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DYNAMICS OF CLINICAL-FUNCTIONAL PARAMETERS IN PATIENTS WITH STABLE CORONARY HEART DISEASE AFTER THE REVASCULARIZATION TAKING INTO ACCOUNT THE PROGRAMS OF RESTORATIVE TREATMENT

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Restorative treatment of patients with stable coronary heart disease is an important component of a comprehensive approach after the revascularization procedures. Our studies performed have shown that the dynamics of clinical-functional parameters in such patients depend on the applied programs of the restorative treatment. The use of standard therapy and restorative treatment programs has improved the quality of life by increasing physical activity, reducing angina pectoris attacks, increasing the treatment satisfaction and attitude towards illness. The developed author's program of "Clinical-psychological rehabilitation of cardiologic patients by optimization of the internal picture of health" in combination with standard treatment and suggestive therapy, has contributed to the positive dynamics of clinical, functional, psychological components and positive impact on the long-term consequences of the disease course.

Key words: coronary intervention, suggestive therapy, picture of health, rehabilitation.

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ДИНАМІКА КЛІНІКО-ФУНКЦІОНАЛЬНИХ ПОКАЗНИКІВ ХВОРИХ НА СТАБІЛЬНУ ІШЕМІЧНУ ХВОРОБУ СЕРЦЯ ПІСЛЯ ПРОВЕДЕННЯ РЕВАСКУЛЯРИЗАЦІЇ ІЗ УРАХУВАННЯМ ПРОГРАМ ВІДНОВНОГО ЛІКУВАННЯ

Відновне лікування хворих на стабільну ішемічну хворобу серця є важливою складовою комплексного підходу після проведення реваскуляризаційних процедур. Проведені нами дослідження показали, що динаміка показників у таких хворих залежить від застосованих програм відновного лікування. Застосування стандартного лікування та програми відновного лікування сприяло покращенню якості життя шляхом збільшення об'єму фізичних навантажень, зменшення нападів стенокардії, зростання задоволення лікуванням та відношення до хвороби. Розроблена авторська програма «Клініко-психологічної реабілітації кардіологічних хворих шляхом оптимізації внутрішньої картини здоров'я» у поєднанні із стандартним лікуванням та сугестивною терапією, сприяла позитивній динаміці клінічних, функціональних, психологічних складових та позитивному впливу на віддалені наслідки перебігу захворювання.

Ключові слова: коронарне втручання, сугестивна терапія, картина здоров'я, реабілітація.

The work is a fragment of the research project "Non-alcoholic fatty liver disease: the impact on the course of cardiovascular diseases, optimization of treatment", state registration No. 0118U004756.

The diseases of the cardiovascular system are among the causes of disability and mortality [3, 9]. According to WHO forecasts up to 2030, the number of deaths because of diseases of the circulatory system will increase up to 25 million [5]. In Ukraine, cardiovascular diseases kill about 500,000 people a year, and in Europe – more than 4 million people. Over the past thirty years in our country, there has been an increase in cardiovascular diseases 3.5-fold, while the mortality rate has increased by 46 % [2].

The use of percutaneous interventions (PCI) is becoming widespread. European recommendations for the use of revascularization methods are regularly reviewed and updated by current perceptions of the disease [11].

The main method of treatment of stable coronary heart disease (SCHD) is optimal drug therapy in combination with the correction of modifying risk factors, and in case of insufficient effectiveness of therapy to reduce angina pectoris and to improve the prognosis, the reserve method is the planned stenting [1].

In modern conditions, there is a necessity to find ways to improve rehabilitation in patients with various manifestations of coronary heart disease in the "new era" [12].

In a published document of the Secondary Prevention and Rehabilitation Section of the European Society for Preventive Cardiology, along with traditional components such as patient's condition assessment, physical activity counseling, physical training, psychosocial management, nutrition counseling, smoking, lipid level and blood pressure control, body weight, seven main clinical conditions were identified, as well as new complex groups of patients, including patients with the chronic coronary syndrome. The complexity of developing individual programs that depends on the heterogeneity of patients in terms of clinical conditions and the possibility of using the relevant components is noted [13].

Patients after revascularization should be included into the phased program of cardiorehabilitation and restorative treatment, with the 1st phase taking place directly in the department (inpatient stage), the 2nd phase – in the cardiorehabilitation department (early inpatient rehabilitation stage), and the 3rd phase – in the polyclinic department (outpatient-clinic stage) [7].

