

Chronic and Tumor Diseases of the Lungs in the Elderly

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Abstract

Chronic obstructive pulmonary disease and lung cancer are severe pathologies that often develop in elderly and senile individuals [1,2]. This article examines the age-related morphological and functional changes in the respiratory system that create a background for the development of these diseases [3]. Special attention is paid to the pathogenesis, clinical features, diagnosis, and treatment of obstructive emphysema and lung cancer in older patients [4,5]. The clinical course of these diseases in the elderly is often atypical, with mild symptoms and a tendency to progress slowly but steadily. [6] The presented data highlight the need for increased oncological vigilance and a comprehensive approach to the management of respiratory diseases in geriatric practice [7].

Keywords : elderly age ; respiratory system ; chronic obstructive pulmonary disease (COPD) ; emphysema ; lung cancer ; pathogenesis ; clinical features ; geriatrics

Introduction

With aging, the organs of the respiratory system undergo significant morphological and functional changes affecting the chest, airways, lung parenchyma, and the vascular system of the pulmonary circulation.[1,3] After 60 years, degenerative-dystrophic changes of the musculoskeletal framework of the chest are noted: osteochondrosis of the thoracic spine, reduced mobility of the costovertebral joints, calcification of the costal cartilages, and waxy and vacuolar degeneration of muscle fibers directly involved in the act of breathing (intercostal muscles and diaphragm). [8] These changes negatively affect pulmonary ventilation. Age-related changes in connective tissue of the lungs, bronchi, and pulmonary vessels lead to decreased elasticity, impaired drainage function, and reduced blood filling. [3,9] These age-related transformations significantly affect the functional features of external respiration and predispose to the development of pathological processes, including chronic obstructive emphysema and lung cancer [2,10].

Obstructive Emphysema Emphysema

Is a term that unites a number of different conditions of the lungs based on the principle of increased air content in them. [4] Diffuse pulmonary emphysema has the greatest clinical significance. Primary and secondary forms are distinguished. Bronchial obstruction plays a leading role in the pathogenesis of both of these forms. Therefore, the term "obstructive pulmonary emphysema" is also used to designate them. The main causative factor of secondary diffuse emphysema is chronic obstructive bronchitis. [11] Impaired bronchial patency in this form of bronchitis is more pronounced in the expiratory phase. This leads to gradual air retention in the alveoli and their expansion. The expansion of alveolar spaces up to the formation of air cavities is facilitated by destructive processes in the alveolar walls, caused by the transition of the

inflammatory process to peribronchial connective tissue, as well as by the stimulation of protease release by alveolar macrophages and leukocytes [12,13].

Vascular changes in secondary diffuse pulmonary emphysema consist of a reduction of the capillary network with disorders characteristic of precapillary pulmonary hypertension. [14] The growth of peripheral pulmonary vascular resistance is facilitated by compression of small pulmonary vessels by emphysematously altered lung tissue and spasm of pulmonary arterioles in areas of alveolar hypoxia (Euler-Liljestrand reflex) [15].

Clinical picture, diagnosis. The clinical picture of obstructive emphysema is largely determined by the presence of primary or secondary diffuse emphysema. [4] The main complaints of patients with secondary pulmonary emphysema are dyspnea and cough. Unlike young people, in the elderly, symptoms of pulmonary insufficiency are clearly evident even with mild degrees of pulmonary emphysema. [6,16] In severe forms, cyanosis is noted as a result of hypoxia. A barrel-shaped chest is revealed, with bulging of the supraclavicular and even subclavian spaces, and participation of accessory muscles in breathing. [17] The chest is fixed in the inspiratory position. The lung borders are shifted downward and have low mobility. On percussion, a box sound is heard; breath sounds and vocal fremitus are weakened; expiration is prolonged with buzzing and, in places, fine-bubbly, non-resonant rales [4,17].

The area of relative and absolute cardiac dullness is reduced, and heart sounds are muffled. In later stages, an accentuation of the second sound over the pulmonary trunk is sometimes noted as a result of the development of hypertension in the pulmonary circulation. [14] A compensatory phenomenon associated with hypoxemia is an increase in the number of red blood cells, which increases the mass of circulating

blood. However, in elderly and senile patients, erythrocytosis is mild due to a decrease in the regenerative capacity of the bone marrow. [1,16] Pulmonary emphysema usually progresses slowly but steadily, especially in the elderly, which is greatly facilitated by an outbreak of infection (pneumonia, exacerbation of chronic bronchitis, etc.). [11] Ultimately, chronic cor pulmonale syndrome develops [14].

Treatment. It is aimed at eliminating the disease that led to the development of emphysema. [4] To combat bronchopulmonary infection, in particular, aerosol antibiotic therapy is carried out; agents that improve bronchial patency (bronchodilators, expectorants) are used. [17] Oxygen therapy is indicated [15].

