Optimization of the Complex Treatment in Patients with Chronic Obstructive Lung Disease in Association with Ischemic Cardiopathy

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Abstract

In 46 patients with chronic obstructive lung disease in association with ischemic cardiopathy we studied the influence of low intensity laser radiation on the clinical symptoms and the inflammatory process of the disease. The inclusion of low intensity laser radiation in the complex therapy of these patients leads to a more pronounced regression of the main symptoms of the disease and the diminishing of the cumulative index by 2.1 times, while in patients being administered solely the standard therapy – only by 1.3 times. The therapy including low intensity laser radiation determined the lowering of weekly angina pectoris seizures by 87%, while in the control group the same index diminished by 45%. It was registered normalization of the laboratory indices that characterize the activity of the inflammatory process sooner by 3-4 days while administering low intensity laser radiation in comparison with the control group.

Key words: low intensity laser radiation, chronic obstructive lung disease, ischemic cardiopathy.

Оптимизация комплексного лечения больных хронической обструктивной болезнью легких с сопутствующей ишемической болезнью сердца

У 46 больных хронической обструктивной болезнью легких в сочетании с ишемической болезнью сердца изучено влияние низко-интенсивного лазерного излучения на динамику клинических проявлений заболевания и активность воспалительного процесса. Включение в комплексную терапию низкоинтенсивного лазерного излучения способствует более ранней регрессии основных клинических симптомов заболевания и снижению общего кумулятивного индекса в 2,1 раза, тогда как у больных, получавших только базисное лечение, снизился лишь в 1,3 раза. Проводимая терапия с использованием низко-интенсивного лазерного излучения способствовала уменьшению на 87% количества ангинозных приступов в неделю, в то время как в группе контроля – на 45%. Нормализация лабораторных показателей, характеризующих активность воспалительного процесса на фоне низко-интенсивного лазерного излучения, происходила на 3-4 дня раньше по сравнению с показателями группы контроля.

Ключевые слова: низко-интенсивное лазерное излучение, хроническая обструктивная болезнь легких, ишемическая болезнь сердца.

Introduction

Chronic obstructive pulmonary disease (COPD) is a chronic inflammatory respiratory disease, predominantly affecting the distal portions of the airways and lung parenchyma with the development of emphysema, manifested by partially reversible airflow limitation, progressive evolution and gradually increasing symptoms of chronic respiratory failure. Currently COPD occupies the 4th place in the world by mortality index in the group of age over 45 years, and is one of the diseases whose mortality index continues to rise. The social importance of the problem is determined by the increase of COPD morbidity, the progressive type of the disease which leads to cardiopulmonary failure and, eventually, to persistent loss of working capacity of the active population, all of these resulting in a changing of the social status of patients and the decreasing quality of life [1, 2, 3].

Although the disease affects primarily the lungs, it is also characterized by systemic manifestations. This is due to a variety of pathogenic mechanisms, not fully investigated yet. Among the reasons for development of systemic manifestations, in addition to hypoxemia, smoking and sedentary lifestyle, an important place is occupied by systemic inflammation, a process involving various organs and systems [4]. Large epidemiological studies have shown that cardiovascular changes are detected in more than 50% of patients with COPD [4, 5].

The prognosis for these patients is the worst when COPD evolves in combination with cardiovascular diseases. Patients with severe COPD have a high risk of sudden death. One of the most common causes that lead to the development of sudden death is heart rhythm disorders [8, 9, 10]. Common problems in patients with COPD are various clinical forms of supraventricular and ventricular arrhythmias. However, it should be noted that the data presented in the literature are controversial. Fluctuations on different data arrhythmias in patients with COPD may be explained by the diversity of the populations involved in clinical trials, phases of the disease and severity of clinical symptoms of COPD, as well as methodological peculiarities of the ECG recording and monitoring. Another important cause of arrhythmia episodes are the medications administered to these patients for the treatment of COPD: theophylline, digoxin, -adrenoreceptor agonists; the risk of these drugs' cardiotoxic effects increases especially in COPD exacerbations, when the preparations' doses are considerably increased on the background of pronounced hypoxemia [3, 4, 7]. It should be noted that the concomitant progression of coronary disease and COPD occurs due to common pathogenic links: development of secondary pulmonary hypertension i ncreases the pressure in the heart's right chambers and in the left atrium, thus worsening the state of coronary flow reserve which, in its turn, increases the myocardial ischemia in both ventricles and leads to coronary disease progression and cardio-pulmonary failure.

