

**ETIOLOGY, PATHOGENESIS AND TREATMENT OF ADENOVIRUS INFECTION,  
WHICH IS NOW CONSIDERED A COMMON AND CURRENT INFECTION**

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**Annotation:** Adenovirus infection is an acute respiratory viral infection caused by an adenovirus and characterized by the development of rhinopharyngitis, laryngotracheobronchitis, conjunctivitis, lymphadenopathy, and dyspeptic syndrome. In the general structure of acute respiratory diseases, adenovirus infection accounts for about 20%.

**Key words:** Adenovirus infection, respiratory viral infection, immunostimulant.

The greatest susceptibility to adenoviruses is demonstrated by children from 6 months to 3 years. It is believed that in preschool age, almost all children suffer one or more episodes of adenovirus infection. Sporadic cases of adenovirus infection are recorded year-round; in the cold season, the incidence is epidemic outbreaks. Close attention to adenovirus infection is focused on infectious diseases, pediatrics, otolaryngology, and ophthalmology.

Currently, more than 30 serovars of viruses of the Adenoviridae family that cause human disease are known. The most common cause of outbreaks of adenovirus infection in adults are serotypes 3, 4, 7, 14 and 21. Serovars of types 1, 2, 5, and 6 usually affect preschool children. Pathogens of pharyngoconjunctival fever and adenovirus conjunctivitis in most cases are serotypes 3, 4, 7.

Virions of the pathogen contain double-stranded DNA, have a diameter of 70-90 nm and three antigens (group-specific A-antigen; B-antigen that determines the toxic properties of adenovirus and type-specific C-antigen). Adenoviruses are relatively stable in the external environment: under normal conditions, they persist for 2 weeks, tolerate low temperatures and drying well. At the same time, the causative agent of adenovirus infection is inactivated when exposed to ultraviolet rays and chlorine-containing disinfectants.

Adenoviruses are spread from sick people who secrete the pathogen with nasopharyngeal mucus and feces. Hence, there are 2 main ways of infection – in the early period of the disease - airborne; in the late period-fecal-oral – in this case, the disease proceeds by the type of intestinal infections. A water route of infection is possible, which is why adenovirus infection is often referred to as "swimming pool disease".

The source of adenovirus infection can also be virus carriers, patients with asymptomatic and erased forms of the disease. Immunity after an infection is type-specific, so repeated diseases caused by a different serotype of the virus are possible. Nosocomial infection occurs, including during parenteral treatment procedures.

#### PATHOGENESIS

Adenovirus can enter the body through the mucous membranes of the upper respiratory tract, intestines or conjunctiva. Reproduction of the virus occurs in epithelial cells, regional lymph nodes and intestinal lymphoid formations, which coincides with the incubation period of adenovirus infection. After the affected cells die, viral particles are released and enter the blood, causing viremia.

Changes develop in the nasal membrane, tonsils, posterior pharyngeal wall, conjunctiva; inflammation is accompanied by a pronounced exudative component, which causes the appearance of serous discharge from the nasal cavity and conjunctiva. Viremia can lead to involvement of the bronchi, digestive tract, kidneys, liver, and spleen in the pathological process.

## SYMPTOMS OF ADENOVIRUS INFECTION

The main clinical syndromes that this infection can take are catarrh of the respiratory tract (rhinopharyngitis, tonsillopharyngitis, laryngotracheobronchitis), pharyngoconjunctival fever, acute conjunctivitis and keratoconjunctivitis, diarrheal syndrome. The course of adenovirus infection can be mild, moderate and severe; uncomplicated and complicated.

The incubation period for adenovirus infection lasts 2-12 days (usually 5-7 days), followed by a manifest period with consistent onset of symptoms. Early signs are an increase in body temperature to 38-39 °C and moderate symptoms of intoxication (lethargy, loss of appetite, muscle and joint pain).