Lung Cancer

Lung cancer is most common between the ages of 40 and 70 years. [5,18] There is a known relationship between the influence of a number of exogenous (chemical and physical) factors, inflammatory processes in the lungs and their combinations, and the occurrence of lung cancer. [19] Among them, smoking occupies the first place. [20] Aging to a certain extent prepares the ground for the development of lung cancer. [2,10] Indeed, with age, metaplasia of the bronchial mucosa occurs, its nutrition is disrupted, and, what is especially important, the bronchial epithelium is largely exposed to carcinogenic substances. [3,21] Age-related changes in the bronchial wall and the presence of a chronic inflammatory process contribute to the deposition of mechanical particles with carcinogens adsorbed on them in the lung tissue. [12,13] The clinical symptoms of lung cancer largely depend on the location of the tumor and the stage of the tumor process. [22] Three main clinical forms of lung cancer are distinguished: 1) central; 2) peripheral; 3) atypical

Clinical picture, diagnosis. The clinical picture of lung cancer consists of: 1) primary symptoms associated with the tumor itself; 2) secondary symptoms caused by complications accompanying tumor growth (atelectasis of the lung area affected by the bronchus, stenosis, pneumonia (acute and chronic), abscess formation, pleural involvement, etc.); 3) symptoms reflecting the general toxic effect on the patient's body of a malignant tumor (weakness, loss of appetite, fatigue, weight loss, etc.); 4) symptoms associated with dysfunction of the endocrine and nervous systems as a result of the tumor's secretion [5,22].

Central form. The most constant and frequent symptom is cough, depending on the germination of the tumor into the bronchial mucosa. [23] In people who have suffered from cough for a long time, which is often observed in old age, special importance should be attached to a change in its character. [6] Hemoptysis is often noted in the sputum. However, this symptom is late. [5] Dyspnea is associated with the exclusion of part of the lung from the act of breathing against the background of already existing inferiority of the function of the external respiratory apparatus caused by age-related changes [2,6].

Peripheral form. Rounded cancerous tumors originate from smaller bronchi and bronchioalveolar ducts. [22] The clinical picture of peripheral uncomplicated cancer, in contrast to central cancer, is relatively poor and monotonous. The disease, especially in elderly and senile people, is asymptomatic for a long time. [5,18] Among the clinical signs, one should note vague chest pain, cough with a small amount of sputum, and the almost constant presence of blood in the sputum. [23] The development is gradual. Body temperature is often subfebrile. Sometimes early precancerous syndromes are observed, but their connection with lung pathology is often ignored. [10] Often the first clinical signs of the disease are symptoms of tumor pressure on neighboring anatomical structures or phenomena caused by the effect of a malignant tumor on the body [5].

Atypical forms. These include the mediastinal, branched, and miliary forms. [22] The mediastinal form develops with massive enlargement of mediastinal lymph nodes or direct spread of the tumor to the mediastinum. The clinical picture consists of symptoms of congestion in the superior vena cava system. [5] In the branched form, tumor growth is infiltrative,

along the bronchial tree. With this form, cachexia and persistent chest pain are observed more often than with others. [23] The miliary form refers to the so-called small bronchogenic cancer with miliary carcinomatosis. The clinical picture resembles diffuse pneumosclerosis [5,22].

Treatment. Although surgical treatment of lung cancer should currently be recognized as the most effective, the vast majority of elderly patients cannot be operated on due to their general health condition and the significant risk of surgery. [7,24] However, in any case, it is necessary to determine, based on a detailed examination of the patient, the possibility of justified radical intervention. This is dictated by the fact that the life expectancy of patients, including the elderly, after radical surgery significantly exceeds that of non-operated patients. [24] However, lung cancer in elderly people is mainly treated conservatively [7].

Radiation therapy is indicated for inoperable, advanced forms of lung cancer and for the treatment of some metastases. [5] Indications for drug therapy of lung cancer are distant metastases and small cell form of cancer; contraindications include severe debilitation of the patient, cachexia, leukopenia, thrombocytopenia, impaired liver and kidney function, and severe hemoptysis due to tumor disintegration [7,24].

Prevention. It is carried out in two directions: combating air pollution, especially in large cities, and improving personal respiratory hygiene, combating smoking. [19,20] The first task is engineering and sanitary-technical, the second is sanitary-hygienic [25].

Conclusion

Thus, the external respiration system undergoes pronounced morpho functional changes during aging. [1,3] These changes must be taken into account when considering issues of pathogenesis and clinical presentation of pulmonary diseases in elderly and senile people. [2,6] Obstructive emphysema and lung cancer are severe and common pathologies in geriatric practice, characterized by an atypical course, mild clinical symptoms, and a tendency toward steady progression. [4,16] Age-related involution of the respiratory organs, decreased immunological reactivity, and the presence of concomitant chronic inflammatory processes create a favorable background for the development and unfavorable course of these diseases. [10,13] A high level of oncological alertness, timely diagnosis using radiological and endoscopic methods, and a comprehensive approach to treatment, taking into account the individual characteristics of the elderly patient, are the key to successful management of this category of patients [7,22].

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