IMPACT OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE
ON THE COURSE OF COMORBID PATHOLOGY WITH CORONARY HEART DISEASE
AND ON MORE SEVERE COURSE OF COVID-19

Summary. The article presents results of scientific researches about influence of chronic obstructive pulmonary disease (COPD) on the course of comorbid pathology with coronary heart disease (CHD). CHD is called in Ukraine ischemic heart disease (IHD). According to the conducted retrospective analysis of scientific publications about simultaneous course of these diseases was established that they occupy one of the leading places among reasons of disability patients and death rate in Ukraine and all over the world. Also article shows significant difficulties in curation of such patients. Theoretically most experts agree that during choosing the tactics of treatment of COPD it is impossible to escape a summary risk that is caused by comorbidity of pathologies, especially for the senile age patients, that is the most vulnerable stratum of population for COVID-19. Patients with combination of CHD and COPD have an unfavorable course of these diseases and high risk of death rate. It is supposed to carry out research to set diagnostic criteria that would serve as the primary or secondary markers of the combined development of COPD and CHD, and prove that COPD and CHD is in clinical and pathogenetical dependence. Therefore, a study of the simultaneous course of COPD and CHD is one of the actual problem of modern medicine and due to our opinion it should be provided further scientific researches.

Keywords: chronic obstructive pulmonary disease, coronary heart disease, comorbid pathology, respiratory insufficiency, ultrasound examination of the heart.
Formulation of the problem. Coronary heart disease occupies a leading position among reasons of death rate and lethality of patients with the chronic obstructive pulmonary disease. In opinion of many leading pulmonologists for timely diagnostics and correct treatment of patients who suffer from COPD it is obligatory to pay more attention in revealing clinical symptomatology of chronic heart disease. Frequency of comorbid pathology of COPD and CHD progressively grows to the extent of aging of population. It is therefore important to investigate influence of COPD on developing and course of the combined pathology of COPD and CHD.

American Thoracic Society and European Respiratory Society have common document in which explains that COPD is a disease that characterized by incomplete irreversible restriction of air flow rate which usually progresses. Key element of progressing disease is a chronic diffuse inflammation with involving in pathological process bronchial wall, interstitial tissue and endothelium of lungs vessels. It leads to developing of peribronchial fibrosis, overload of right parts of the heart (reason of occurrence of pulmonary hypertension) and restrictive lungs derogations. Increasing shortness of breath and weakness limit physical activity of patient and lead to muscle atrophy and chronic hypoxemia of tissues with changing in rheological properties, contribute to the disorders of microcirculation in lungs, miocardium and others organs and systems. All this changes create favorable condition for severe course of COVID-19.

Research analysis. Frequency of exposure of CHD among patients with COPD varies from 25 to 65% cases according to data of Spanish society of internal medicine, on the other hand patients hospitalized because of exacerbation of COPD in 20,8% cases had concomitant CHD [1].

Prevalence of other concomitant diseases such as arterial hypertension (79,8%), diabetes mellitus (19,1%), atrial fibrillation (23,9%) among patients with COPD is also significant [2].

According to the data of researchers of Rotterdam, COPD causes the increase of risk of sudden cardiac death during 5 years since establishment of diagnosis and for patients with the frequent exacerbation of COPD the risk of sudden cardiac death is in 3 times higher [3], therefore control above prevalence of combination of these diseases acquires an important value, especially in COVID-19 pandemic.

From data of the Swedish register of SWEDHEART for 2005-2010 among over 4 thousand patients with the acute infarction of myocardium and COPD death rate is considerably higher during first year – 24% against 13% to compare with the patients that did not have COPD, developing of heart failure – 17,2% against 9,7% [5].

V.K. Tashchuk (В.К. Ташчук), T.M. Amelina (Т.М. Амеліна), O.S. Polianska (О.С. Поліанська) and others are paying attention to influence of dysfunction of endothelium on the main pathogenic mechanisms in progression CHD in combination with COPD [6] and without it.

COPD as one of the risk factor of cardiovascular diseases is studied by J. Finkelstein, E. Cha, S.M. Scharf and others [7].

Rotterdam (Роттердам) is studying an influence of COPD on sudden cardiac death (L. Lahousse, M. Niemeijer, M. E. van den of Berg and others) [3].

