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Detection of Bronchiectasis at the Initial Stage, Modern Solutions for Early Diagnosis of Bronchiectasis Pathology

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Abstract: Bronchiectasis is a disease characterized by irreversible changes (expansion, deformation) of the bronchi, accompanied by functional weakness and the development of a chronic purulent-inflammatory process in the bronchial tree. The main manifestation of bronchiectasis is a persistent cough accompanied by purulent sputum. Hemoptysis and even pulmonary hemorrhage may develop. Over time, bronchiectasis can lead to shortness of breath and anemia, and in children, delay in physical development. The diagnostic algorithm includes a physical examination of the patient, auscultation of the lungs, X-ray of the chest organs, bronchoscopy, sputum analysis, bronchography and pulmonary function tests. Treatment of bronchiectasis is aimed at stopping the purulent-inflammatory process in the bronchi and cleaning the bronchial tree.

Key words: Causes, Pathogenesis, Symptoms of bronchiectasis, Diagnosis, Treatment of bronchiectasis, Prognosis and prevention.

Bronchiectasis (BED) is a disease characterized by irreversible changes (expansion, deformation) of the bronchi, accompanied by functional weakness and the development of a chronic purulent-inflammatory process in the bronchial tree. Altered bronchi are called bronchiectasis (or bronchiectasis). Bronchiectasis occurs in 0.5-1.5% of the population, mainly develops in childhood and youth (from 5 to 25 years). The disease occurs in the form of repeated bronchopulmonary infections and is accompanied by a persistent cough with sputum. In bronchiectasis, damage to the bronchi may be limited to one segment or lobe of the lung or may be widespread.

Bronchiectasis is a permanent expansion of one or more sections of the bronchi, resulting in the destruction of the elastic and muscular layers of their walls. Bronchiectasis is a common pathology: according to statistics, it accounts for about 12-35% of chronic lung diseases.

All bronchiectasis, depending on the mechanism of their occurrence, are divided into primary and secondary forms.

Primary bronchiectasis or bronchiectasis itself is an independent pathology - one of the chronic non-specific lung diseases. It occurs in children and adolescents against the background of lungs that look healthy - that is, it has nothing to do with chronic diseases of the respiratory system. Bronchiectasis is infected, but it is almost isolated from the nearby areas of the lungs.

Secondary bronchiectasis develops against the background of chronic respiratory diseases and is a complication of them. The first symptoms of the disease appear in adulthood. Infected bronchiectasis is closely related to the adjacent lung parenchyma.

Despite the fact that bronchiectasis has two forms, patients often refer to both of them under the term "bronchiectasis", so our article also discusses primary and secondary bronchiectasis.

According to morphological characteristics, bronchiectasis is divided into 3 types:

cystic or saccular (resembling bag-like expansions at the level of bronchi of at least 4th degree);

fusiform or cylindrical (they look like beads connected in a row, they end sharply; such bronchiectasis is located at the level of the 6-10th level of the bronchi);

multiple expansion of the bronchi or "varicose bronchiectasis" (looks like a cross between the previous forms, resembles varicose veins).

Bronchiectasis occurs when 2 mechanisms affect the genetically defective bronchial wall: a clear violation of bronchial permeability, followed by inflammation.

With many lung diseases, the permeability of the bronchi is impaired to one degree or another, or they contribute to the development of this condition. Under obstruction (clogging), the lung stops participating in the act of breathing and collapses - atelectasis is formed. Then an inflammatory process develops below the blocked place in the bronchus, in which the wall is also involved, and then bronchiectasis is formed.

Symptoms

During the period of remission (a good period, without manifestations of the disease or with mild symptoms), the patient may be disturbed by a cough, in which a small amount of muco-purulent sputum may be released, or the symptoms may be completely absent.

Voltage :

cough with a lot of purulent sputum with an unpleasant smell. Sputum is better removed in the morning and in a certain position of the body - on the side opposite to the location of bronchiectasis (deformation, expansion of the bronchi);

signs of intoxication - increased body temperature, weakness, increased sweating, headache, decreased appetite and performance;

shortness of breath;

possible hemoptysis (due to rupture of capillaries in the pulmonary vessels);

chest pain.

For a long time:

cyanosis of the fingers, lips, tip of the nose (due to the development of cardiopulmonary failure);

changing the shape of the fingers - thickening due to bone growth, convexity of the nail plate.

Reasons

The cause of primary bronchiectasis is a congenital malformation of the bronchi - underdevelopment of the bronchial wall (dysplasia). Congenital bronchiectasis is much less common than acquired bronchiectasis. Acquired bronchiectasis occurs as a result of frequent bronchopulmonary infections in childhood - bronchopneumonia, chronic deforming bronchitis, tuberculosis or lung abscess. Sometimes bronchiectasis develops due to foreign bodies entering the lumen of the bronchus.

