

Features of indicators of lipid profile of blood in patients with chronic obstructive pulmonary disease

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Abstract

In complex treatment of chronic obstructive pulmonary disease (COPD) combined with ischemic heart disease (IHD) more and more attention is drawn to pleiotropic effect of statins. The objective of our researches became determining the effectivity of utilization of rosuvastatin (CRESTOR, IPR PHARMACEUTICALS, Inc.) in complex treatment of COPD combined with IHD. Basing on pulmonology department of Poltava regional clinical hospital, 30 patients with COPD combined with IHD have been examined (stable effort angina FC II) aged from 51 to 67 y.o. (average age was 57.03 ± 3.51). The patients were divided into two age compatible groups. Patients of the main group ($n = 15$) underwent regular COPD and IHD treatment, adding 20 mg of rosuvastatin per night. The observed group ($n = 15$) didn't receive rosuvastatin. The examination of patients was held before and half year of treatment, included the estimation of respiratory symptoms of the disease, the degree of intensity of dyspnea (Medical Research Council Dyspnea Scale). The tolerance to physical exercise was studied with 6 minute walking test. The cholesterol level, HDL, LDL, function of ventilation have been tested as well. The average frequency of aggravations during the year was estimated through retrospective examination of anamnesis.

After treatment the improvement of clinical state has been noticed at both groups due to decrease of intensity of respiratory symptoms of the disease, such as cough, amount of expectoration, dyspnea and also increase of tolerance to physical exercise and improvement of laboratory-instrumental indexes. Though the patients of the main group were noticed to have significantly less amount of expectoration and cough. The distance covered in 6 minutes was positively longer ($p < 0.05$). It has to be noted that the patients of the main group had positive decrease of wheezing after treatment, due to increase of FEV1, GI ($p < 0.05$). Also, the positive decrease of general cholesterol in blood took place, along with triglyceride and LDL, and increase of HDL ($p < 0.01$). The retrospective studying of the anamnesis revealed that the frequency of aggravations during the year was 1-2 times a year (1.6 ± 0.48). Including rosuvastatin into the treatment scheme allows to decrease and stabilize the main clinical symptoms of this constellation of diseases, improving the quality of life.

Introduction

Today doctors are increasingly facing the so-called comorbid course of chronic obstructive pulmonary disease (COPD) and ischemic heart disease (IHD), which is accompanied with the syndrome of mutual burdening and development of the "vicious circle", which leads to deterioration of COPD and has a negative impact on the effectiveness of basic treatment. Taking into account these circumstances, the considerable attention is paid to treatment of co-morbidities in the international consensuses and protocol of patients with COPD.

Most confirmed hypotheses consist in the fact that in such an association diseases are connected with common risk factors (active or passive smoking, adverse environmental conditions, respiratory tract infections) which cause chronic systemic inflammation by acting on vascular endothelial cells, airway epithelium, lung parenchyma.

The use of basic medications for the treatment of COPD, such as inhaled corticosteroids, has a pronounced anti-inflammatory effect on both the local and systemic levels, and it does not ensure the complete elimination of inflammation [1].

Taking into account the common risk factors and pathogenetic mechanisms in development of both diseases, increasing attention has been paid to the use of statins in treatment of COPD. This group of medications except the main one of lipid-lowering action, has pleiotropic (anti-inflammatory, immunomodulatory, and antioxidant) effects, influencing not only the condition of the vascular wall, but also the diseases of respiratory system. Under the influence of statins, a

decrease in the level of systemic inflammation markers and C-reactive protein (CRP) occurs, by means of reducing the production of interleukin-6 [2].

The results of randomized multicenter studies demonstrated that statin therapy in high doses reduces the risk of mortality in patients with COPD, decreases exacerbations and slows the processes of emphysema development [3,4]. Statins have pleiotropic effects, most of which, in our opinion, with this constellation of diseases, is anti-inflammatory.

Thus, the use of statins in treatment of COPD combined with ischemic heart disease requires further study. The aim of the research is to investigate the clinical efficacy of the use of rosuvastatin (CRESTOR, IPR PHARMACEUTICALS, Inc.) in treatment of COPD combined with ischemic heart disease.

Materials and methods

We examined 30 patients with COPD of B group combined with ischemic heart disease (stable exertional angina of FC II) aged from

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51 to 67 (average age was 57.03 ± 3.51) who were hospitalized in the Pulmonology Department of Poltava regional clinical hospital named after M.V. Sklifosovsky. The study was carried out at the Research Institute for Genetic and immunological bases of pathology and pharmacogenetics higher state educational institution of Ukraine "Ukrainian Medical Dental Academy" (HSEIU "UMCA"). The average duration of COPD in examined patients was between 10 and 15 years.

The diagnosis of COPD was established in accordance with the order of the Ministry of Public Health of Ukraine No 555 as of 06.27.2013 and the provisions set forth in the document GOLD (Global Initiative for Chronic Obstructive Lung Disease). IHD diagnosis was verified on the basis of clinical picture, medical history, ECG, and a six-minute walk test (SMWT).

According to the aim of the study, all patients were divided into two groups. Patients were selected based on the "case-control" method, so that the groups were comparable in terms of age, COPD group, FC of stable angina.

Patients of the main groups ($n = 15$) received COPD protocol therapy, namely 25 µg of serevent by two inhalations twice a day; if necessary, 0.4 g of aerofillin twice a day, 0.3 g of ambroxol twice a day. The protocol treatment of IHD included isosorbide-dinitrate at a dose of 20-40 mg/day, cardiomagnil at a dose of 75 mg/day, 10 mg of rosuvastatin. Patients of the control group ($n=15$) did not take rosuvastatin.

