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New fundamental clinical approach to Pulmonary hypertension

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Abstract

Pulmonary hypertension (PH) is a group of diseases characterized by a progressive increase in pulmonary vascular resistance. Increased pulmonary resistance causes right ventricular heart failure and premature death of patients. The prevalence of pulmonary hypertension in the general population can be as high as 20-50 per 100,000 populations. Idiopathic pulmonary hypertension develops in young women between the ages of 20 and 40. In men, this disease is less common. Secondary PH develops in various chronic lung diseases and diseases accompanied by hypoxemia, as well as in the pathology of the left heart, chronic pulmonary embolism and other pathological processes accompanied by a violation in the pulmonary vascular bed. In recent years, considerable attention has been paid to the study of this issue, and the problem of timely and effective diagnosis and treatment of pulmonary hypertension is very relevant. It is necessary to highlight the following areas in order for the diagnosis, treatment and prevention of pulmonary hypertension to be successful. In the article we will analyze what is Definition Pulmonary hypertension.

KEY WORDS: pulmonary hypertension; clinical symptoms; disease progression

Definition

The definition of PH is an increase in mean pressure in the pulmonary artery of more than 25 mm Hg. Art. at rest and more than 30 mm Hg. during physical exertion.

Specialists of various fields (cardiologists, pulmonologists, rheumatologists, etc.) in the world use the terms “primary or secondary PH” instead of the term pulmonary hypertension. This term refers to an increase in pressure in the pulmonary circulation. We often use the term LS, which defines changes in the right ventricle (hypertrophy and / or dilatation), which are caused by an increase in pressure in the pulmonary circulation.

It is also necessary to take into account that there are other factors that determine the prognosis of patients with chronic obstructive pulmonary disease, systemic diseases. It must be taken into account that circulatory failure, in turn, is associated with impaired diastolic and systolic functions of the right ventricle. We approve the proofreading of the definition in the next edit [1].

“LS is primary or secondary PH resulting from dysfunction of the pulmonary vascular endothelium, structural and functional changes in the pulmonary vessels in combination with hypertrophy and/or dilatation of the right ventricle, changes in the right atrium, diastolic and/or systolic dysfunction of both ventricles of the heart.”

In 2018, it was proposed to change the diagnostic criterion for PH in the form of a decrease in the value of the mean pulmonary artery pressure (mean PAP) ≥25 mm Hg. Art. up to ≥20 mmHg Art. Given the fact that many of the experts’ proposals are still under discussion and have not been reflected in the European recommendations, we will describe the current situation and concept [2].

There is a special concept: Pulmonary arterial hypertension is a precapillary form of PH that develops in the absence of lung diseases, chronic pulmonary embolism (PE), and other rare diseases (group V) as possible causes of increased PAP [3,4,5,6].

Clinical signs and symptoms

All clinical symptoms revealed during questioning and examination of patients are not pathognomonic, which makes early diagnosis difficult. At the initial stage, the disease may be asymptomatic. The range of clinical symptoms (shortness of breath, fatigue and weakness, pain in the heart, dizziness and syncope) is large [4,5].

The characteristic symptoms of PH are cough and hemoptysis

Inspiratory dyspnea is expressed in varying degrees: from minimal to maximal [7]. Shortness of breath on exertion is the most common first symptom of the disease. As a rule, with the course of the disease, shortness of breath progressively increases. In this case, attacks of suffocation are usually not observed.

Chest pain in patients usually has an indefinite character: pressing, aching, stabbing, squeezing; without a clear onset, lasting from several minutes to a day, aggravated by physical exertion, usually not stopped by taking nitroglycerin. A number of patients have typical angina attacks with irradiation to the left shoulder blade and arm, which can mask coronary heart disease and even acute myocardial infarction [7].

More than half of patients with PH have dizziness and fainting, provoked by physical activity. The usual duration of syncope is 2-5 minutes, sometimes up to 20-25 minutes [8]. Most patients complain of palpitations and interruptions in the work of the heart. At the same time, malignant rhythm disturbances, as a rule, are not recorded on the ECG, more often there is sinus tachycardia.

Cough is observed in a third of patients. Cough is associated with congestion and inflammatory changes in the lungs and bronchi [9].

Hemoptysis usually occurs once, but can last for several days, is associated both with thromboembolism in small branches of the pulmonary artery, and due to rupture of small bronchial arteries of the bronchial mucosa [7].

Symptoms associated with concomitant diseases indicate a possible clinical. Orthopnea and paroxysmal increase in shortness of breath at night indicates congestion in the pulmonary circulation due to damage to the left heart [4,5]. Arthralgias, skin manifestations, fever and other symptoms of connective tissue diseases are sometimes observed. Snoring and sleep apnea, the association of shortness of breath with breathing disorders during sleep requires a polysomnographic study.

