation and secondary prevention are crucial for enhancing quality of life and reducing morbidity and mortality rates among patients. Despite advancements in cardiac treatment and rehabilitation, issues remain surrounding healthcare accessibility, patient education, and economic factors. This review underscores the necessity of integrating rehabilitation into IHD management to optimize treatment outcomes and improve the quality of life for affected individuals.

Keywords: ischemic heart disease, coronary atherosclerosis, myocardial infarction, cardiovascular complications, coronary artery bypass grafting, percutaneous coronary intervention, quality of life, rehabilitation, pharmacotherapy, secondary prevention, cardiac rehabilitation, risk factors, vascular intervention, health outcomes, patient education, long-term prognosis, economic impact, lifestyle modification, heart failure, cardiovascular disease.

Ischemic heart disease (IHD) remains a leading healthcare problem in most countries around the world. The progression of coronary atherosclerosis manifests as angina attacks, acute myocardial infarction (AMI), arrhythmias, heart failure, and sudden death. Pharmacological treatment for patients with IHD aims to slow the growth of atherosclerotic plaques, prevent their rupture and thrombosis, and ultimately reduce the incidence of cardiovascular complications (CVC). Since the second half of the 20th century, surgical myocardial revascularization procedures have been actively utilized in clinical practice. It is known that coronary artery bypass grafting (CABG) and percutaneous coronary intervention (PCI) are the most effective interventional methods for treating IHD. They are performed to expand the stenosed vessel, restore blood flow in ischemic areas, and ease symptoms of stable angina (SA). Among high-risk patients, early CABG and PCI provide better outcomes compared to initial conservative therapy, particularly in reducing mortality and the incidence of AMI. Undoubtedly, the basis of various management methods for IHD patients is the reduction of CVC, improvement in quality of life (QoL), and prognosis for specific patients. However, it has been noted that a decrease in QoL is, to some extent, associated with an adverse clinical outcome. Nevertheless, it is our opinion that the criterion for evaluating the effectiveness of the procedures performed should be an increase in QoL not only in the short term but also in longer follow-up assessments. At the same time, a review of the literature indicates that changes in QoL parameters for IHD patients at different timelines after undergoing CABG and PCI compared to optimal medical therapy (OMT) are not always clear and appear to require further detailed investigation. In Poland, a study involving 107 IHD patients with multivessel coronary artery disease was conducted. The follow-up period was 12 months. These patients were divided into two groups:

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Group 1 had 55 patients who underwent CABG, and Group 2 consisted of 52 patients who received OMT. It was noted that in Group 1 and Group 2, 3 and 6 patients died from all cardiovascular causes, respectively, while angina attacks were reported in 5 patients from Group 1 and in 20 patients from Group 2 (p=0.003). The conclusion is made that according to the SF-36 questionnaire, high-risk patients who underwent CABG have better physical and mental health and life capabilities compared to those who received only OMT. It is acknowledged that QoL improves in the short term after OMT and CABG. However, this situation becomes less obvious over the long term and requires clarification [1].

Diseases of the circulatory system (DCS) hold a leading position in the structure of mortality among the adult population in economically developed countries. According to Rosstat, in 2014 the mortality rate from DCS in Russia was alarmingly high at 653.7 per 100,000 population. Among DCS, ischemic heart disease (IHD) is the leading cause of death in the world and in Russia. In Europe, IHD accounts for 20% of deaths. By disability outcomes, IHD ranks 5th among all diseases and could reach 1st place by 2020.

The treatment of patients suffering from IHD is a multistep process that includes optimal medical therapy, high-tech endovascular and surgical myocardial revascularization methods. Surgical myocardial revascularization (coronary bypass surgery, CBS) is a complex and traumatic intervention. Key methods for creating bypass paths for coronary blood flow include mammary-coronary anastomosis (using the internal thoracic artery) and aortocoronary bypass grafting (CABG) with autogenous venous (saphenous vein) or autogenous arterial (internal thoracic arteries or radial artery) grafts. The risk of complications increases with the number of grafts used. However, thanks to modern achievements in cardiac surgery, mortality during CBS has decreased to 3.7%. IHD surgical therapy allows for increased longevity in patients with significant atherosclerotic coronary artery disease (CAD)—three-vessel lesions, left main coronary artery stenosis, ischemic left ventricular (LV) dysfunction, and severe angina. According to the SYNTAX study (Synergy between Percutaneous Coronary Intervention with Taxus and Cardiac Surgery), CABG reduced the likelihood of serious cardiovascular complications (CVC): after 1 year and 5 years, the incidence of all CVC was 12.4% and 26.9%, respectively, with mortality at 3.5% and 5.4%, myocardial infarction (MI) at 3.3% and 7.3%, and repeated interventions at 5.9% and 12.8%.