Patients were examined before and 12 days after treatment, therapy included the assessment of respiratory symptoms on a scale from 0 (no symptoms) to 3 (considerably severe symptoms). The degree of dyspnea was assessed using a modified scale of dyspnea (shortness of breath), MRC (Medical Research Council Dyspnoea Scale). Exercise tolerance was studied by a six-minute walk test (SMWT), which was conducted according to standard procedures.

The distance that a patient covers over the period of six minutes was taken into account. The level of cholesterol, LDL, HDL was determined. The respiratory function was defined: FEV₁ (forced expiratory volume in the 1st second), FEV₁/FVC–Gaensler index (GI), Tiffeneau index modification FEV₁/VC.

The average frequency of exacerbations during the previous year has been evaluated by a retrospective study of medical history.

Statistical analysis was performed using Excel 7.0 editor. The results are given in the tables as the arithmetic average \pm standard deviation ($M \pm m$). In order to evaluate the differences in performance as compared with the original data, Student's t-test was used. A significant difference was considered with the error probability $p < 0.05$.

Results

After the treatment of patients in both groups, the improvement in clinical status was detected due to decreased severity of respiratory symptoms: cough, sputum, dyspnea, as well as increased exercise tolerance and improved laboratory and instrumental performance (Table 1).

It was noted that regression of the respiratory symptoms in the main group of patients was more manifested in the comparative analysis of clinical symptoms between the groups. Thus, the patients of the main group had statistically significant decrease in the intensity of cough and quantity of sputum than patients in the control group ($p < 0.05$).

Furthermore, the pattern has been observed in the analysis of tolerance to physical activity between these groups of patients. After treatment patients had the increased tolerance to physical activity, but the patients of group II did not have a substantial nature of this condition, whereas the patients of the main group had significantly higher index ($p < 0.05$).

It should be noted that in patients of the main group after 6 months of treatment there was significant reduction of wheezing by means of increased FEV1 and GI ($p < 0.05$).

Having analyzed the lipid levels in patients from the main and control groups before and after treatment, the significant difference was observed. Thus, after treatment in patients of the main group, as one can see from table 2, there was a significant reduction in blood levels of total cholesterol, triglycerides, LDL and increase in HDL ($p < 0.01$).

When assigning means rosuvastatin were observed serious adverse events, which demanded its cancellation or destination other medicines to reduce side effects.

The retrospective study of the case history (1.6 ± 0.48) revealed that the frequency of exacerbations in the past year was observed from 1 to 2 times per year.

Table 1. Clinical and instrumental indicators in patients with COPD of B group in the combination with IHD, FC II. $*(p < 0.05 - p < 0.001)$ significant difference of indicators in the dynamics of treatment; $\#(p < 0.05)$ significant difference of indicators between the groups after treatment

Indicators	Group I (main)		Group II (control)	
	Before treatment	After 6 months of treatment	Before treatment	After 6 months of treatment
Cough (scores)	2.2 ± 0.13	$1.75 \pm 0.05^{*\#}$	2.3 ± 0.13	$1.9 \pm 0.06^*$
Sputum (scores)	2.32 ± 0.17	$1.61 \pm 0.06^{*\#}$	2.4 ± 0.16	$1.78 \pm 0.07^*$
Breathlessness (scores)	2.33 ± 0.12	$1.73 \pm 0.10^*$	2.27 ± 0.11	$1.82 \pm 0.10^*$
6-minute test (m)	411.47 ± 20.57	$468.17 \pm 19.35^*$	409.20 ± 20.46	453.47 ± 18.58
FEV ₁ %	56.23 ± 3.01	$66.57 \pm 3.27^*$	55.51 ± 2.98	62.8 ± 3.02
GI	62.7 ± 3.76	$74.1 \pm 3.61^*$	63.33 ± 3.8	70.26 ± 3.51

Table 2. Lipid profile indicators in patients with COPD of B group in the combination with IHD, FC II. $*(p < 0.01 - p < 0.001)$ significant difference of indicators in the dynamics of treatment; $\#(p < 0.001)$ significant difference of indicators between the groups after treatment

Lipid profile indicators	Group I (main)		group II (control)	
	Before treatment	After 6 months of treatment	Before treatment	After 6 months of treatment
Cholesterol	5.88 ± 0.35	$4.20 \pm 0.25^{*\#}$	5.77 ± 0.35	5.75 ± 0.35
Triacylglycerol	2.17 ± 0.11	$1.68 \pm 0.08^{*\#}$	2.14 ± 0.11	2.16 ± 0.08
LDL	3.38 ± 0.20	$2.43 \pm 0.15^{*\#}$	3.25 ± 0.20	3.23 ± 0.19
HDL	0.95 ± 0.05	$1.16 \pm 0.06^*$	1.06 ± 0.05	1.05 ± 0.05

Conclusion

1. Inclusion of rosuvastatin in the comprehensive treatment of patients with COPD in combination with IHD can reduce and stabilize the main clinical manifestation of this constellation of diseases through its pleiotropic action, most of which is anti-inflammatory.
2. When assigning means rosuvastatin were observed serious adverse events, which demanded its cancellation or destination other medicines to reduce side effects.
3. The frequency of exacerbations of COPD in patients with cardiovascular pathology with the use of statins is significantly reduced; thereby the quality of patients life is improved.

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