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Clinical efficiency of restorative treatment after percutaneous coronary intervention in patients with coronary artery disease

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Abstract

The article discusses topical issues of treatment and rehabilitation strategies in patients with ischemic heart disease (IHD). The results of our own research on assessing the effectiveness of complex rehabilitation of patients with myocardial changes with the study of indicators of lipid metabolism, platelet aggregation, functional state of patients with coronary artery disease, after stenting of the coronary arteries have been stated in the article.

Keywords: Ischemic heart disease; Stable angina pectoris; Stenting of coronary arteries; Cardiac rehabilitation; Statins; Antiplatelet agents

1. Introduction

According to experts from the World Health Organization, the main cause of morbidity and mortality in the population worldwide is coronary artery disease (CAD) [1], stroke and peripheral arterial disease [2] due to atherosclerosis. They also occupy a leading place in the structure and disability of the population and represent a huge socio-economic problem in the modern world [3].

An increase in myocardial oxygen demand is the predominant mechanism of ischemia, and atherosclerotic coronary artery disease is the main etiological factor [4]. Myocardial oxygen demand is determined by the tension of the walls of the left ventricle (LV); heart rate (HR); myocardial contractility. The higher the value of these indicators, the higher the oxygen consumption [5]. The amount of coronary blood flow depends on the resistance of the coronary arteries (CA), heart rate, the difference between diastolic pressure in the aorta and LV [6]. Risk factors (RF) are of great importance in the development of the disease, which contribute to its occurrence and pose a threat to its further development [7]. In the pathogenesis of ischemic heart disease and its complications, lipid metabolism disorders, increased platelet aggregation activity and inflammation factor play a special role.

IHD treatment is a multi-stage process that includes optimal drug therapy, high-tech endovascular and surgical methods of myocardial revascularization [8]. Therapy of coronary artery disease by surgical methods makes it possible to increase the life expectancy of patients with severe atherosclerotic lesions of the coronary artery - three-vessel lesion, stenosis of the left coronary artery trunk, ischemic LV dysfunction, and severe angina pectoris.

After discharge from the hospital, the maintenance of the achieved success of the operation and the further course of the disease depend on measures aimed at improving the long-term results and prognosis of coronary artery disease [9]. Despite the widespread use of coronary artery stenting (CAS), the incidence of adverse ischemic events associated with

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atherothrombosis remains high [10]. The question of the possibility of reducing the duration of controlled physical training (FT) in the early stages of training after surgery is relevant [11]. In this regard, the development, improvement and implementation of rehabilitation and secondary prevention programs into practical health care is acquiring great medical and social significance. The development of the rehabilitation and preventive direction is becoming a priority task of modern cardiology and society as a whole.

The aim of the study was to evaluate the clinical effects and safety of a comprehensive medical rehabilitation program prescribed early after CAS.

2. Material and methods

The study included patients (n = 36) suffering from coronary artery disease, who, according to indications, underwent CAS after planned coronary angiography.

IHD therapy included dual antiplatelet therapy (DAPT) (aspirin, 75-100 mg / day and clopidogrel, 75 mg / day), statins (atorvastatin, at a dose of 20-40 mg / day (group I) or rosuvastatin, at a dose of 10 -20 mg / day (group II) beta-blockers, according to indications, ACE inhibitors, nitrates Before the SCA procedure and in the dynamics of treatment and rehabilitation (after 3, 6 and 9 months), the parameters of electrocardiography (ECG) and echocardiography (EchoKG) were studied) with the assessment of LV parameters, lipid spectrum: total cholesterol (TC), high density lipoprotein-cholesterol (HDL-C) and low density lipoprotein cholesterol (LDL-C), triglycerides (TG); platelet aggregation. / d, and also did cardio training on the FCXT fluid recumbent cycle) (dosage: 1-3 days - level 1, frequency 30 rpm, speed 8 km / h; 4-6 days - level 3, frequency 35 rpm min, speed 9 km / h; 7-9 days - level 5, frequency 40 rpm, speed 10 km / h). The criteria for excluding patients in the study were serious violations of the heart rhythm and conduction, severe heart failure, the power of the threshold physical activity (FN) with a bicycle ergometric test less than 50 W, the level of blood pressure (BP) more than 180/100 mm Hg. Art., a history of stroke or transient ischemic attack, narrowing of the inner diameter of the carotid arteries by 50% or more, intermittent claudication syndrome, recurrent thromboembolic complications, severe diabetes mellitus, morbid obesity, severe respiratory distress, concomitant diseases that interfere with PT. The criteria for the inclusion of patients in the group of patients with an unfavorable course were: the development of cardiovascular complications (acute coronary syndrome, heart attack, stroke, cardiovascular death, hospitalization due to a worsening of the course of coronary artery disease, the absence of positive dynamics of the stress test).