After discharge from the hospital, the preservation of surgical success and the further course of the disease depend on measures aimed at improving the long-term outcomes and prognosis of IHD. According to angiographic studies, annually 4 to 9% of venous grafts cease to function, leading to a recurrence of angina symptoms. In the Asymptomatic Cardiac Ischemia Pilot Study (ACIP), signs of transient myocardial ischemia reappear in 43% of patients within a year after surgical myocardial revascularization, and according to Y. Kataoka's research, 5% of patients experience MI. In the Bypass Angioplasty Revascularization Investigation (BARI), deterioration of LV function over 5 years was observed in 51% of patients after CABG. Ischemia post-surgery is more often a consequence of graft insufficiency due to the atherosclerotic process within the graft itself or progression distal to the aortocoronary graft in the coronary arteries. In 75% of cases, changes in untreated coronary arteries are discovered [2].

In modern understanding, medical rehabilitation is a set of interconnected medical, psychological, and social activities aimed not only at recovery and preservation of health but also at restoring (maintaining) the individual and social status of the patient to the fullest extent possible [WHO, V.A. Epifanov, 2005]. The main components of rehabilitation intervention include: adequate

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pharmacotherapy, physical and psychological rehabilitation, education, and dynamic monitoring of the patient. The high clinical effectiveness of each rehabilitation intervention can be considered fully evidenced. Participation in rehabilitation programs based on physical training can reduce overall mortality and cardiac mortality by 20% and 26%, respectively (reliable studies are few and contradictory [Davies R.F. et al., 1997, Englblom E. et al., 1997, Hedback B. et al., 2001, Taylor R.S., 2004]). Information about the cost-effectiveness of comprehensive cardiac rehabilitation is lacking, despite the leading causes of insufficiently wide utilization of cardiac rehabilitation worldwide being its labor intensity and high cost. It is currently unknown whether the implementation of a comprehensive long-term rehabilitation program, increasing healthcare costs, will lead to a positive social and economic effect [3].

Mortality from cardiovascular diseases (CVD) in Russia remains high in both general and standardized indicators. To a large extent, cardiovascular mortality is due to IHD. According to Rosstat, in 2011, 7,411,000 patients with IHD were under observation in the country, with this diagnosis being established for the first time for 738,000 patients within the year. In that same year, IHD was listed as a cause of death in 568,000 cases, which constitutes 397.4 per 100,000 population. In our country, IHD is the most common reason adults seek medical attention among all CVD, accounting for 28% of cases. At the same time, the actual number of patients with IHD is significantly higher. According to the Russian Acute Coronary Syndrome (ACS) Register, almost half of patients with acute coronary insufficiency present with their first IHD manifestation as MI. Therefore, it can be assumed that only 40–50% of all IHD patients are aware of their condition and receive appropriate treatment, while 50–60% of cases remain unrecognized. With age, the prevalence of IHD and its most commonly seen form, angina, increases, and gender differences in incidence diminish. The annual mortality among patients with stable angina is nearly 2%, and 2-3% of patients annually experience non-fatal MI. Patients with a confirmed diagnosis of stable angina die from IHD twice as often as those without this disease. Men suffering from angina generally live 8 years less than those without this condition. The disease can manifest as effort angina, which may be caused by stenosis of epicardial arteries; microvascular dysfunction; or be due to vasoconstriction in the area of dynamic stenosis or resting angina, which may be caused by vasospasm (local or diffuse) in epicardial artery stenosis; diffuse spasms of epicardial vessels; spasms of small vessels; and combinations of the aforementioned causes or asymptomatic course due to absence of clinical or instrumental signs of myocardial ischemia and/or left ventricular dysfunction. Chronic IHD may follow a relatively benign course for many years. Distinct phases of stable symptomatic or asymptomatic conditions may be interrupted by the development of acute coronary syndrome (ACS). The gradual progression of coronary artery atherosclerosis and heart failure leads to a decrease in functional activity among patients, with some experiencing acute complications (unstable angina, MI) that can be fatal (sudden cardiac death). Timely diagnosis, proper stratification of complication risks, and the administration of comprehensive pharmacological and, when necessary, invasive treatment can improve the quality of life and substantially reduce morbidity and mortality among individuals with chronic forms of IHD [4].