Considering the foregoing, the development of new non-drug methods of treatment of coronary heart disease associated with COPD exacerbations is current, it will allow the reduction medicinal preparations dosage and subsequent reduction of iatrogenic influence on the cardiovascular system. A particular attention is given to the usage of low-intensity laser irradiation (LILR) in comorbidities as a method of treatment of COPD and associated coronary heart disease, which has anesthetic, anti-inflammatory and regenerative effects on microcirculation and local tissue [6].

Aim of the study – to increase the effectiveness of the complex treatment of patients with COPD and associated ischemic heart disease using low-intensity laser irradiation.

Material and methods

The study included a total of 46 patients with stage II COPD associated with angina pectoris of effort FC II, aged 40-70 years (mean age - 54.5 ± 7.54 years), the main disease duration ranged between 5-40 years with an average duration of 10.3 ± 5.3 years. The diagnosis of COPD was established in accordance with the recommendations of the international protocol of GOLD (2003) and in accordance with the results of clinical, electrocardiographic, radiographic, bronchoscopic and laboratory examinations. The diagnoses of heart disease and post-infarction cardiosclerosis were established in accordance with the recommendations of OSRC and ICD-10.

The inclusion criteria for patients included in the study groups were: patients treated inpatient or outpatient, both sexes, medium severity COPD and associated coronary heart disease, angina pectoris of effort FC II. The exclusion criteria were: congenital and acquired heart defects, unstable angina, severe heart rhythm disturbances, associated asthma, systemic diseases of the connective tissue, pathologies of the hepatobiliary system with portal hypertension, blood diseases.

ECG examination included the 12 standard derivatives, was performed according to the standard protocol, with subsequent measurement of basic parameters. We used the Holter ECG monitoring (Holter-ECG) to view the ventricular activity with further processing of the results. All patients were evaluated by Doppler-echocardiography to study the intracardiac hemodynamics according to recommendations of the ASE, with subsequent calculation of the pulmonary artery systolic pressure (PASP) and mean pulmonary artery pressure (MPAP), the end-systolic (ESV) and end-diastolic (EDV) volumes, the minute volume (MV) and stroke volume (SV) of the left (LV) and right (RV) ventricles.

All patients with stage II COPD associated with angina pectoris of effort FC II were randomized into 2 groups: group I (main group, n = 24), who were administered, in addition to the basic treatment, courses of irradiation with low-intensity laser with a wavelength of 0.89 mcm by the method of external irradiation of the indicated segments in the instructional methodology; group II (control group, n = 22) received only basic treatment.

Laser therapy procedures were performed daily over 10-12 days, at a brief duration of action no more than 15 minutes, at a dose not exceeding 0.5 Dm/cm2. Laser therapy was administered from day 2-3 after hospitalization and diagnosis of the patient, establishing the degree of the disease and determination of contraindications for treatment.

Statistical processing of the results was performed using the statistical software package Microsoft Excel 2007. Quantitative data recorded with normal distribution are presented as M ± m, where M is the arithmetic mean, and m – the standard deviation. Truthfulness of the results was acceptable when the statistical confidence interval was > 95%. Differences were considered statistically reliable when $p < 0.05$.

Results and discussions

All 46 patients were interviewed. In 43.5% of cases the patients reported such symptoms as palpitations and cardiac rhythm disturbances, which had some connection with complaints from the respiratory system (cough with sputum ($p < 0.05$) and dyspnea ($p < 0.05$). Short-term pain in the precordial region was found in 30.4% of patients with COPD: in 10.8% of cases the pain was of pungent nature and in 19.6% of cases – of ischemic nature. According to the interview results 76.1% of patients had various types of dyspnea: expiratory – 26.1%, inspiratory – 13%, mixed – 54.4% of cases. Along with the increasing of the obstruction in COPD increases the respiratory activity of the respiratory system by 5-6 times with further development of hyperventilation. Due to these phenomena, the respiratory cycle shortens which leads to the increase of the functional residual capacity of the lungs and, over time, to its dominance on inspiratory reserve lung volume. The most negative impact of this process is the development of respiratory muscle fatigue and in some cases exhaustion. As a result, a reduction of the alveolar ventilation and decrease