3. Results and discussion

All patients included in the study, before CAS, suffered from stable exertional angina of III – IV functional class (FC), had arterial hypertension (AH) (72%); high cholesterol levels (74%); left ventricular myocardial hypertrophy according to echocardiography (47%); overweight or obesity (59%); burdened heredity for CVD (65%).

Before the CAS procedure, lipid indices were (groups I and II, respectively): total cholesterol - 6.6 and 6.9 mmol / l; LDL-C -3.2 and 3.6; HDL-C - 1.2 and 1.1; TG - 2.3 and 2.5 mmol / L and CRP - 7.5 and 7.5 mg / L. Higher indices of body mass index (BMI), hypertension were more often determined in patients with coronary artery disease with cardiovascular (CV) IV FC. To improve the prognosis, revascularization in patients with CV was performed in patients with coronary artery disease > 50%, two and three-vascular lesions with stenoses > 50% and reduced LV ejection fraction (EF) (LVEF ≤ 35%), a large area of transient myocardial ischemia under stress stress -testing (> 10% of the LV area) or significant fractional reserve of coronary blood flow FFR, or with stenosis > 50% in a single intact coronary artery (in the presence of documented myocardial ischemia; or FFR <0.80, or stenosis > 90%). Patients with stable forms of coronary artery disease who do not have indications for myocardial revascularization may be unreasonably subjected to coronary intervention (more often CAS) in the presence of coronary artery stenosis > 70%, including in the absence of angina pectoris clinic. A factor that significantly affects the performance of myocardial revascularization without indications is the presence of stenosis of the coronary arteries over 70% (p <0.05).

At the end of the observation, the content of lipids (groups I and II, respectively): total cholesterol - 5.0 and 4.8; LDL-C -2.36 and 2.3; HDL-C - 1.27 and 1.18; TG - 1.61 and 1.55 mmol/L. Complete stabilization of the platelet aggregation index in patients occurs later, therefore the 1st month is the most important for the prevention of complications. Patients with high levels of systemic inflammation (30%) showed increased platelet reactivity. The relationship between platelet function and the levels of markers of systemic inflammation, determined on the first day of hospitalization and over time, was established. With the combined use of drugs, the hypolipidemic efficacy of statins, as

well as the antiplatelet effect of aspirin and clopidogrel, remained at a sufficient level, their anti-inflammatory effect was clearly traced. High residual platelet reactivity (22.5%) increases the likelihood of ischemic events and restenosis.

The main goal of CHD treatment is to reduce the risk of death, myocardial infarction and other adverse consequences, as well as to reduce the severity of symptoms of the disease and improve the patient's quality of life [12,13,14]. The choice of a treatment method is determined not only on the basis of the clinical picture of the disease, but also requires predicting its course and taking into account the social, cultural and economic consequences [15,16]. The basis of conservative treatment of stable coronary artery disease is the elimination of modifiable risk factors and complex drug therapy, which is carried out indefinitely [17]. Particular attention is paid to the identification of concomitant hypertension, diabetes mellitus, dyslipoproteinemia [18,19,20].

The main goal of diet therapy is to reduce excess body weight and blood cholesterol levels [21,22]. A strict diet can reduce plasma total cholesterol levels by 10-15% [23]. Reducing excess body weight reduces the risk of general and cardiovascular death. Recommend increasing the content of fresh fruits and vegetables in the diet (more than 300 g per day), dietary fiber, whole grains, reducing the consumption of sweet and sugary carbonated drinks. Limit the use of fatty meats, generally red meat and gastronomic products. Recommend eating fish 2 times a week. Patients, especially with concomitant hypertension, should limit the consumption of table salt to 5 g per day [24]. Correctly selected FNs have numerous positive effects on physiological processes in the CVS - this is a training effect with an increase in tolerance to FN, an increase in HDL cholesterol levels, a decrease in body weight, a decrease in psychological stress, and positive emotions, especially when exercising in groups. Walking, walking, swimming are most acceptable. A sedentary image affects a patient with coronary artery disease unfavorably. Smokers are encouraged to quit smoking by not only changing behavioral strategies, but also using pharmacological support; avoid secondhand smoke. Annual influenza vaccination is recommended. With concomitant hypertension - antihypertensive drugs to achieve the target blood pressure level <140/90 mm Hg (primary goal), provided that it is well tolerated and at the age of 65 - <130/80 mm Hg. (secondary target), but not less than 120 and 70 mm Hg. Prior to myocardial revascularization, patients with stable angina pectoris should receive optimal drug therapy because of its proven benefit in reducing symptoms and improving prognosis.

