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CLINICAL AND LABORATORY DIAGNOSTICS OF ACUTE BRONCHITIS

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Abstract
The relevance of the topic of acute bronchitis is due to its high prevalence and significant impact on the quality of life of patients. Acute bronchitis, an inflammation of the bronchial tree, often occurs after viral infections, which makes it especially relevant during cold and flu season. In recent years, there has been an increase in the number of cases of the disease in both children and adults, which requires a careful approach to diagnosis and treatment. In addition, improper treatment or ignoring the disease can lead to chronicity of the process and the development of more serious diseases, such as chronic obstructive pulmonary disease. Studying acute bronchitis is also important from a public health perspective, as it may contribute to overall morbidity and demand for medical resources.

Keywords: Acute bronchitis, laboratory diagnostics, microbiological examination, spirometry, pulse oximetry, prognosis.

Introduction

Acute bronchitis is an inflammatory disease of the respiratory tract, characterized by inflammation of the bronchial mucosa. Most often, it is caused by viral infections, including adenoviruses, respiratory syncytial viruses and influenza viruses. Symptoms of acute bronchitis can manifest themselves in the form of a dry cough, which becomes productive over time, accompanied by the release of mucous or purulent sputum, as well as shortness of breath and wheezing.

The etiology of acute bronchitis is multifaceted and includes both infectious and non-infectious factors. The most common cause of acute bronchitis is a viral infection resulting from influenza, parainfluenza, adenoviruses and respiratory syncytial virus. These viruses lead to inflammation of the bronchial mucosa, which causes a number of symptoms such as cough, sputum production and difficulty breathing [2, 4, 6].

In addition to viruses, acute bronchitis can be caused by bacterial infections, including streptococci and staphylococci, as well as exposure to aerosols, polluted air, chemical irritants and tobacco

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smoke. Individuals with weakened immune systems, smokers and those exposed to occupational hazards are at risk. Understanding the etiology of acute bronchitis is important for choosing the right treatment tactics and preventive measures aimed at reducing morbidity and improving the quality of life of patients.

The pathogenesis of acute bronchitis includes multiple mechanisms aimed at protecting the body, but at the same time leading to clinical manifestations: cough, shortness of breath and general discomfort, which significantly reduces the patient's quality of life. Pathogenesis begins with an infectious agent that penetrates the epithelial layer of the bronchial tree. This leads to activation of the inflammatory response caused by the release of inflammatory mediators such as histamine and prostaglandins [1, 5, 7].

As a result of inflammation, swelling of the mucous membrane, increased secretion of mucus and narrowing of the lumen of the bronchi are observed, which greatly complicates breathing. The process of mucosal thickening is also due to the activation of local immune cells such as macrophages and lymphocytes. These cells release cytokines that increase inflammation and further tissue damage.

The clinical symptoms of acute bronchitis include a variety of manifestations. The most characteristic symptom is a productive cough, which can be either dry or wet. Patients often report pain in the chest, aggravated by coughing. Usually there is general malaise, increased body temperature, as well as shortness of breath and wheezing resulting from narrowing of the bronchi. Visualized changes in the lungs can be confirmed using bronchoscopy or radiography [1, 13, 14]. When auscultating the lungs, the doctor may hear whistling or moist rales, which indicates the presence of secretions in the airways.

It is important to note that acute bronchitis can also be of an allergic nature, manifesting itself in the form of a cough caused by exposure to allergens.

Laboratory diagnosis of acute bronchitis plays a key role in determining the cause of the disease and helping to choose effective treatment. The first step in the diagnostic process is a history and clinical examination, which allows the doctor to assess the nature of symptoms, such as cough, difficulty breathing and bronchial discharge.

Various laboratory methods are used to confirm the diagnosis. A complete blood count can reveal signs of inflammation, such as elevated white blood cell levels and ESR. Microbiological examination of sputum in acute bronchitis is an important tool for diagnosing and identifying the pathogenic flora responsible for the development of the inflammatory process. Most cases of acute bronchitis are caused by viruses, but bacterial flora may also be involved, especially when complications arise [3, 8, 19].