### Respiratory tract damage

Catarrhal changes in the upper respiratory tract occur simultaneously with fever. Serous discharge from the nose appears, which then becomes mucopurulent; nasal breathing becomes difficult. There is moderate hyperemia and swelling of the mucous membrane of the posterior pharyngeal wall, dotted whitish plaque on the tonsils. When an adenovirus infection occurs, a reaction occurs from the submandibular and cervical lymph nodes. In the case of laryngotracheobronchitis, hoarseness of voice, dry barking cough, shortness of breath, and laryngospasm may occur.

### Conjunctival lesion

Conjunctival damage in adenovirus infection can occur as catarrhal, follicular or filmy conjunctivitis. Usually, the eyes are involved in the pathological process alternately. Worries about cutting, burning, lacrimation, a feeling of a foreign body in the eye. Examination reveals moderate redness and swelling of the eyelid skin, hyperemia and graininess of the conjunctiva, injection of the sclera, and sometimes the presence of a dense grayish-white film on the conjunctiva. In the second week of the disease, signs of keratitis may join conjunctivitis.

### Intestinal form

If the adenovirus infection occurs in the intestinal form, there are paroxysmal pain in the parotid and right iliac region, fever, diarrhea, vomiting, mesenteric lymphadenitis. With severe pain syndrome, the clinic resembles acute appendicitis. Fever with adenovirus infection lasts 1-2 weeks and can be undulating in nature. Signs of rhinitis and conjunctivitis subside after 7-14 days, catarrh of the upper respiratory tract-after 14-21 days.

## COMPLICATIONS

In the severe form of the disease, parenchymal organs are affected; meningoencephalitis may occur. Children in the first year of life often develop adenovirus pneumonia and severe respiratory failure. The complicated course of adenovirus infection is usually associated with a layer of secondary infection; the most common complications of the disease are sinusitis, otitis media, and bacterial pneumonia.

## DIAGNOSTICS

Recognition of an adenovirus infection is usually made on the basis of clinical data: fever, catarrh of the respiratory tract, conjunctivitis, polyadenitis, and the consistent development of symptoms. Methods of rapid diagnosis of adenovirus infection are immunofluorescence reaction and immune electron microscopy. Retrospective confirmation of the etiological diagnosis is performed by ELISA, RTGA, and RSC. Virological diagnostics involves the isolation of adenovirus from nasopharyngeal flushes, scrapings from the conjunctiva and feces of the patient, but due to its complexity and duration, it is rarely used in clinical practice.

### Differential diagnosis

Differential diagnosis of various clinical forms of adenovirus infection is carried out with influenza, other acute respiratory viral infections, pharyngeal and ocular diphtheria, infectious mononucleosis, mycoplasma infection, and yersiniosis. For this purpose, as well as for the

appointment of local etiotropic treatment, patients need to consult an ophthalmologist and an otolaryngologist.

#### TREATMENT OF ADENOVIRUS INFECTION

General etiotropic therapy is performed with antiviral drugs (umifenovir, ribavirin, a drug made from antibodies to human gamma interferon). Local therapy of adenovirus infection includes: instillation of eye drops (deoxyribonuclease solution or sodium sulfacyl), application of acyclovir in the form of eye ointment behind the eyelid, intranasal application of oxaline ointment, endonasal and endopharyngeal instillation of interferon. Symptomatic and post-syndromic therapy is performed: inhalation, taking antipyretics, antitussives and expectorants, vitamins. When an adenovirus infection is burdened with bacterial complications, antibiotics are prescribed.

#### PROGNOSIS AND PREVENTION

Uncomplicated forms of adenovirus infection end favorably. Deaths can occur in young children due to the occurrence of severe bacterial complications. Prevention is similar to the prevention of other acute respiratory infections. During periods of epidemic outbreaks, isolation of patients is indicated; routine disinfection, ventilation and UFO of premises; administration of interferon to persons at risk of infection. Specific vaccination against adenovirus infection has not yet been developed.

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