Table 1

The dynamics of the main clinical symptoms during the treatment period

Symptoms	Expression of the symptoms (in points)			
	Main group (n = 24)		Control group (n = 22)	
	Initial	End of treatment	Initial	End of treatment
Cough	2.8 ± 0.20	0.93 ± 0.16***	2.7 ± 0.17	2.0 ± 0.18**
Sputum expectoration	2.6 ± 0.19	1.9 ± 0.16**	2.6 ± 0.16	2.0 ± 0.13**
Dyspnea during physical effort	2.4 ± 0.21	1.2 ± 0.16***	2.5 ± 0.18	2.1 ± 0.14
Dry rales in lungs	2.8 ± 0.19	1.14 ± 0.09***	2.7 ± 0.15	1.9 ± 0.15***
Cumulative index	10.6 ± 0.18	5.17 ± 0.11***	10.7 ± 0.16	8.0 ± 0.14***

Note: * - $p < 0.05$; ** - $p < 0.01$; *** - $p < 0.001$ – the differences from the original data are statistically authentic.

Table 2

The dynamics of extra systoles during the treatment period

Extrasystole type	Main group (n = 24)		Control group (n = 22)	
	Initial	End of treatment	Initial	End of treatment
SVES	1482.6 ± 41.5	138.8 ± 9.5*	1491.7 ± 42.5	765.4 ± 5.2*
VES	32.1 ± 2.1	7.9 ± 1.8*	31.8 ± 2.8	14.3 ± 3.2*

Note: * - $p < 0.01$ – the differences from the original data are statistically authentic.

of the respiratory function leading to increased arterial PCO2 and hypercapnia develop, these being the biological markers of respiratory failure. In the current study we found that maximum effort during the stress physical effort test (SPT) ST segment depression occurs to 2.1 ± 0.3 mm in patients from the main group and to 2.3 ± 0.2 mm in patients from the control group ($p > 0.1$). The recovery time of the ECG indexes to the initial ones after stopping the effort timed 4.1 ± 0.4 and 4.2 ± 0.5 min, respectively ($p > 0.1$). Holter-ECG analysis in the main group revealed the duration of the ischemic episodes of 8.6 ± 0.4 min, in the control group - 9.1 ± 0.5 min ($p > 0.1$). Average amplitude of ST segment deviation in patients in group I was 1.5 ± 0.3 mm, while in group II - 1.7 ± 0.8 mm ($p > 0.1$). No statistically significant differences were found between the duration of myocardial ischemia and ST segment deviation amplitude ($p > 0.1$).

By the end of the treatment, the main symptoms of COPD (cough, sputum expectoration, dyspnea) regressed significantly in patients of both groups, but in patients who applied LILI this indicator had significant dynamics compared with the control group (tab. 1).

Inclusion of LILI in the complex medical measures of patients with COPD and angina pectoris contributed to the decrease of cough from 2.8 ± 0.20 to 0.93 ± 0.16 ($p < 0.001$), sputum expectoration decreased from 2.6 ± 0 19 to 1.9 ± 0.16 ($p < 0.01$), the intensity of dry rales over lungs decreased from 2.8 ± 0.19 to 1.14 ± 0.09 points ($p < 0.001$). After finishing the treatment course, decreasing dyspnea was found in all patients, but it was more pronounced in patients who supplemented LILI to the basic therapy: from 2.4 ± 0.21 to 1.2 ± 0.16 points ($p < 0.001$), in comparison with the patients from the control group: from 2.5 ± 0.18 to 2.1 ± 0.14 points ($p > 0.1$). When using LILI along with the basic treatment the cumulative index decreased by day 10-12 from 10.6 ± 0.18 to 5.17 ± 0.11 (with 51.2%) or 1.5 times in comparison with the data obtained in the control group (from 10.7 ± 0.16 to 8.0 ± 0.14). Significant changes were registered in the quantity and content of sputum under the influence of LILI – the number of leukocytes in the sputum of patients from the main group decreased from 26 ± 4.1 to 11 ± 2.8 l/fov ($p < 0.001$), while those in the control group – from 28 to 19 ± 3.9 ± 4.5 l/fov ($p > 0.1$). We also noticed that in patients who were administered LILI therapy, the normalization of the laboratory indices occurred faster by 4.6 ± 0.3 days ($p < 0.001$), C-reactive protein – 4.5 ± 0,2 days ($p < 0.001$) and fibrinogen – 3.8 ± 0.18 days ($p < 0.001$) in comparison with the same data in patients who received only the standard treatment.