To analyze sputum, doctors collect it in a sterile manner, which minimizes the risk of contamination. Laboratory tests include culture on nutrient media, which makes it possible to isolate and identify microbes. Particular attention is paid to gram-positive and gram-negative bacteria, such as Streptococcus pneumoniae and Haemophilus influenzae, as well as anaerobes.

The results of a microbiological study help in choosing adequate antibacterial therapy and allow doctors to adapt treatment to a specific pathogen, which significantly improves the prognosis and contributes to the patient's rapid recovery. Thus, this study is a key step in the management of acute bronchitis.

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Pulse oximetry and spirometry are important diagnostic procedures for acute bronchitis, allowing one to assess the functional state of the respiratory system. Pulse oximetry, a simple and painless technique, measures the level of oxygen in the blood, which helps identify hypoxia, characteristic of inflammatory processes in the lungs. In conditions of acute bronchitis, when swelling of the mucous membrane and obstruction of the airways occurs, this indicator can change significantly [1, 9, 18].

Spirometry, in turn, provides data on inspiratory and expiratory volumes, as well as functional lung reservoirs. Measuring forced vital volume and expiratory flow allows physicians to assess the degree of obstruction and determine the severity of the patient's condition.

In cases requiring more in-depth diagnosis, bronchoscopy or chest radiography may be prescribed. The prognosis for patients with acute bronchitis usually includes several key factors. With timely diagnosis and proper treatment, including rest, plenty of fluids and, if necessary, drug therapy, most patients recover within one to two weeks [3, 12, 15]. However, for smokers and people with chronic lung diseases, the risk of complications increases significantly.

Inflammation can cause not only discomfort, but also difficulty breathing. To relieve symptoms, the use of inhalers and wet compresses is recommended, which can help reduce swelling of the bronchi.

However, it is important to remember that in the absence of proper treatment, acute bronchitis can become chronic, which makes further prognosis less optimistic. Therefore, the best approach remains prevention and prompt medical attention.

Treatment of acute bronchitis is a multi-step process aimed at relieving symptoms and eliminating the cause of the disease. At the beginning, it is important to provide the patient with rest and plenty of fluids, which promotes better removal of mucus and moisturizes the mucous membranes. Doctors may prescribe anti-inflammatory drugs to relieve inflammation and pain.

Verbal inhalations using saline and bronchodilators help widen the airways and make breathing easier. If a bacterial infection is diagnosed by your doctor, antibiotic therapy may be required. However, when bronchitis is of viral origin, antibiotics are ineffective [2, 10, 17].

The use of mucolytics helps to thin the sputum, which makes it easier to clear. Expectorants are also recommended to improve cough productivity. Do not forget about completely quitting smoking, which significantly speeds up recovery. If necessary, antitussives are prescribed, but they should be used with caution so as not to impede the passage of sputum.

Preventing acute bronchitis is an important aspect of maintaining respiratory health. First of all, you need to pay attention to strengthening the immune system. Regular physical activity, a balanced diet rich in vitamins and minerals, as well as adequate sleep help increase the body's defenses. Avoiding contact with infectious agents is also key. It is important to adhere to good hygiene, wash your hands frequently and use masks during epidemics of respiratory infections. We should not forget about bad habits: smoking and alcohol abuse significantly increase the risk of developing bronchitis [1, 11, 16].

In addition, vaccination against influenza and pneumococcal viruses is necessary, which helps reduce the likelihood of concomitant infections. Regular preventive examinations with a doctor will help to promptly identify and eliminate risk factors.

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Conclusions. Thus, an integrated approach to the laboratory diagnosis of acute bronchitis contributes to the development of an effective treatment strategy and the prevention of complications. In turn, the correct approach to the treatment of acute bronchitis promotes rapid recovery and restoration of the function of the respiratory system. Disseminating information about the prevention and treatment of acute bronchitis is a necessary step to reduce its negative impact on the population.

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