Pathogenesis

Chronic inflammation of the bronchial tree leads to changes in the mucous and muscular layers of the bronchus, as well as in the peribronchial tissues. Becoming flexible, the affected walls of the bronchi expand. After bronchitis, pneumonia, tuberculosis or lung abscess, pneumosclerotic processes in the lung tissue lead to wrinkling of the lung parenchyma and stretching and deformation of the walls of the bronchi. Destructive processes also affect the nerve nodes, arterioles and capillaries that feed the bronchi.

Fusiform and cylindrical bronchiectasis affect large and medium-sized bronchi, saccular bronchiectasis affects smaller ones. Non-infected bronchiectasis, small in number and small in size, may not manifest themselves clinically for a long time. With the addition of infection and the development of the inflammatory process, bronchiectasis is filled with purulent sputum, which

maintains chronic inflammation in the changed bronchi. This is how bronchiectasis develops. Bronchial obstruction, difficulty in self-cleaning of the bronchial tree, reduction of protective mechanisms of the bronchopulmonary system and chronic purulent processes in the nasopharynx contribute to the preservation of purulent inflammation in the bronchi.

Classification

According to the generally accepted classification, bronchiectasis is divided into:

according to the type of bronchial deformation - saccular, cylindrical, spindle-shaped and mixed;

according to the degree of spread of the pathological process - unilateral and bilateral (indicating a lung segment or lobe);

according to the stage of the course of bronchiectasis - exacerbation and remission;

according to the condition of the parenchyma of the affected part of the lung - atelectatic and not accompanied by atelectasis;

according to the causes of development - primary (congenital) and secondary (acquired);

according to the clinical form of bronchiectasis - mild, severe and severe forms.

A mild form of bronchiectasis is characterized by exacerbations 1-2 times a year, long-term remissions, during which patients feel practically healthy and functional.

The severe form of bronchiectasis is characterized by seasonal, long-lasting exacerbation, purulent sputum is released from 50 to 200 ml per day. During the period of remission, cough with sputum, moderate shortness of breath and reduced work capacity remain.

In severe forms of bronchiectasis, there are frequent, prolonged exacerbations with a temperature reaction and short-term remissions. The amount of sputum produced rises to 200 ml, and the sputum often has a rotten smell. During the period of remission, the ability to work was preserved.

Symptoms of bronchiectasis

The main manifestation of bronchiectasis is a constant cough with discharge of purulent sputum with an unpleasant odor. Sputum production is especially abundant in the morning ("full mouth") or in the correct drainage position (head end down on the affected side). The amount of sputum can reach several hundred milliliters. During the day, the cough starts again with the accumulation of sputum in the bronchus. Cough can cause rupture of blood vessels in thinned bronchial walls, which is accompanied by hemoptysis, and if large vessels are damaged, pulmonary bleeding.

Chronic purulent inflammation of the bronchial tree leads to poisoning and exhaustion of the body. Patients with bronchiectasis experience anemia, weight loss, general weakness, pale skin, and delay in physical and sexual development of children. Shortness of breath in bronchiectasis is manifested by cyanosis, shortness of breath, thickening of the terminal phalanges of the fingers in the form of "drumsticks" and nails in the form of "watch glasses" and deformation of the chest.

The frequency and duration of exacerbation of bronchiectasis depends on the clinical form of the disease. Aggravation of the disease occurs in the form of bronchopulmonary infection with an increase in body temperature and an increase in the amount of sputum. Even without exacerbation of bronchiectasis, a productive wet cough with sputum continues.

Complications

The complex course of bronchiectasis is characterized by symptoms of a severe form, which are accompanied by secondary complications: cardiopulmonary failure, cor pulmonale, kidney amyloidosis, liver, nephritis, etc. Also, prolonged bronchiectasis can be complicated by iron. deficiency anemia, lung abscess, pleural empyema, pulmonary hemorrhage.

Diagnostics

In bronchiectasis, a physical examination of the lungs reveals a delay in lung mobility during breathing and dulling of the percussion sound on the affected side. The auscultatory picture in bronchiectasis is characterized by a weakening of breathing, a mass of wet rashes of various sizes (small, medium and large bubbles), usually in the lower parts of the lungs, which decrease after sputum. In the presence of a bronchospastic component, a whistling dry raler is added. Diagnosis

Laboratory research methods:

Studying the physical properties of sputum

Implementation of the Wasserman reaction (RW)

Detection of hepatitis B virus antigen (HBsAg Hepatitis B virus) in blood

Detection of M, G (IgM, IgG) class antibodies to viral hepatitis C (hepatitis C virus) in the blood.