One of the components of restorative treatment is teaching the methods of autotraining, relaxation, music therapy [4].

Along with consideration the resources of the person, both intellectual, mental and physical ones, it is necessary to develop some comprehensive restorative treatment programs based on the scientific study of subjective ideas about health, the study of the phenomenon of internal health picture [14].

Today there is a necessity to implement restorative treatment programs for patients, especially after revascularization procedures, which would include medicinal therapy, physical rehabilitation, psychological component and correction of the internal picture of health and attitude to health.

The purpose of the study was to assess the dynamics of clinical-functional parameters in patients with stable coronary heart disease after percutaneous coronary intervention through the use of the developed restorative treatment program.

Material and methods. The research is based on the study results in 450 patients with coronary heart disease (CHD), patients were divided according to nosological forms of the disease, methods of revascularization and restorative treatment. In each of the groups there were 3 subgroups: a subgroup of patients using standard treatment; a subgroup of patients, who were involved in suggestive therapy in addition to standard treatment; a subgroup of patients who were applied a restorative treatment program, which consisted of the use of standard treatment, suggestive therapy and the author's "Program of clinical-psychological rehabilitation of cardiologic patients by optimization of the internal picture of health" (author's certificate for scientific work No. 75681 dated 29.12.2017) [6, 10].

Diagnosis and treatment of patients with coronary heart disease were performed in accordance with the existing standards of CHD patients' management.

Suggestive therapy consisted in the use of autosuggestion based on the developed author's text with musical accompaniment. Classes were held every day in the inpatient department wards with the participation of 3 to 9 people, the duration of the class was 25 minutes.

The procedure of patients' participation in the "Program of clinical-psychological rehabilitation of cardiologic patients by optimization of the internal picture of health" was performed in the following steps: 1) introductory interview; 2) work in the selected program of optimization of internal health picture (IHP) (5 lessons – each 60 minutes) and individual psychological counseling (60 minutes); 3) post-diagnostic phase. Each component (sensitive, emotional, cognitive, behavioral, value-motivational) was considered at the solitary lesson.

Patients' complaints and objective examination data were analyzed. The functional state of hemodynamics was studied using echocardiography method. There were determined: aortic diameter (dAo, cm), left atrial diameter (dLA, cm), end-systolic dimension (ESD, cm), left ventricular end-diastolic dimension (EDD, cm), end-systolic and end-diastolic volumes (ESV and EDV, ml) of the left ventricle (LV), interventricular septum thickness (IVST, cm) and posterior left ventricular free wall thickness (PVFWT), stroke volume (SV, ml), ejection fraction (EF,%) of LV, calculated indexed on the surface area of the body such indices as EDV index (ml/m^2), ESV index (ml/m^2), LAVI (left atrial volume index) (ml/m^2), LV myocardial mass index (LVMMI, g/m^2).

Determination of cortisol level in blood serum was performed using immunochemiluminescence method with the help of an automatic analyzer "Roche, Hitachi" (manufactured in Japan, Germany). Reference values were 57.2–194.2 ng/ml. Blood sampling was performed in the morning before and immediately after physical exercise – a test with a 6-minute walk.

All patients were performed a survey about quality of life using a Seattle Angina Questionnaire (SAQ).

In all groups of patients, observation was performed at the beginning of treatment, after 1 month and 6 months. Long-term effects were analyzed in all groups of patients after 1 and 3 years.

The results obtained were statistically processed by the methods of variation statistics. The probability of differences between the compared groups was determined using Student's t-test. Statistical testing of hypotheses to determine the differences between nonparametric features was performed using the χ^2-criterion and z-criterion. Correlation analysis was performed on the basis of determining the parametric correlation coefficient. The reliability of the correlation was evaluated by Student's criterion. The results were statistically plausible with $p<0.05$. Statistical processing of the results was performed using the computer program IBM SPSS (Statistical Package for the Social Sciences) Statistics 23.

The results of the study and their discussion. Analyzing the clinical signs of SCHD and the data of objective examination, their positive dynamics was noted in all groups of patients. In particular, if at the beginning of treatment, the angina pectoris attacks were noted by the majority of patients of all groups (68.42 %, 68.42 % and 63.16 %), then after 1 and 6 months – only a few patients did it.