Symptoms of disease progression

Edema of the lower extremities, ascites, loss of appetite, severe weakness increases with tricuspid insufficiency [9].

Anamnestic information. Given the established genetic aspect, it is necessary to exclude the presence of characteristic clinical symptoms in the patient's relatives. There is a risk of developing the disease when using drugs, toxins (anorectics, rapeseed oil), chemotherapy (cyclophosphamide, bleomycin, etc.) [1,3]. The diagnosis is highly likely in patients with clinical symptoms against the background of portal hypertension, HIV infection, venous thrombosis. Many patients have a family history of sudden death, cardiovascular disease and an increased tendency to thrombosis [8,10].

Independent risk factors for development include: previous splenectomy, ventriculo-venous shunts for the treatment of hydrocephalus, placement of central intravenous catheters or pacemaker electrodes, thyroid hormone replacement therapy, oncological and chronic inflammatory diseases [3,4].

Physical examination

During physical examination, patients most often reveal acrocyanosis, with a long course of the disease – changes in the phalanges of the fingers in the form of "drumsticks" and nails in the form of "watch glasses" [9]. Patients with emphysema have a change in the shape of the chest ("barrel" chest). With the development of right ventricular heart failure, swollen jugular veins, hepatomegaly, peripheral edema, and ascites are observed. With auscultation, with a high degree of probability, it is possible to establish the presence of pathology of the lungs and heart. Typical auscultatory signs are accent II tone over the pulmonary artery, pansystolic systolic murmur of tricuspid insufficiency, Graham Still's murmur [7].

Instrumental methods

Instrumental methods of examination are Electrocardiography, X-ray of the chest organs.

Examination of the function of external respiration / analysis of the gas composition of arterial blood; Transthoracic echocardiography; Ventilation-perfusion lung scintigraphy; CT scan; Magnetic resonance imaging; Ultrasound of the abdominal organs.

To assess the cause and severity of PH in all patients, it is necessary to conduct

routine laboratory tests: biochemical (assessment of kidney and liver function, protein content, electrolytes) and general (hemoglobin, red blood cells, hematocrit, white blood cells, platelets) blood tests, examine the coagulogram. Testing for HIV infection is recommended in all patients with PAH. A mandatory assessment of the functional state of the thyroid gland is necessary, given the possible association of PH with thyroid dysfunction [11,12].

Functional status assessment

An objective assessment of the functional ability of patients with is necessary to assess the severity of disorders and the dynamics of the clinical condition against the background of ongoing therapy. In the study of exercise tolerance, the most commonly used test is the 6-minute walk test (and the cardiopulmonary exercise test with an assessment of gas exchange).

The 6-minute walk test is a simple, accessible tool for assessing functional status and has prognostic value. The test is usually supplemented by a Borg dyspnea index and pulse oximetry [13].

The cardiopulmonary exercise test makes it possible to assess ventilation and gas exchange during dosed physical activity (peak oxygen consumption index, anaerobic threshold). In patients with PAH, the anaerobic threshold and peak oxygen consumption are reduced [14,15].

Hemodinamics

Assessing the severity of hemodynamic disorders, deciding on the choice of pathogenetic therapy and evaluating its effectiveness.

Lung biopsy

Conducting both open and thoracoscopic lung biopsy is associated with a significant risk of complications, including fatal ones. In routine clinical practice, this method is usually not used.

Open and thoracoscopic lung biopsy is not recommended.

Risk assessment in patients

For a comprehensive assessment of the status of patients initially and in dynamics, it is important to consider clinical data, the results of a cardiopulmonary stress test, biochemical markers, hemodynamic and echocardiographic parameters.

In this article, we made an excursion into the most modern approaches for diagnosing a disease, proper treatment and the formation of a policy for the prevention of this disease. However, we want to emphasize the special significance of blood rheology, as determining blood flow and organ and systemic circulation.

In our studies, it is clearly seen that the rheological status, which combines rheological factors, often changes specifically in pulmonary hypertension. Research is needed in this direction and registration of the analysis of the hemorheological status of the blood of patients with arterial hypertension, as a mandatory method of laboratory research in patients of this group.

We believe that this article will open a discussion among scientists-rheologists, cardiologists, representatives of biomedicine who have fundamental and applied knowledge in the field of macro-and microcirculation to draw up a special note for departmental healthcare organizations. It should be noted that in addition to Belgium and Ukraine, Georgia, Bulgaria, Turkey and France are participating in this process.

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