Correlation analysis of the results obtained while applying standard treatment completed with LILI therapy showed the following: a marked decrease in the intensity of cough ($r = 0.41$), significant decrease in the occurrence of dyspnea during easy or medium exercise ($r = 0.49$), lower number of patients with rales in lungs ($r = 0.33$).

In patients with COPD and associated ischemic heart disease who applied LILI therapy in addition to the basic scheme was marked the decrease in angina episodes per week with 87.3%, decrease of nitroglycerin consumption to 0-1 tablets per day, decrease of the subjective sensation of shortness of breath, of the palpitations and cardiac rhythm disturbances. This dynamic of symptoms was recorded already after 8-10 days of treatment and remained stable until the end of treatment. The administration of LILI courses caused a reduction

Table 3

The dynamics of the echocardiography parameters of the left ventricle's functioning during the treatment period

Parameters	Main group (n = 24)		Control group (n = 22)	
	Initial	End of treatment	Initial	End of treatment
EDD, cm	5.08 ± 0.21	4.87 ± 0.18	5.12 ± 0.56	5.01 ± 0.56
ESD, cm	3.84 ± 0.23	3.42 ± 0.27	3.69 ± 0.25	3.72 ± 0.23
SF, %	26.27 ± 3.81	31.95 ± 3.74	26.21 ± 4.14	26.42 ± 3.34
EDV, ml	122.4 ± 8.42	117.3 ± 8.51	122.2 ± 8.61	125.6 ± 8.33
ESV, ml	59.73 ± 5.61	47.22 ± 3.85	59.81 ± 6.81	57.89 ± 5.38
SV, ml	61.79 ± 5.81	67.94 ± 5.74	61.90 ± 7.31	66.44 ± 6.26
MV, l/min	4.73 ± 0.95	4.79 ± 0.98	4.71 ± 0.93	4.71 ± 0.88
EF, %	50.31 ± 5.01	58.32 ± 5.43	50.27 ± 4.88	54.07 ± 4.71
IV, ml/min	41.92 ± 4.24	46.62 ± 4.51	41.81 ± 4.26	44.84 ± 4.28
CI, l/min/m2	3.19 ± 0.42	3.23 ± 0.37	3.17 ± 0.33	3.18 ± 0.43

Table 4

The dynamics of the echocardiography parameters of the right ventricle's functioning during the treatment period

Parameters	Main group (n = 24)		Control group (n = 22)	
	Initial	End of treatment	Initial	End of treatment
EDD, cm	2.34 ± 0.05	2.18 ± 0.04*	2.33 ± 0.04	2.28 ± 0.06
ESD, cm	1.85 ± 0.04	1.65 ± 0.03***	1.88 ± 0.05	1.72 ± 0.05
SF, %	17.1 ± 2.1	23.4 ± 1.9*	17.9 ± 2.4	19.8 ± 2.0
EDV, ml	47.5 ± 3.9	46.5 ± 4.7	46.9 ± 3.6	46.7 ± 3.7
ESV, ml	26.9 ± 2.6	22.4 ± 2.8	27.1 ± 3.8	25.4 ± 4.0
SV, ml	43.1 ± 3.8	48.8 ± 3.1	42.9 ± 4.1	44.1 ± 4.5
MV, l/min	1.2 ± 0.1	1.6 ± 0.1**	1.3 ± 0.1	1.4 ± 0.3
EF, %	43.1 ± 3.8	48.8 ± 3.1*	42.9 ± 4.1	44.1 ± 4.5
IVRT, ms	127.0 ± 2.6	112.0 ± 2.5***	126.5 ± 2.8	125.3 ± 3.1
PASP, mm Hg	56.4 ± 4.5	34.6 ± 4.1***	56.8 ± 5.8	45.7 ± 5.1
MPAP, mm Hg	37.8 ± 3.2	23.5 ± 3.2***	37.1 ± 2.9	31.4 ± 3.0
E/A	1.05 ± 0.01	1.12 ± 0.02	1.12 ± 0.02	1.08 ± 0.03

Note: * - $p < 0.05$; ** - $p < 0.01$; *** - $p < 0.001$ – the differences from the original data are statistically authentic.

in the duration of angina episodes from 9.1 ± 0.5 to 0.25 ± 0.03 min. ($p < 0.001$), decreased the average amplitude of ST segment deviation from 1.5 ± 0.3 to 0.2 ± 0.1 mm ($p < 0.01$). In the control group, nitroglycerin consumption decreased by 45% and the duration of anginal episodes – from 9.3 ± 0.5 to 2.4 ± 0.09 min. ($p < 0.01$). The ST segment deviation in this group decreased from 1.6 ± 0.3 to 0.7 ± 0.2 mm ($p < 0.01$).