Assessing objective signs, there were observed: a decrease in the percentage of patients with lower leg edema, peripheral cyanosis and pale skin. At the beginning of treatment, attenuation of heart tones was observed in half of the patients (47.3 %, 52.6 % and 52.6 % of patients), but after 6 months of restorative treatment such symptoms were only in a few patients.

In the groups of patients with the use of suggestive therapy and restorative treatment program, a decrease has already been observed after 1 month of dyspnoe, heart malfunction, palpitations, general weakness, and after 6 months these signs were absent. However, in some patients receiving standard treatment, these symptoms were after 6 months' treatment.

The dynamics of metric and volumetric indices of LV in the group of patients with SCHD who were performed PCI, is represented in table 1.

Table 1

Dynamics of metric and volumetric parameters of LV in patients with SCHD who have had PCI

Index, units of measurement	Term of observation		
	At the beginning of treatment	1 month	6 months
Standard treatment (n=19)			
EDV, cm^3	128.0±6.34	118.3±6.36	114.4±6.40
ESV, cm^3	64.0±3.00	58.4±3.09	57.0±3.10
EDD, cm	4.94±0.20	4.85±0.18	4.83±0.15
ESD, cm	3.23 ±0.18	3.16±0.16	3.14±0.16
EF, %	50.40±1.19	52.±1.20	53.9±1.20
Suggestive therapy (n=19)			
EDV, cm^3	129.5±6.19	115.5±6.11	111.4±6.08*
		-10.81	-12.43
ESV, cm^3	63.7±3.16	56.5±3.03	54.5±3.08*
		-11.30	-14.44
EDD, cm	4.96±2.19	4.86±0.17	4.81±0.16
ESD, cm	3.20±0.17	3.11±0.16	3.10±0.15
EF, %	50.0±1.21	52.9±1.18	54.6±1.19*
		+5.80	+9.20
Restorative treatment program (n=19)			
EDV, cm^3	127.5±6.12	114.7±6.13	109.5±6.00*
		-10.04	-14.12
ESV, cm^3	65.3±3.20	55.3±3.11	54.4±3.00*
		-15.31	-16.69
EDD, cm	4.95±0.21	4.84±0.18	4.79±0.18
ESD, cm	3.21±0.19	3.10±0.17	3.09±0.17
EF, %	50.0±1.20	53.2±1.23	56.3±1.22**
		+5.77	+11.93

Notes:1. Significance of the difference in indicators compared with the values at the beginning of treatment: *<0.05; **<0.01.
2. Δ – percentage increase (+) / decrease (-) compared to the values at the beginning of the treatment.

When using standard treatment in patients with SCHD, there was only a tendency to reduce the value of EDV and ESV while reducing the rates of EDD and ESD. Under such conditions, a tendency to decrease in EF (p>0.05) was observed. In the group of patients who were used suggestive therapy, such dynamics was reliable, both in terms of EDV and ESV and of the growth of EF. However, significant changes in these indices were observed only after 6 months' treatment. In particular, EF increased from 50.0±1.21 % up to 54.6±1.19 % (p<0.05), and EDV and ESV decreased at 12.43 % and 14.44 % (p<0.05), respectively. In the group of patients using the restorative treatment program, the dynamics of EDV and ESV was more significant after 6 months' treatment. There was a decrease in EDV and ESV at 14.12 % and 16.69 % (p<0.05) and an increase in EF at 11.93 % from 50.3±1.12 to 56.30±1.22 % (p<0.01).

No dynamics in diameters of left atrium, aorta and lung artery (dLA, dAo, dLA) was observed. IVST and PVFWT also remained unchanged. Moreover, these patterns occurred in all groups of patients throughout the observation period. In particular, the diameters of left atrium, aorta, lung artery did not change during the application of the restorative treatment program. Significant changes in IVST and PVFWT were also not observed (p>0.05).

After PCI in patients with SCHD, the dynamics of indexed echocardiography was aimed at reducing the ESV index in the groups of standard treatment and suggestive therapy and reducing the EDV index in the group of patients with restorative treatment program. Significant dynamics of other indices in these groups of patients was not observed (table 2).