Detection of M, G (IgM, IgG) class antibodies to human immunodeficiency virus HIV-1 (HIV 1) in blood.

Detection of antibodies of classes M, G (IgM, IgG) to human immunodeficiency virus HIV-2 (HIV 2) in blood.

Microscopic examination of sputum smears for Mycobacterium tuberculosis

Bacteriological examination of sputum for aerobic and facultative anaerobic microorganisms

Mycological examination of sputum for fungi of the genus Aspergillus (Aspergillus spp.).

Detailed general (clinical) blood test

General therapeutic biochemical blood test

General urinalysis

Instrumental research methods:

Electrocardiogram registration

X-ray of the paranasal sinuses

X-ray of the lungs

Study of the concentration of hydrogen ions (pH) of the blood

Study of the level of buffer substances in the blood

Taking blood from an artery

Checking blood oxygen levels

In patients with bronchiectasis, lung pattern deformation and cellularity, areas of atelectasis, and a decrease in the volume of the affected segment or lobe are revealed in the frontal and lateral projections of the lung X-ray. Endoscopic examination of the bronchi - bronchoscopy - allows to detect abundant, sticky purulent secretion, to obtain material for cytology and bacterial analysis, to determine the source of bleeding, as well as to sanitize the bronchial tree in preparation for the next diagnostic stage - bronchography. .

Bronchography (contrast x-ray examination of the bronchi) is the most reliable method of bronchiectasis diagnosis. This allows you to determine the spread of bronchiectasis, their location and shape. In adult patients, bronchography is performed under local anesthesia, in children - under general anesthesia. With the help of a soft catheter inserted into the bronchial tree, the bronchi are filled with contrast material, then X-ray control and a series of images are taken. Bronchography reveals the deformation, convergence of the bronchi, their cylindrical, bag-like or spindle-like expansion, lack of contrast in the branches of the bronchi located distal to the bronchiectasis. To determine the degree of respiratory failure, a patient with bronchiectasis undergoes respiratory function tests: spirometry and peak flowmetry.

Treatment of bronchiectasis

During the exacerbation of bronchiectasis, the main therapeutic measures are aimed at sanitizing the bronchi and suppressing the purulent-inflammatory process in the bronchial tree. For this purpose, antibiotic therapy and bronchoscopic drainage are performed. Antibiotics can be administered parenterally (intravenously, intramuscularly) and endobronchially during sanitary bronchoscopy. Cephalosporins (ceftriaxone, cefazolin, cefotaxime, etc.), semi-synthetic penicillins (ampicillin, oxacillin) and gentamicin are used to treat chronic inflammatory processes of the bronchi.

In bronchiectasis, drainage of the bronchial tree is also carried out by placing the patient in bed with the tip of the leg elevated, which facilitates the release of sputum. To improve sputum evacuation, expectorant, alkaline drink, chest massage, breathing exercises, inhalations and medicated electrophoresis of the chest are prescribed.

Often, with bronchiectasis, they resort to bronchoalveolar lavage (bronchial lavage) and suction of purulent secretions using a bronchoscope. Therapeutic bronchoscopy allows not only to wash the bronchi and remove purulent secretions, but also to introduce antibiotics, mucolytics, bronchodilators into the bronchial tree, and to use ultrasound sanitation.

The diet of patients with bronchiectasis should be complete, enriched with protein and vitamins. In addition to the diet, meat, fish, cottage cheese, vegetables, juices and fruits are included. In addition to exacerbation of bronchiectasis, breathing exercises, taking expectorant herbs and sanatorium-resort rehabilitation are indicated.

In the absence of contraindications (cor pulmonale, bilateral bronchiectasis, etc.), surgical treatment of bronchiectasis is indicated - removal of the changed lobe of the lung (lobectomy). Sometimes surgical treatment of bronchiectasis is performed for health reasons (in cases of severe, persistent bleeding).

Prognosis and prevention

In some cases, surgical removal of bronchiectasis leads to complete recovery. Regular courses of anti-inflammatory therapy can achieve long-term remission. Exacerbation of bronchiectasis can occur in the wet, cold season, during hypothermia and after a cold. In the absence of treatment of bronchiectasis and its complex course, the prognosis is unfavorable. A severe long-term course of bronchiectasis leads to disability.

Prevention of the development of bronchiectasis includes dispensary monitoring of patients with chronic bronchitis and pneumosclerosis by a pulmonologist, their timely and adequate treatment, exclusion of harmful factors (smoking, industrial and dust hazards), hardening. In order to prevent the exacerbation of bronchiectasis, it is necessary to timely sanitize the paranasal sinuses for sinusitis and the oral cavity for diseases of the dentofacial system.

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