According to Holter-ECG monitoring during the treatment period of patients with COPD who supplemented the basic therapy with LILI, there was a significant decrease of the frequency of ventricular extrasystoles recorded per one day ($p < 0.01$), while supraventricular tachycardia episodes disappeared (tab. 2). The number of supraventricular extrasystoles (SVES) in the observed patients decreased by 90.6%, while on the background of the basic therapy – only by 43.7%. Additional LILI procedures decreased the number of ventricular extrasystoles (VES) from 32.1 ± 2.1 to 7.9 ± 1.8 (by 75.4%, $p < 0.001$), while the basic therapy – from 31, 8 ± 2.8 to 14.3 ± 3.2 (by 55.0%, $p < 0.001$).

In tab. 3 the dynamics of the echocardiographic parameters of the left ventricle's (LV) functioning during the treatment period in patients with COPD and associated ischemic heart disease are presented.

Echocardiography examination results (tab. 3) show that the treatment given to patients in group I and group II resulted in an improvement of the studied indices, but none of the groups did obtain statistical authenticity. However, it should be noted that the end-diastolic (EDD) and end-systolic (ESD) dimensions of the LV decreased in patients of both groups, but more pronounced in patients of the main group which administered laser therapy in addition to the basic treatment. In patients of the main group EDD VS decreased by the end of the treatment period in average by 0.21 ± 0.19 cm, while in the control group this index was 2 times worse; ESD VS – in average by 0.42 ± 0 25 cm, while in the control group – only by 0.03 ± 0.24 cm.

The modification of the EDD and ESD resulted in the increasing of LV's shortening fraction (SF), which averaged 31.95 ± 3.74% in the main group and 26.42 ± 3.34% in the control group (1.2 times less). Also there have been positive changes of the volumetric indices of the heart under the influence of combined basic therapy and LILI therapy. Thus, the end-diastolic (EDV) and end-systolic (VES) volumes of LV decreased on average to 117.3 ± 8.51 ml and 47.22 ± 4.85 ml, respectively (initial parameters being: 122 4 ± 8.42 ml and 59.73 ± 5.61 ml, respectively; $p < 0.001$), while in the control group – to 125.6 ± 8.33 ml and 57.89 ± 5 38 ml, respectively. The ejection fraction (EF) also had positive dynamics in both groups: increase by 8.1% in the main group and by 3.8% in the control group.

In tab. 4 the dynamics of the echocardiography parameters of the right ventricle's (RV) functioning during the treatment period in patients with COPD and associated ischemic heart disease are presented.

The data presented in tab. 4 reveals that under the influence of the administered treatment there has been an improvement in almost all studied indices, but these changes depended on the applied scheme. Associated LILI based treatment resulted in an authentic reduction of PASP and MPAP from 56.4 ± 4.5 to 34.6 ± 4.1 mm Hg ($p < 0.001$) and 37.8 ± 3.2 up to 23.5 ± 3.2 mm Hg, respectively ($p < 0.001$). Basic treatment, which was administered to patients of control group, also had a positive but statistically insignificant effect. LILI procedures determined RV's IVRT to decrease from 127.0 ± 2.6 to 112.0 ± 2.5 ms ($p < 0.01$), while the basic treatment – from 126.5 ± 2.8 to 125.3 ± 3.1 ms, which is a positive, but statistically insignificant outcome. The dynamic of the volumetric (ADV and ESV) and dimensional (EDD and ESD) indices was more evident in patients who administered LILI procedures in comparison with those who received only basic treatment.