Initially, the term “quality of life” (QoL) appeared in medicine around the 1940s. According to the WHO definition, QoL is an individual's perception of their position in life in the context of culture and value systems of the environment in which they live, inextricably linked to their goals, expectations, standards, and concerns. A.A. Novik et al. in 1999 defined health-related quality of life as "an integral characteristic of the physical, psychological, emotional, and social functioning of a

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healthy or sick individual, based on their subjective perception." QoL is a multifaceted concept reflecting the level of well-being and satisfaction individuals derive from various aspects of life, including those affected by illnesses and their treatment. In this regard, in recent years both globally and domestically, increasing attention has been directed towards health-related quality of life (HRQL). In foreign literature, HRQL is described as the reflection of the disease's impact and its treatment on the patient’s perceptions, which vary with the influence of different damaging factors, functional stresses, and psychological and social impacts. Since 1995, an international non-profit organization, the MAPI Research Institute, has been studying QoL in France, which coordinates all research in the field of QoL. This institute organizes annual congresses for the International Society for Quality of Life Research (ISOQOL), promoting the idea that the goal of any treatment is to bring a patient's QoL closer to that of practically healthy individuals. Consequently, a new term—quality-adjusted life year (QALY)—has gained popularity. The QALY coefficient can range from 0 to 1 based on the subjective assessment of the patient. One year of completely healthy life is valued as 1.0 QALY. If a patient assesses their QALY as 0.5, then two years of life equal one year of healthy life [5].

Despite a decrease in mortality and disability rates from ischemic heart disease (IHD) in Russia, it remains one of the major circulatory system diseases. Successful surgical treatment of IHD patients significantly reduces population disability. Alongside the improvement of surgical correction techniques, methods for medical rehabilitation in the postoperative period are also evolving. Surgical treatment is merely a stage in managing IHD, as it does not eliminate the underlying causes of the disease. The clinical effectiveness of surgical intervention is largely determined by the rehabilitation program aimed at consolidating surgical results and eliminating risk factors for developing IHD. An analysis of the results of IHD rehabilitation has indicated that most patients experience manifestations of maladaptation. According to many authors, patients with different levels of adaptive status respond differently to the therapy provided, considerably prolonging the recovery period. Research has shown that considering the adaptive state of patients during their rehabilitation and sanatorium-resort treatment, as well as the timely correction of maladaptive reactions, significantly enhances the effectiveness of the restorative treatment provided [6].

An important task facing domestic healthcare is to reduce the mortality rate and disability among patients with ischemic heart disease (IHD). Rehabilitation and secondary prevention programs play a leading role in this. Unfortunately, in our country, a publicly accessible system for managing cardiac patients in primary healthcare utilizing non-pharmacological treatment methods is still insufficiently developed, despite numerous pieces of evidence supporting their effectiveness. This is likely due to inadequate material and technical support, a lack of sufficient specialists and their knowledge, undervaluation of this method by the treating physicians, and low patient motivation to follow lifestyle modification recommendations. This article contains an overview of the main directions of physical rehabilitation in IHD. The review includes facts obtained from analyzing numerous randomized studies conducted worldwide involving thousands of patients. A positive effect of cardiac rehabilitation is highlighted, confirmed by reductions in both morbidity and mortality rates, both overall and specifically cardiovascular. Positive influences of cardiac rehabilitation on patients' physical condition, weight, blood pressure, lipid profiles, glycemia, and insulin sensitivity, as well as fibrinolytic activity, are also noted. Moreover, evidence is provided that cardiac rehabilitation lowers population disability and enhances the quality of life for IHD patients. Cardiovascular diseases continue to reign as leading causes of death globally. In the Russian Federation, they account for 56%