Achieving and maintaining target levels of platelet aggregation significantly reduces the risk of negative cardiac events after SCA. The problem of insufficient adherence of patients to drug therapy remains relevant. From one third to half of patients, one way or another, violate the doctor's prescriptions. Adherence increases the effectiveness of therapy, reduces the risk of complications and further hospitalizations, the need to visit the clinic. The main factors shaping compliance are: the age of the patients (in young people, as a rule, compliance is lower), the price of the drug (reduced compliance when more expensive ones are prescribed), the duration of the disease (maximum - when the diagnosis is made), the presence of complications in the anamnesis and comorbid conditions (in the presence of complications, it increases), the severity of the symptoms of the disease (in the presence of patient complaints, compliance increases), the number of drugs used (when prescribing several drugs, the risk of missed admission increases). One of the possible ways to improve patient compliance with therapy is to reduce the number of prescribed drugs (alternatively, fixed combinations), patient education, consultations with the attending physician about the disease and its consequences.

Patient adherence to drug treatment was assessed through oral questioning of patients, analysis of the compliance of the therapy with medical prescriptions and calculation of compliance: cases of regular and continuous admission by the patient of the prescribed dose of the corresponding drug for $\geq 85\%$ of the reporting period were considered as complete (exact) compliance with the recommendations. Evaluation of compliance with dietary recommendations was carried out on the basis of a conversation with the patient and analysis of food diaries. The accuracy of the exercise recommendations was assessed by the physician on the basis of the questionnaire completed by the patients, developed for this study, and interviews of patients for additional (clarifying) information. Information and training sessions were conducted in the form of individual counseling and group lectures using video materials, posters, brochures for patients. The duration of the lesson is 60 minutes (40 minutes - informing, 20 minutes - answers to patients' questions). Patient adherence to non-drug treatment. The majority of patients regularly monitored blood pressure and pulse (over 95%), followed recommendations on nutrition (over 80%) and physical activity (over 65%), and visited a cardiologist (100%) throughout the entire period.

After CAS, at the outpatient stage, during the entire observation period, mandatory activities were carried out: face-to-face consultations of a cardiologist, intermediate telephone contacts, activities related to laboratory and instrumental examination and physical rehabilitation and educational programs of patients. Treadmill test or stress echocardiography. A training session of exercise therapy with an instructor, a cycle of simulator trainings at the Center. At each visit (consultation with a cardiologist), a patient survey, analysis of self-control diaries, an assessment of the accuracy of the implementation of recommendations for drug therapy, diet, physical activity and physical training,

physical examination, anthropometry, measurement of blood pressure, resting heart rate was carried out, the level of RF correction was assessed. Correction of drug therapy and recommendations for non-drug treatment were carried out.

The effectiveness of RF correction during the follow-up period after SCA was in 80% of patients. 65.2% of patients managed to reduce their weight by an average of 2 kg / year; only 13% of patients gained weight; By the end of the observation, there were 1.8 times more people with normal body weight and 3.5 times less people with obesity ($p < 0.05$), 30% of those who quit smoking. In group II patients, compared with group I, the average level of total cholesterol, TG ($p < 0.05$), LDL ($p < 0.05$), CA ($p < 0.05$) was lower, higher HDL ($p < 0.05$), more often target values of total cholesterol ($p < 0.05$), LDL and HDL ($p < 0.05$) were achieved. Most patients showed a decrease in LV myocardial mass according to echocardiography.

The daily tasks of doctors include not only effective treatment of patients with pre-existing pathology, which ensures the prevention of complications, but also individualized management of IHD patients after SCA. At the same time, it is necessary to timely use the means for controlling lipid metabolism and platelet aggregation, which include statins, aspirin and clopidogrel, which are recommended and effective in the treatment of patients with coronary artery disease after SCA. The results of the clinical study showed that an early comprehensive rehabilitation program after SCA has a beneficial effect on the indicators of FRS, echocardiography and factors involved in atherothrombogenesis, maintains the patient's psychological status, improves his QOL and the clinical course of ischemic heart disease. Moderate-intensity PTs are safe and available to patients early after SCA. During training, the patient can independently train at home according to a specially developed program. The safety of early (after three days) stress testing and subsequent independent outpatient training in patients after planned SCA, including with incomplete revascularization of the coronary bed, was revealed. At the same time, regular medical supervision is required to increase the effectiveness of the course of early rehabilitation of patients after planned SCA.

4. Conclusion

Independent outpatient training after planned SCA is a safe method of physical rehabilitation. Cardiological rehabilitation, along with a distinct clinical effect, leads to positive social consequences - an increase in the number of people leading an active lifestyle and resuming work. All patients with coronary artery disease who have undergone SCA, in order to improve the quality of life and prognosis, should be involved in a comprehensive cardiac rehabilitation program. The participation of these patients in cardiac rehabilitation leads to an increase in patients' adherence to drug therapy and non-drug correction of RF.

Compliance with ethical standards

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Disclosure of conflict of interest

No conflict of interest from the authors.

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