J.Soriano, D. Guerrero, F. Rigo and others study prevalence of obstruction of bronchous among patients with cardiovascular diseases [8].

P. Andell, S. Koul, A. Martinsson and others [et al.] analysed influence of COPD on the rates of heart attacks and death rate from the infarction of myocardium among patients [5].

Influence of severity of COPD on the results of surgical interferences for patients, that had planned ACABG was described by H. Saleh, K. Mohan, M. Shaw and others and others [et al.] [4].

Maclay J.D. examines the mechanisms of combination of cardiovascular diseases and COPD [9].

Prevalence of COPD among patients with a acute coronary syndrome on the basis of spirometry (Based Screening Study) was determined in the researches by Т. Mooe, N. Stenfors [10].

In the dissertation works of some Ukrainian scientists were shown the various aspects of comorbidity of COPD and CHD: Gerych P.R. (Герич П.Р.) – COPD and CHD: pathogenesis of the combined cardiovascular pathology and differentiated approache of therapy (2017) [11]; Didenko D.V. (Діденко Д.В.) – ischemic heart disease and chronic obstructive disease of lungs: prevalence of the combined course among the hospitalized patients (2018) [2].

Highlighting unresolved issues. At the moment in the medical publications more often starts to appear information that COPD increases risk of cardiovascular diseases which is predetermined by many aspects. Presence of common risk factors: old age, smoking, low physical activity, overweight, diabetes mellitus, systemic diseases, atherogenic dyslipidemia, endothelium disfunction, etc. plays an important role in developing comorbid pathology with COPD. Simultaneous course of COPD and CHD has very widely prevalence among therapeutic patients also because of the same pathogenetic factors:

- disorder of reological characteristics that leads to hypercoagulation;
- changes in lungs ventilation that is a reason of tissue hypoxia;
- reduction of capillary bed;
- hemodynamic disorders;
- progressive immunological inflammation.

During bronchial obstruction appears significant morphological destruction in bronchial wall that provokes process of atherosclerotic changes. Such common aspects also aggravates course of COVID-19.

Well-proven is a negative influence of the COPD on the course of CHD – the presence of COPD raises the risk of death of the patients with CHD.

Persisting of inflammation from which suffer patients with COPD is considered as one of the leading mechanisms of atherogenesis and cardiovascular diseases. There were marked more complicated disorders of myocardial functional reserves for the common pathology (COPD and CHD). It reveals in the deviation of the axis of the heart, reduction of bioelectrical activity of heart, in tachycardia and tachyarrhythmia, in the signs of hypertrophy of the
left and right ventricles, and also hypertrophy of the auricles. In such comorbid pathology more often arises depression of the segment ST, that indicates a significant coronary dysfunction for such patients. Bioelectrical activity of myocardium was decreased in all patients with CHD (100,0%) and in 83,3% patients with COPD. Most patients had tachycardia, especially at the presence of COPD. Among disord-
eres of the heart rythm most often occurred supraventricular extrasystole, that appeared in 27,5% cases for patients with the common pathology, 13,3% cases for patients with CHD and 10,0% for patients with COPD. Also ventricular extrasystoles – 7,5% cases for patients with combination of COPD and CHD, and 6,7% for patients with CHD. There were no substantial differences between frequency of dis- orders of the heart conduction system. By analysing the signs of hypertrophy of the left ventricular, it is marked that index of Solovyova-Layona (Соловйова-Лайона) and Cornell (Корнельський) criterion were seted (38,92±1,95) and (32,33±1,81) for patients with combination of COPD and CHD, while for patients with CHD these indexes were determined at the lev-
el of (36,77±2,20) and (30,10±1,51) accordingly that substantially differ from patients with COPD [2].

Most patients were treated because of acute forms of CIHD – acute heart attack of myocardium and unstable angina of 57,9%, chronic forms of CIHD – 42,1%.Should be taken attention that symptoms such as feeling of compression in the heart area, pain in a thorax and breathlessness are typical for a myocardial ischemia, and can occur in patients with CODOL. Often in both cases pa-
tients are feeling better after rest. Similarity and masked of symptoms, difficulties with doing tests with physical activity for patients with comorbid-pathology quite often is the reason of untimely diagnostics and prescribing treatment [Reed and others [et al.], 2012].