The reduction of the signs of bronchial obstruction was accompanied by an apparent improvement in comparison with the initial levels of both volume and speed indices of the external respiration functionality (FER). The most authentic changes were produced in the following indices: vital capacity

Table 5

The dynamics of the main ERF parameters, the level of 17-OHCS excretion and the 6-minute walk test results before and after the treatment

Parameters	Main group (n = 24)		Control group (n = 22)	
	Initial	End of treatment	Initial	End of treatment
VC, %	71.5 ± 2.63	81.1 ± 3.47*	63.7 ± 3.28	71.7 ± 3.83
IC, %	58.1 ± 2.8	65.7± 2.7*	46.7 ± 2.91	53.9 ± 4.36
MEV1, %	58.7 ± 3.22	67.4 ± 3.13*	47.7 ± 2.84	59.8 ± 4.89*
PEF, %	58 ± 3.91	73.5 ± 4.48*	55.3 ± 4.83	68.4 ± 6.14*
MEF25, %	50.8 ± 4.29	62.8 ± 4.81*	43 ± 4.98	57.2 ± 7.71
Indicele Tiffneau	81.2 ± 2.48	89.8 ± 2.35	86.7 ± 3.97	88.7 ± 2.22
17-OHCS, mcmol/24h	11.1± 0.81	18.3 ± 0.75	11.3 ± 1.0	11.8 ± 1.07
Distanța, m	445.7 ± 13.3	547.8 ± 14.1***	343.2 ± 21.2	367.2 ± 21.8
Distanța relativă, %	81.7 ± 1.73	101.0 ± 2.1***	63.2 ± 3.28	67.3 ± 3.18

Note: * - $p < 0.05$; *** - $p < 0.001$ – the differences from the original data are statistically authentic.

(VC), inspiratory capacity (IC), maximum expiratory volume in 1 second (MEV1), peak expiratory flow (PEF) and maximum expiratory flow (MEF25). By the end of the treatment with LILI procedures, the results of the 6-minute walk test revealed the increase of the average index in both absolute distance (from 445.7 ± 13.3 to 547.8 ± 14.1 m; $p < 0.001$) and relative (from 81.7 ± 1.73 to 101.0 ± 2.1%; $p < 0.001$) values. Markedly decreased dyspnea, both at rest and after exercise, indicates an increase in exercise tolerance induced by LILI procedures. By the end of the treatment period, in patients from the main group the blood hypoxemia had significantly decreased (PaO_2 increased from 60.5 ± 0.4 to 69.2 ± 0.3 mm Hg, $p < 0.001$) and hypercapnia ($PaCO_2$ increased to 42.5 ± 0.4 to 36.2 ± 0.3 mm Hg, $p < 0.001$). In patients from control group PaO_2 and $PaCO_2$ changes were insignificant and the difference between the indices was not statistically authentic. After LILI procedures a true increase was registered of total 17-OHCS excretion in urine.

The dynamics of the main ERF parameters, the level of 17-OHCS excretion and the 6-minute walk test results before and after the treatment are presented in tab. 5.

The results of the study reveal that the treatment with LILI of the patients with mild severity COPD determines a positive dynamic of almost all parameters of the ERF to the extent of normal values, in those with non severe COPD – was present an average increase of 10% compared with the initial values. In the control group, both mild and medium gravity, there were not registered statistical authentic differences between the original data and those obtained after the treatment ($p > 0.1$).

As a result of the applied medical and recuperative measures including the LILI procedures, the average level of total cholesterol in the blood serum dropped from 6.71 ± 0.22 to 5.37 ± 0.19 mmol/l (19.8%, $p < 0.01$), triglycerides – from 1.97 ± 0.17 to 1.27 ± 0.15 mmol/l (35.5%, $p < 0.01$). At the same time, we observed the lowering of atherogenous fractions of cholesterol and the rising of the antiatherogenous ones. Because of this, the atherogenic coefficient decreased from 5.69 ± 0.41 to 3.58 ± 0.39 ($p < 0.05$) while LILI usage and from 5.98 ± 0.49 to 5.12 ± 0.31 ($p < 0.05$) in patients who administered only the basic therapy. The study of coagulation markers revealed a positive effect of LILI procedures on the coagulant property of the blood.

After the use of LILI, there has been an authentic decrease in serum fibrinogen concentration from 4.62 ± 0.12 to 3.21 ± 0.11 g/l (by 30.5%, $p < 0.01$) and the reduction of thrombin time from 57.13 ± 0.92 to 44.07 ± 0.98 sec (by 22.8%, $p < 0.01$). In the control group there was a positive tendency in the dynamic of the analyzed indices, but the difference between initial and final levels was not statistically authentic. Data shows that in patients with COPD which applied LILI there was an improvement of the lipid metabolism and coagulation indices normalization, which improves the rheological properties of blood. This is of great importance in the pathogenic treatment of patients with COPD and associated coronary heart disease.

