

**ANALYSIS OF THE MOST EFFECTIVE METHODS OF TREATMENT OF
ADENOVIRUS PNEUMONIA**

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Annotation: Adenovirus pneumonia is a focal or interstitial inflammation of the lower respiratory tract caused by adenoviruses. It is accompanied by fever and intoxication syndrome, wet cough, shortness of breath. Other characteristic symptoms of infection are conjunctivitis, rhinopharyngitis. The diagnosis is confirmed by the clinical picture, laboratory (PCR, ELISA) and radiation studies (radiography, CT of the lungs). Treatment includes antiviral, immunomodulatory, infusion, symptomatic therapy, oxygen therapy, and physical therapy methods.

Key words: Adenovirus pneumonia, immunosuppression, concomitant bronchopulmonary, endocrine.

Adenovirus-associated pneumonia is a form of complicated adenovirus infection (AVI). In the structure of other viral pneumonias, it accounts for about 30%. Severe community-acquired pneumonia develops in 2.5% of cases of adenovirus infection, and mortality in complicated forms reaches 60-80%. Adenovirus pneumonia is more often diagnosed in children, immunocompromised adults and elderly patients, which makes the disease relevant not only for clinical pulmonology, but also for pediatrics and geriatrics.

REASONS

Characteristics of the pathogen

Respiratory infection is caused by a DNA-containing pneumotropic virus of the genus Mastadenovirus of the family Adenoviridae. Human adenoviruses (HAdV) were isolated as the causative agent of pneumonia in 1955. To date, 7 species and 88 serotypes of HAdV have been described and studied.

Some of them cause predominant damage to the conjunctival epithelium (B, C, D), others – to the gastrointestinal tract (F, G), and others-to the genitourinary system (B, D). Adenoviruses of the B, C, and E types are associated with the occurrence of adenovirus pneumonia; serotypes B3, B7, B14, and B21 are most tropic to the lower respiratory tract epithelium.

HAdVs are stable in the external environment, their inactivation occurs when heated to 56°C, contact with chlorine-containing and phenol-containing disinfectants, and UV radiation.

Epidemiology

Distributors of infection are virus carriers and patients with adenovirus infection. Pathogens enter the lungs by airborne droplets when you inhale droplets of saliva or mucus from an infected person. In people with normal immunity, adenovirus is retained in the lymphatic structures of the nasopharynx, so the lower respiratory tract is usually not affected. However, debilitated individuals and young children may develop adenovirus pneumonia. Since adenoviruses can cross the placenta from an infected mother to the fetus, intrauterine pneumonia can occur.

The incidence of adenovirus pneumonia is seasonal, and the number of hospitalizations for this reason increases in the autumn-winter period.

Risk factors

There are both sporadic cases and group outbreaks of AVI. Local outbreaks occur in isolated groups (children's homes, military garrisons, boarding schools for the disabled and elderly, correctional institutions). For adults, conditions that increase the likelihood of developing pneumonia are:

- concomitant bronchopulmonary, endocrine, and cardiovascular diseases (COPD, diabetes, and chronic heart failure);
- immunosuppression (HIV, post-organ transplant status, cachexia, hormone therapy, radiation therapy, chemotherapy);
- pregnancy.

In the pediatric population, adenovirus pneumonia is usually diagnosed in the presence of the following risk factors::

- prematurity;
- hypotrophy;
- artificial and mixed feeding;
- rickets;
- anemia.

PATHOGENESIS

The upper respiratory tract and conjunctiva of the eye serve as the entrance gate for AVI. Usually adenoviruses persist in lymphoid formations of adenoids, tonsils, causing rhinitis, tonsillitis, pharyngitis. Together with the ingested mucus, they enter the intestines, causing the clinic of gastroenteritis.

In addition, bronchogenic adenoviruses can reach the lower respiratory tract. This is favored by the ability of pneumotropic viruses to bind to CD46 receptors and desmoglein 2, which are widely present in the bronchial epithelium. A special feature of AVI is its "creeping" character: first, the epithelial cells of the nose and pharynx are affected, then the bronchi and alveoli, mesenteric lymph nodes, where the adenovirus replicates.

Adenoviruses have a cytopathogenic effect on pneumocytes, causing their degeneration and necrosis. In the affected organs, exudative inflammation develops with pronounced edema of the mucous membrane. There is a sharp lymphoid infiltration of the walls of the trachea and bronchi, dilation of capillaries, hemorrhages, accumulation of serous exudate in the bronchial tree. Lymphogenically, the adenovirus enters the tracheobronchial lymph nodes, causing their hyperplasia. Most often, NDP infection occurs in the form of bronchitis, bronchiolitis, and bronchopneumonia.

Due to the interaction with blood proteins, in particular, with factor X, adenoviruses have the ability to enter the bloodstream, causing a systemic inflammatory response, characterized by a significant production of pro-inflammatory cytokines (TNF α , IL-6 and 8, IFN- γ and α 2), damage to the heart, liver, kidneys, and brain.