COPD has negative influence on the prognosis of course of CHD for patients that had the aortic coronary artery bypass grafting (ACABG), and it is proven that among such patients that had severe course of COPD (according to data of spirometry), early death rate after ACABG is in 4 times higher, than for patients with the normal indexes of spi-
rometry and sets 5,7% [4].

Aim of the article. To research impact of COPD on developing and course of comorbid pathology COPD and CHD.

Exposition of material. During examination of 157 patients who suffer from combined pathology COPD and CHD and were hospitalized in the pul-
monary and therapeutic departments of 5th clinical hospital of e.Liviv, it was educed that in some cases COPD becomes as a predictor or aggravated factor of comorbidity with CHD. So for 52 patients with the exacerbation of severe course of COPD clinical signs of CHD intensifies in 21 cases, that was con-
fi
ermed by an ultrasound examination of the heart. Severity of the course of COPD was determined on clinical signs and data of spirometry. After the detailed inspection of 45 patients with mild course of COPD the signs of CHD appeared clinically and were confirmed in the laboratory.

Inspection of patients with CHD in combination with COPD was laboured by impossibility of imple-
mentation of tests with physical activity because of considerable respiratory insufficiency that is intens-
fifying during exacerbation of COPD.

In 25 cases development of exacerbation of COPD patients explained as a connection with flu, in 73 cases with the violation of the base therapy.

Most patients with exacerbation of COPD did not adhere to base therapy because of insufficiency of compliance with doctors, and also expensive pris-
es on prescribed medication.

There were set gender differences among pa-
tients that were examind. Mostly among patients with severe course of COPD were men – 80%, wom-
en 20%.

It was also set that with the increase of age of patients on COPD severity of course and frequency of exacerbation grew also. And proportionally was grown frequency of combination of COPD and CHD.

Among inspected patients there were 10% who never smoke, 80% ex-smokers, but 10% were ac-
tive smokers during research.

Considerable amount of patients with combina-
tion of COPD and CHD, and frequent exacerbation of COPD consist of heavy smokers.

High intensity and long duration of smoking cause a negative impact on arterial vessels includ-
ing heart coronar, that is one of reasons of strengthening of systemic inflammation and developing co-
 morbidity of COPD and CHD.

The main clinical sign in 85% of patients with exacerbation of COPD was shortness of breath. It complicated diagnostics of comorbidity with CHD that also reveals in breathlessness especially in cas-
es of painless forms. During physical activities of patients shortness of breath disturbed them in 100% cases.

Combination of COPD and CHD intensifies bronchial obstruction that leads to respiratory in-
sufficiency, it worsens course of CHD and its pro-
gression with the increasing ventilation disorders.

Mutually aggravating action of COPD and CHD is one of the reason of early disability and death of patients.

During research was educed that combination of COPD and CHD causes negative changes in structural morphological indicators of heart. One of the important diagnostic criteria of functional ability of myocardium is emission fraction, it char-
acterizes systolic function of heart. So researchers reveal that reduced emission fraction is more often observed among patients with combined pathology COPD and CHD. Severe course of COPD in com-
bination with CHD leads to compensatory hy-
throphy of left ventricle. Remodeling of the right parts of heart manifests in hypertrophy of right ventricle, its dilatation ( size of right ventricle in 25 patients exceeds 3,0 cm).

Diastolic disfunction is increased in 90% of the cases of comorbid pathology. That influences on clinical condition of patients, reduces tolerance to physical activity and worsens quality of life of patients.

Conclusions and prospects of further de-
velopments. Theoretically most experts agree that during choosing the tactics of treatment of COPD it is impossible to escape a summery risk that is caused by comorbidity of pathologies, especially for the senile age patients, that is the most vulnerable stratum of population for COVID-19.
Patients with combination of CHD and COPD have an unfavorable course of these diseases and high risk of death rate. It needs the exposure of this pathology in time and implementation of modern quality methods of diagnostics and treatment.

It is supposed to carry out research to set diagnostic criteria that would serve as the primary or secondary markers of the combined development of COPD and CHD, and prove that COPD and CHD is in clinical and pathogenetical dependence.

Therefore, a study of the simultaneous course of COPD and CHD is one of the actual problem of modern medicine and due to our opinion it should be provided further scientific researches.

References:

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