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of all death outcomes, with almost half of these caused by ischemic heart disease (IHD). Considering the rising mortality, disability, and temporary loss of working capacity, issues surrounding IHD have transcended healthcare and gained national significance. Despite advancements, modern medicine's evolution has encountered several "bottlenecks" that directly or indirectly affect the provision of medical care to patients with IHD. On one hand, everything appears satisfactory—patients with IHD receive care from specialized professionals, there is a wide array of pharmaceutical drugs available that expands with each passing year, and surgical interventions (operations on the working heart, laparoscopic procedures, transplantation of donor and artificial organs, etc.) are well-developed. On the other hand, the flip side of the coin reflects a lack of systematic approach by contemporary physicians, who frequently treat the disease rather than the patient. An increase in adverse reactions and side effects from modern medications, along with the insufficient attention to rehabilitation in patients with IHD, nullifies the benefits of surgical interventions. Therefore, addressing the problem of IHD is impossible without incorporating high-quality and effective rehabilitation methods into treatment programs, which include non-pharmacological measures. It’s worth quoting the words of Academician E.I. Chazov, which remain relevant today: "We must frankly admit that the potential of non-pharmacological treatment methods is still under-researched in our scientific research institutes and clinics and is being used far too little in the treatment process for many diseases. There seems to be a perception that not only leading specialists in various fields of medicine but also practicing physicians are skeptical about the possibilities of these methods and insufficiently informed about the indications and contraindications for their usage." [7]

Ischemic heart disease (IHD) is a leading cause of mortality in developed countries. According to the GNIЦ for Preventive Medicine, approximately 10 million citizens of the Russian Federation aged 40-70 suffer from IHD. The mortality rate from IHD in our country is three times higher than the average European indicators for both men and women. Partial or complete loss of work capacity related to IHD incurs substantial economic costs. The breakthrough in IHD treatment is associated with advances in interventional cardiology. In recent years, percutaneous coronary interventions (PCI) have become the leading method for revascularization in patients with IHD, facilitating the alleviation or reduction of angina symptoms, decreasing mortality, and the frequency of non-fatal complications in various forms of myocardial infarction, while increasing tolerance to physical exertion and improving quality of life. The efficacy and prognosis of surgical interventions are determined not only by the duration and characteristics of IHD, the number of stenotic vessels, the completeness of revascularization, and the presence of postoperative complications but largely depend on how patients with IHD are managed in the postoperative period, the appropriateness of the rehabilitation programs selected, and the effectiveness of physical training methods utilized. The aim of the present study was to investigate the impact of specific physical exercises performed in aerobic and mixed modes, as well as segmental massage, on the body's tolerance to physical stress and the state of myofascial structures in patients who have undergone surgical and percutaneous revascularization of the myocardium [8].

Cardiological rehabilitation is a complex, multi-component process that includes pharmacotherapy, kinesitherapy, dietary therapy, cessation of harmful habits, control of modifiable risk factors, lifestyle modification, and patient education. These interventions aim to restore the physical, psychological, and social status of patients, potentially preserving their work capacity and improving their quality of life. The medical aspect is the most crucial component of cardiac rehabilitation, largely determining its success. Medical therapy for cardiac patients must be

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comprehensive, utilizing drugs from all classes included in the treatment recommendations for corresponding nosological forms and clinical conditions. Throughout the treatment process, it is essential to achieve and maintain target levels of key hemodynamic and biochemical indicators. Failure to adhere to these conditions is associated with a high risk of recurrent cardiovascular events. An important factor influencing treatment efficacy is the informational dialogue between the physician and the patient, during which the purposes and mechanisms of the prescribed medications are explained to the patient. Currently, there is evidence supporting the positive impact of four classes of medications on the prognosis of patients with ischemic heart disease (IHD): antiplatelet agents, β-blockers, statins, and angiotensin-converting enzyme (ACE) inhibitors. According to contemporary recommendations, medications from these classes should be prescribed to all patients with IHD who lack contraindications. This requirement notably pertains to high-risk patients, especially those who have experienced acute coronary syndrome (ACS—myocardial infarction (MI) or episodes of unstable angina) and revascularization procedures (coronary artery bypass grafting (CABG) and percutaneous coronary interventions (PCI)). Therapy with drugs proven to influence prognosis should commence during the inpatient phase and continue during rehabilitation in sanatorium and outpatient care settings [9].

Currently, personalized databases and registries are actively being developed and implemented in practical healthcare to streamline information and address management tasks. In the future, the collection, accumulation, storage, processing, and provision of necessary data to all participants in the system for medical support (in our case, cardiac surgery) is advisable to be entrusted to a single information center—a specialized registry operating within a single institution. Utilizing such a registry in healthcare management practice will allow tracking the dynamics of patient condition indicators over time across various key points (before the operation, during inpatient, sanatorium, and outpatient phases). Therefore, testing the application of such systems in practical activities is relevant, including for monitoring patient status after cardiac surgical treatment [10]

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