Table 2

Dynamics of parameters indexed to body surface area according to echocardiography data in patients with SCHD who had planned PCI

Index, units of measurement	Term of observation	
	At the beginning of treatment	6 months
Standard treatment (n=19)		
Index LVM, g/m^2	129.01±6.45	119.21±5.89
Index EDV, ml/m^2	99.22±4.95	95.11±4.76
Index ESV, ml/m^2	48.41±2.21	41.32±2.0*
Index LVV, ml/m^2	3.3±0.17	3.2±0.16
Suggestive therapy (n=19)		
Index LVM, g/m^2	131.21±6.7	117.20±5.92
Index EDV, ml/m^2	52.12±2.7	47.11±2.4
Index ESV, ml/m^2	48.54±2.2	40.52±2.01*
Index LVV, ml/m^2	3.0±0.16	3.1±0.15
Restorative treatment program (n=19)		
Index LVM, g/m^2	137.11±6.8	125.10±6.5
Index EDV, ml/m^2	107.23±5.01	87.20±4.32**
Index ESV, ml/m^2	45.50±2.2	41.49±2.4
Index LVV, ml/m^2	3.1±0.16	2.9±0.15

Note: Significance of the difference in indicators compared with the values at the beginning of treatment: *<0.05; **<0.01.

The study of life quality showed an improvement in most indices by increasing physical exercises, reducing angina pectoris attacks, increasing satisfaction with the treatment and attitudes towards the disease. Thus, in the group of patients with the restorative treatment program the indices of attitude to the disease and satisfaction with the treatment increased respectively from 31.2±5.3 points to 93.2±5.1 points and from 71.3±4.2 points to 92.5±4.4 points (p<0.01), and in standard treatment only from 32.2±5.5 points to 60.8±5.5 points and from 64.3±3.7 points to 82.3±4.4 points (p<0.05).

The dynamics of indices of satisfaction with treatment and attitude to the disease in the group of suggestive therapy was, respectively, from 69.2±3.7 points to 74.1±4.5 points after 1 month and up to 86.1±3.7 points after 6 months' treatment (p<0.05). The dynamics of other indices of life quality in relation to the limitation of physical activity and angina pectoris attacks did not differ significantly, but was clearly positive (p<0.05).

The dynamics of cortisol level in patients with SCHD was analyzed; they were performed planned PCI after 1 and 6 months of restorative treatment during the test load with a 6-minute walk (fig. 1).

Before and after exercise load, cortisol levels were different in patients with SCHD. In particular, in patients with SCHD who received standard treatment, cortisol level before physical exercises was (174.22±12.04) ng/ml, and at exercise height – (223.32±11.31) ng/ml after 1 month of observation. The dynamics of cortisol levels in patients during the restorative treatment program was from 173.21±22.02 ng/ml to 219.2±13.65 (p<0.05) ng/ml, after 1 month of observation. The dynamics of cortisol levels was the same after 6 months of observation.

Remote observation of patients with SCHD after PCI confirmed the described patterns in the correction of clinical-functional characteristics.

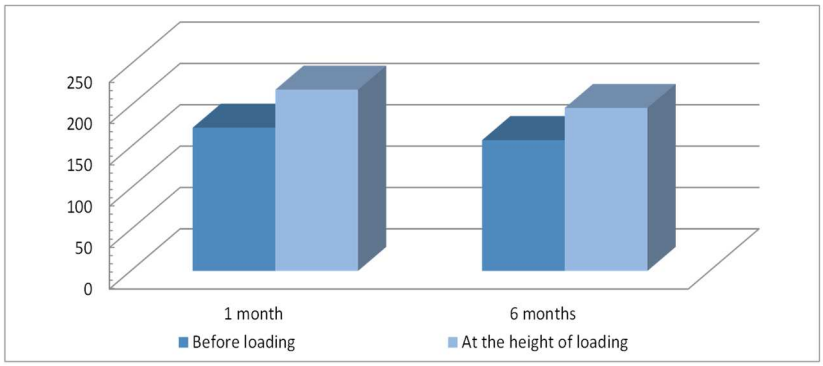

Fig.1. Dynamics of cortisol level indices in patients with SCHD who have had the planned PCI and who were applied a restorative treatment program

In particular, 1 year after the start of observation and PCI in the group of patients there were only few cases of sudden death, unstable angina pectoris and myocardial infarction, and in the group of patients after the restorative treatment program there were no such observation endpoints.

The data of the three-year observation has also confirmed these patterns. Namely, only a few patients from the restorative treatment program group were performed planned PCI and CABG (5.26 %), and there was observed only one case of MI and sudden death.

In other groups of patients, and most often in the group of standard treatment and less in the group of suggestive therapy for three years of observation, there were noted 1-2 cases of sudden death, recurrent PCI, development of MI and UA (fig. 2).