The analysis of the information stated above, we can conclude the following: the inclusion of LILI procedures in the complex of medical measures taken to treat exacerbations of COPD associated with angina pectoris of effort FC II improves the efficiency of the overall therapy of this disease, manifests a high tolerance and safety which are certain arguments for the widespread use of this method as ancillary therapy in exacerbations of the disease.

Conclusions

1. Inclusion of LILI in the standard treatment of COPD associated with angina pectoris of effort FC II reduces the early clinical symptoms and the cumulative index by 2.1 times, while in patients who received only basic treatment this index decreased by 1.3 times.
2. Administration of LILI procedures determined the decrease by 87% of the number of weekly anginal seizures in the main group, while in the control group this index reached 45% only.
3. Adding the LILI procedures to the standard therapy resulted in a faster normalization by 3-4 days in the main group of the laboratory indices that characterize the inflammatory process in comparison with the control group.
4. Procedures of LILI added to the therapy of patients with COPD associated with coronary heart disease contributed

to the reduction of clinical manifestations of the disease, the significant increase of MEV1 and exercise tolerance in comparison to patients who received only basic treatment.

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Role of Steatosis in the Pathogenesis and Course of Chronic Hepatitis C

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Abstract

Chronic hepatitis C – became a serious issue of public health due to its high prevalence throughout the world. According to the WHO data, in the next decades among the chronic diffuse diseases of the liver two basic pathologies that lead to the liver cirrhosis will predominate, - chronic hepatitis and steatosis. Patients with chronic hepatitis C infection have variable degree of steatosis even in the absence of other possible steatogenic factors, like alcohol, drugs or metabolic syndrome. According to studies of previous years it is believed that liver steatosis is more frequently encountered and has severe forms in chronic hepatitis caused by the genotype 3 of viral infection C, so-called "virus steatosis", explaining this thereby that the replication of virus directly participates in lipid accumulation in the liver tissue. The direct responsibility of virus C in the pathogenesis of steatosis is shown by: 1. the association with chronic hepatitis C genotype 3 infection, suggesting that some viral sequences are involved in the intracellular accumulation of lipids; 2. the correlation between severity of steatosis and viral C replication levels; 3. association between response to treatment and disappearance of steatosis. Other observations suggest that the pathogenesis of steatosis in chronic hepatitis C is not caused only by virus C. The origin of the mild steatosis observed in most patients may be metabolic, since its severity correlates with body mass index and insulin resistance. Management of steatosis in chronic hepatitis C requires knowledge of its pathogenesis.

Key words: chronic hepatitis C, hepatitis C genotype, liver steatosis.

Роль стеатоза в патогенезе и течении хронического гепатита С

Хронический гепатит С является серьезной проблемой общественного здравоохранения в связи с высокой распространенностью во всем мире. По данным ВОЗ, в ближайшие десятилетия среди хронических диффузных заболеваний печени будут преобладать две основные патологии, которые приводят к циррозу печени - хронический гепатит и стеатоз. Пациенты инфицированные хроническим гепатитом С имеют различную степень стеатоза даже в отсутствие других возможных стеатогенных факторов, таких как алкоголь, наркотики или метаболического синдрома. По данным исследований прошлых лет считается, что стеатоз печени чаще встречается и имеет более тяжелое течение при хронических гепатитах вызванных 3 генотипом гепатита С, так называемый «вирусный стеатоз», объясняя это тем самым, что репликация вируса непосредственно участвует в жировой инфильтрации печени. Прямое участие вируса гепатита С в патогенезе стеатоза следует из: 1 – взаимосвязи с 3 генотипом инфекции вируса гепатита С, предполагая, что некоторые вирусные части участвуют во внутриклеточном накоплении липидов; 2 – корреляции между тяжестью стеатоза и степенью репликации гепатита С; 3 – взаимосвязь между ответом на лечение и исчезновением стеатоза. Другие наблюдения показывают, что в патогенезе стеатоза при хроническом гепатите С участвует не только вирус гепатита С. Происхождение наблюдаемого умеренного стеатоза у большинства больных может быть метаболическим, так как его тяжесть коррелирует с индексом массы тела и резистентности к инсулину. Диагностика и лечение стеатоза при хроническом гепатите С требует глубокого знания его патогенеза.

Ключевые слова: хронический гепатит С, генотип вируса С, стеатоз печени.