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CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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Abstract
Chronic obstructive pulmonary disease is one of the most common diseases of the respiratory system in the modern world. According to the World Health Organization, COPD ranks third among the causes of death worldwide. In Russia, more than 11 million people suffer from this disease, and many of them do not even suspect its presence at the early stages.

Introduction

Chronic obstructive pulmonary disease is a progressive disease characterized by an inflammatory component, impaired bronchial patency at the level of distal bronchi, and structural changes in lung tissue and pulmonary vessels. The main clinical signs include cough with mucopurulent sputum production, dyspnea, and changes in skin color (cyanosis or a pinkish coloration).

Causes of COPD

Among the causes leading to the development of chronic obstructive pulmonary disease, 90–95% are attributed to tobacco smoking. Among other factors (about 5%) are occupational hazards (inhalation of harmful gases and particles), respiratory infections in childhood, concomitant bronchopulmonary pathology, and environmental conditions.

In less than 1% of patients, COPD is based on a genetic predisposition, manifested by a deficiency of alpha-1 antitrypsin, which is produced in liver tissues and protects the lungs from damage by the enzyme elastase.

COPD is an occupational disease of miners, railway workers, construction workers in contact with cement, workers of the pulp and paper and metallurgical industries, and agricultural workers engaged in the processing of cotton and grain. Among occupational hazards, the leading causes of COPD include:

-contact with cadmium and silicon;
-metal processing.

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Stages of COPD

Stage of COPD course	Characteristics	Name and frequency of required examinations
I. Mild	Chronic cough and sputum production are usually, but not always, present. $FEV_1/FVC \leq 70\%$ $FEV_1 \geq 80\%$ of predicted values	Clinical examination and spirometry with bronchodilator test once a year. During COPD exacerbation — complete blood count and chest X-ray.
II.Moderate	Chronic cough and sputum production are usually, but not always, present. $FEV_1/FVC \leq 50\%$ $FEV_1 < 80\%$ of predicted values	The scope and frequency of examinations are the same
III. Severe	Chronic cough and sputum production are usually, but not always, present. $FEV_1/FVC \leq 30\%$ $30\% \leq FEV_1 < 50\%$ of predicted values	Clinical examination twice a year; spirometry with bronchodilator test and ECG once a year. During COPD exacerbation — complete blood count and chest X-ray.
IV. Very severe	$FEV_1/FVC \leq 70\%$ $FEV_1 < 30\%$ of predicted values or $FEV_1 < 50\%$ of predicted values in combination with chronic respiratory failure or right ventricular failure	The scope and frequency of examinations are the same. Oxygen saturation ($SatO_2$) — 1–2 times a year.

Symptoms of COPD

At the early stages, chronic obstructive pulmonary disease has a latent course and is not always detected in a timely manner. The characteristic clinical picture develops starting from the moderate stage of COPD.

The course of COPD is characterized by cough with sputum and dyspnea. At the early stages, patients are troubled by episodic cough with mucous sputum (up to 60 ml per day) and dyspnea during intense physical exertion; as the severity of the disease progresses, cough becomes persistent, and dyspnea is felt at rest. With the addition of infection, the course of COPD worsens, sputum becomes purulent, and its amount increases.

The COPD may develop into to two clinical forms:

Bronchitic type.

In patients with the bronchitic type of COPD, predominate purulent inflammatory processes in the bronchi , accompanied by intoxication, cough, and abundant sputum production. Bronchial obstruction is significantly pronounced, while pulmonary emphysema is mild. This group of patients is conventionally referred to as “blue bloaters” due to diffuse blue cyanosis of the skin. The development of complications and the terminal stage occur at a young age.

Emphysematous type.

With the development of COPD according to the emphysematous type, expiratory dyspnea (with difficulty in exhalation) comes to the forefront of symptoms. Pulmonary emphysema predominates over bronchial obstruction. Due to the characteristic appearance of patients (pink-gray skin color,

barrel-shaped chest, cachexia), they are referred to as “pink puffers.” This form has a more benign course, and patients usually survive to old age.

Diagnosis

The slow and progressive course of chronic obstructive pulmonary disease raises the issue of timely diagnosis of the disease, which contributes to improving quality of life and increasing life expectancy. When patient history, attention should be paid to the presence of harmful habits (tobacco smoking) and occupational factors.

Study of pulmonary function.

The most important method of functional diagnostics is spirometry, which reveals the first signs of COPD. Measurement of speed and volume indicators is mandatory: vital capacity (VC), forced vital capacity (FVC), forced expiratory volume in one second (FEV_1), and others in a post-bronchodilator test. Summation and ratio of these indicators make it possible to diagnose COPD.

Sputum analysis.

Cytological examination of sputum in patients with COPD makes it possible to assess the nature and severity of bronchial inflammation and to exclude oncological processes. During remission, sputum is mucous with a predominance of macrophages. In the phase of COPD exacerbation, sputum becomes viscous and purulent.

Blood analysis.

Clinical blood examination in COPD reveals polycythemia (increase in the number of erythrocytes, hematocrit, hemoglobin, and blood viscosity) as a consequence of hypoxemia in the bronchitic type of the disease. In patients with pronounced manifestations of respiratory failure, blood gas analysis is also examined.

Chest X-ray.

Chest radiography excludes other diseases with similar clinical manifestations. In patients with COPD, chest radiographs show thickening and deformation of the bronchial walls and emphysematous changes in lung tissue.

Drug treatment

Pharmacotherapy for COPD depends on the stage of the disease, severity of symptoms, degree of bronchial obstruction, presence of respiratory or right ventricular failure, and concomitant diseases. Drugs used in COPD are divided into agents for relief of exacerbations and agents for prevention of exacerbation development. Inhaled forms of drugs are preferred.

Inhalation treatment of COPD

To relieve rare attacks of bronchospasm, inhalations of short-acting β-adrenergic agonists are prescribed: salbutamol, fenoterol.

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Drugs for prevention of attacks:

formoterol; tiotropium bromide;combined drugs (Berotec, Berovent).

If the use of inhalations is impossible or their effectiveness is insufficient, the use of theophylline may be necessary. In case of bacterial exacerbation of COPD, antibiotics are required. The following may be used: amoxicillin 0.5–1 g three times a day, azithromycin 500 mg for three days, clarithromycin SR 1000 mg once a day, clarithromycin 500 mg twice a day, amoxicillin + clavulanic acid 625 mg twice a day, cefuroxime 750 mg twice a day.

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