SYMPTOMS OF ADENOVIRUS PNEUMONIA

In most cases, lung inflammation on the background of AVI develops approximately on the 5th day after the onset of the disease. Signs of respiratory damage are usually preceded by fever up to 37.8 ° 39°C, intoxication syndrome (headache and muscle pain, weakness). At the beginning of the disease, rhinopharyngitis (runny nose, sore throat, dry unproductive cough), conjunctivitis (lacrimation, hyperemia of the eye mucosa) worries.

With the development of adenovirus pneumonia, the symptoms worsen: the temperature does not decrease, intoxication increases, cough with mucosal sputum appears, shortness of breath. In children, coughing can have an obsessive whooping cough-like character, and asthmatic syndrome often develops. In elderly patients, mental disorders are noted: agitation, confusion, episodes of aggression.

Distinctive features of adenovirus pneumonia are a long course (on average 21 days), slow reverse development. Usually, a microbial component quickly joins, and pneumonia becomes viral-bacterial in nature.

COMPLICATIONS

Severe forms of adenovirus pneumonia are characterized by a high percentage of lung parenchyma damage, various systemic complications, and a high risk of death. On the part of the respiratory organs, pleurisy and respiratory failure most often occur.

It is possible to develop adenovirus meningoencephalitis, hemorrhagic cystitis, toxic myocardial dystrophy, hepatitis, and nephropathy. The causes of death in fatal adenovirus pneumonias are acute respiratory distress syndrome, multiple organ failure, and DIC.

DIAGNOSTICS

Pneumonia is recognized on the basis of clinical and radiological data, but laboratory identification of the pathogen is required to confirm its adenovirus etiology. Depending on the patient's age and the severity of the disease, the examination and treatment are carried out by pediatricians, internists, pulmonologists, infectious diseases specialists. The auscultation picture is characterized by dry and different-sized wet wheezes in the lungs, with percussion revealing a box sound. To confirm adenovirus pneumonia is performed:

- X-ray of the lungs. It detects increased pulmonary pattern, infiltrative foci, interstitial and peribronchial changes, and sometimes pleural effusion. Depending on the severity and day of the disease, the images may show a different amount of lung tissue damage (segmental, lobar, total pneumonia). For atypical radiological changes, a CT scan of the lungs may be required.
- Clinical and biochemical tests. The hemogram is characterized by neutrophilic leukocytosis, lymphocytosis, the presence of atypical mononuclears, and an increase in ESR. In severe forms, leukopenia and lymphocytopenia are detected. Basic biochemical parameters are studied: liver enzymes, urea, creatinine, total protein, etc. Blood gas composition is monitored in patients with signs of DN.
- Special tests. To detect adenovirus in biomaterial (sputum, nasopharyngeal mucus, blood), molecular genetic (PCR) diagnostics and the direct method of fluorescent antibodies (pMFA) are used. Serological diagnostics (ELISA, RSC, etc.) is based on the detection of an increasing titer of specific antiviral antibodies in paired sera.

Differential diagnosis

If a viral etiology of pneumonia is suspected, it is necessary to find out the direct pathogen. Using clinical and laboratory methods, other most common infections complicated by pulmonary inflammation are excluded:

- respiratory syncytial infection;
- flu and parainfluenza;
- coronavirus infection;
- metapneumovirus infection;
- rhinovirus infection.

In addition, differential diagnosis is carried out with non-infectious pathologies: obstructive pneumonitis in lung cancer, obliterating bronchiolitis, lupus pneumonitis, eosinophilic pneumonia, lipoid pneumonia, pulmonary vasculitis, etc.

TREATMENT OF ADENOVIRUS PNEUMONIA

Patients with lung damage of adenovirus etiology are hospitalized in the pulmonology department, with a complicated course of infection – in the ICU. Patients over 70 years of age with severe concomitant diseases, immunosuppression, signs of DN, and young children are subject to mandatory inpatient treatment.

Drug therapy

In adenovirus pneumonia, human leukocyte interferon and interferon inducers are used as etiotropic agents. In case of a complicated course, it may be necessary to conduct infusion therapy, prescribe immunoglobulins, antibiotics (penicillins, cephalosporins, aminoglycosides, macrolides). It is recommended to use mucolytic, expectorant, antipyretic drugs,

vitamins. When ARDS develops, non-invasive and invasive auxiliary ventilation of the lungs is performed, and corticosteroids are administered.

Physical therapy

In case of bronchial obstruction, inhalation of bronchodilators through a nebulizer, drug inhalations with the addition of interferon, glucocorticoids are indicated. After the temperature normalizes, a complex of physiotherapy is added to the treatment: UHF, electrophoresis, inductothermy, and UVB. To improve sputum drainage, percussion and vibration massage are performed.

PROGNOSIS AND PREVENTION

In immunocompetent individuals, adenovirus pneumonia usually proceeds in a mild form and ends with recovery without consequences. However, among the risk groups (newborns, the elderly, patients with immunosuppression), the probability of complications and mortality remain high.

Personal prevention is similar to other viral infections: compliance with a mask regime during outbreaks, frequent hand washing, and nasal lavage. In groups, it is necessary to separate healthy people and people with signs of acute respiratory viral infections. The current live oral vaccine against adenovirus K 4 and 7 serotypes is of limited use and is currently used only in the US Armed Forces.

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