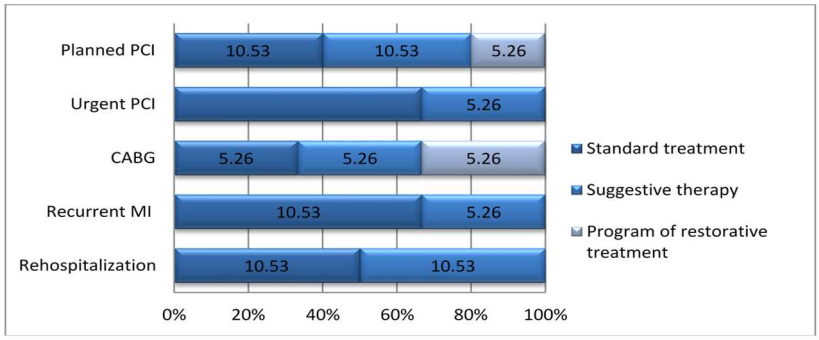

Fig. 2. Terminal points of SCHD after PCI performed during 3 years of restorative treatment.

Summarizing the results of our studies, we've found that the use of the program of restorative treatment of patients with SCHD after PCI is an effective component for the correction of clinical-functional characteristics of patients. Performance of percutaneous coronary interventions leads to the improved Doppler parameters of the left ventricle, less pronounced structural-fibrotic changes, as well as to the reduced occurrence of complications [8]. When using standard treatment in patients with SCHD after PCI there was a tendency to reduce the value of EDV, ESV, EF with the simultaneous decrease of the rates of EDD and ESD ($p>0.05$). The dynamics of these indices was reliable in the group of patients where suggestive therapy was used, significant changes in these indices were observed only after 6 months' treatment. The dynamics of indexed parameters was aimed at the reduction of the ESV index in the groups of standard treatment, suggestive therapy, and in the group of patients with the restorative treatment program – the reduction of the EDV index.

Due to the use of modern methods of diagnosis and treatment of patients with coronary heart disease, there is a necessity to develop and implement new approaches to the restorative treatment and rehabilitation that will affect physical and cognitive functioning, modification of personal factors, quality of life [15].

The use of PCI in patients with SCHD contributes to a significant impact on the clinical-functional parameters of the cardiovascular system, which improves the quality of life of patients. However, the degree of positive changes depends on the applied tactics of restorative treatment. There are objective and subjective reasons for changing the quality of life of patients with SCHD. Differences in the indices of life quality of patients depend on the chosen treatment tactics. It was found that according to the majority of scales the quality of life is higher in patients who received invasive treatment tactics, due to the bright changes in the clinical condition of the patient. It was found that the dynamics of the increase in these patients persists throughout the period of restorative treatment, combination of rehabilitation with the use of restorative treatment program is more effective. The combination of restorative treatment optimizes standard treatment tactics with the improvement of functional and mental condition of patients, which affects the dynamics of SCHD.

Along with this, the main task of rehabilitation of cardiac patients in the new millennium is the ability to find the ways to improve the coverage and quality of effective rehabilitation programs for all groups of patients and implement them in practice [12].

Developed author's program "Clinical-psychological rehabilitation of cardiologic patients by optimization of the internal picture of health" in combination with the standard treatment and suggestive therapy helps to improve quality of life, which has a positive impact on the long-term consequences, preventing sudden coronary death, recurrent myocardial infarction and hospitalizations.

Performance of a comprehensive and "modern" cardiac rehabilitation program is mandatory both in the hospital and on the outpatient basis to ensure the expected results [12]. The program "Clinical-psychological rehabilitation of cardiologic patients by optimization of the internal picture of health" is an important component to ensure a multidisciplinary approach regarding the rehabilitation of cardiac patients at all stages: from hospitalization of patients up to the phase of an outpatient care.

Conclusions

1. Restorative treatment is an important component of the comprehensive support of patients with SCHD who have had PCI.

2. The effectiveness of the recovery period depends on the clinical-functional indices of the cardiovascular system, as well as on the applied restorative treatment programs.

3. The use of the restorative treatment program optimizes standard tactics of treatment through functional, mental recovery of patients and helps to improve the course of SCHD.

Prospects for further research are the development of telemedicine means and online technologies for the patients with SCHD with the possibility of support in the following steps of restorative treatment.

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