

## **Features of the Course and Treatment of Conjunctivitis in Patients with Viral Infections, Including COVID-19**

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**Abstract:** Conjunctivitis is a disease of the organs of vision characterized by the development of a strong inflammatory process in the mucous membrane of the eye. Symptoms of the disease manifest themselves in the form of redness and swelling of the conjunctiva, eye discharge and increased photosensitivity. Almost anyone can experience conjunctivitis. This disease not only causes great discomfort, but is also dangerous for others. Therefore, to exclude any complications and infection of other people, it is necessary to treat the pathology competently.

This is an inflammation of the connective membrane of the eye (conjunctiva), which covers the back surface of the eyelids and the eyeball up to the cornea. This connective membrane includes lymphatic and blood vessels, nerve fibers, and glands that secrete protective mucus.

**Keywords:** Construction, inflammation, origin, diagnosis, treatment, prevention.

### **The conjunctiva performs several physiological functions:**

Protects the organ of vision from infections. After pathological microorganisms enter the surface of the conjunctiva, immune cells are released from the blood vessels into the tear fluid, which itself has a bactericidal effect and enhances its effect together with protective cells. Due to its adhesive properties, the shell helps to preserve pathological agents, preventing them from penetrating deep into the tissues of the eye.

Protects eyes from mechanical damage. The conjunctiva is very sensitive, so even the penetration of a small speck causes the feeling of a foreign body, which causes tearing and frequent blinking.

Nourishes and moisturizes tissues. The glands of this shell secrete a special mucus that serves as an excellent lubricant and natural moisturizer for the organ of vision, and blood vessels supply the eye with nutrients and oxygen.

Inflammation of the connective membrane leads to the appearance of conjunctivitis. This disease can occur in acute or chronic form. The acute stage of the pathology is treated therapeutically and disappears within 4 weeks. Chronic inflammation of the conjunctiva is characterized by alternating periods of remission and exacerbation and lasts for a long time. In adults, in 85% of cases, the inflammatory process is caused by viruses. In childhood, conjunctivitis can be caused by both viral and bacterial infections. Infection occurs through contact with a sick person, so it is very important to follow the rules of hygiene.

The prognosis for treatment of conjunctivitis is usually favorable. At the same time, there are some forms of the disease in which complications can develop, including visual impairment. Conjunctivitis can lead to the development of keratitis (inflammation of the cornea), this pathology is called keratoconjunctivitis.

### **Causes of the disease**

The main cause of conjunctivitis is infection of the mucous membrane of the eye with a viral or bacterial infection. The fungal form of the disease is rare. Inflammation of the conjunctiva can occur due to a serious allergic reaction, as well as mechanical or toxic irritation of the eye membranes (under the influence of smoke, corrosive suspensions in the air, dust particles). The most common type of conjunctivitis is mixed.

### **Factors that cause inflammation of the conjunctiva:**

infection through contact with a sick person;

Chronic and acute pathologies of ENT organs;

swimming in a dirty water pool (artificial, natural);

general decrease in immunity;

being in a room with polluted air;

severe eye fatigue for a long time (for example, when constantly working at the computer or in poor lighting);

non-compliance with hygiene requirements when using contact lenses.

The disease often affects the organs of vision in the elderly and children. The lowest incidence is observed in patients aged 20 to 40 years.

### **Conjunctivitis is classified according to several parameters:**

mushroom;

allergic;

viral;

bacterial;

Acanthamoeba.

Symptoms of the disease may vary depending on the type of infection that caused the inflammatory process.

Viral conjunctivitis often develops against the background of the common cold or other infectious pathologies (chickenpox, parotitis, smallpox). When the disease occurs independently, the causative agent of the disease is usually an adenovirus, rarely an enterovirus.

Viral conjunctivitis often occurs after contact with an infected person. There are cases that are known to be associated with diseases and infections of the upper respiratory tract. In this case, the incubation period is 5-12 days. First one eye becomes infected, then the infection spreads to the other.

Bacterial conjunctivitis is often caused by *Staphylococcus aureus*, sometimes various *Haemophilus influenzae*, gonococci and *Pseudomonas aeruginosa*. The disease is accompanied by a large amount of purulent discharge from the eye. There is a strong reddening of the membranes of the eyelids and eyeballs, moderate swelling of the eyelids. After drying, the discharge causes the eyelids and eyelashes to stick. Absence of chemosis and photophobia is the main difference between bacterial conjunctivitis and viral conjunctivitis. Bacterial forms of pathology can appear both acutely and chronically. Chronic disease is characterized by slow

progression. It is characterized by the development of joint pathologies (blepharoconjunctivitis, dry eye syndrome).

Actanthamoeba keratoconjunctivitis is caused by the soil-dwelling pathogen *Actanthamoeba* bacteria. The disease is usually diagnosed in contact lens wearers, and microcracks in the conjunctiva become a channel for infection. At the first stage, the patient complains of discomfort under the upper eyelid and the presence of a foreign body there. Then there is periodic pain, spasm of the eyelids, inflammatory processes in the cornea, photophobia, perforation and melting of the corneal tissue. In the most severe cases, there is a risk of complete loss of vision.

Fungal conjunctivitis or ophthalmomycosis develops as a result of infection of the conjunctiva by various fungi (most often aspergillus, candida). A small amount of such fungi is always present on the mucous membranes and the edges of the eyelids, but when favorable conditions arise, they multiply rapidly and become the cause of the disease. The fungal form is often diagnosed after antibiotic (corticosteroid) therapy. The fungus can also get into the conjunctiva while swimming in the pool or in a room with high humidity.

Allergic conjunctivitis is not contagious in nature. Its appearance is triggered by allergens from the environment. This type of disease is seasonal. Seasonal inflammation of the conjunctiva is caused by flowering trees, pollen or fungal spores. From late autumn to the first days of spring, the symptoms of allergic conjunctivitis disappear completely. One type of this pathology is vernal keratoconjunctivitis. It is accompanied by bronchial asthma and skin rash.

Atopic conjunctivitis is diagnosed throughout the year. The causative agents of the disease are animal hair, mites, dust, low-quality cosmetics and aggressive household chemicals. The spring form of this disease usually manifests itself in childhood. By the age of 20, it disappears completely. In this case, the list of symptoms includes: redness of the conjunctiva, photophobia, swelling of the eyelids, increased sensitivity to light, watery or transparent discharge, itching in the eyes, blue color of the connective membrane, in most cases, chemosis occurs (ie swelling of the membrane). The inflammatory process affects both eyes at the same time and is accompanied by blepharitis. A blood test shows the level of eosinophils.

### **Symptoms of conjunctivitis**

Symptoms of the disease depend on the stage and complexity of the course. The main symptoms of inflammatory pathology of the visual organ

severe redness;

the development of the inflammatory process;

burning;

sensation of a foreign body in the eye.

When the cornea of the eye is involved in the inflammatory process, the symptoms increase. In this case, the patient complains:

photophobia;

eye pain;

spasms of the eyelids.

At first, the disease affects only one eye, and later it can pass to the other. Sometimes a gray film appears in the eye, which can be easily removed with a cotton swab. Depending on its nature, conjunctivitis can be accompanied by various types of discharge (including watery or purulent).

To a large extent, the symptoms of conjunctivitis depend on its type. For example, allergic inflammation of the eye, burning, itching under the eyelids, redness, severe swelling, photophobia, the formation of follicles and papillae of different sizes, and superficial discharge

collected at the edges of the cornea (infiltrates mixed with lymph and lymph ). blood) is observed.

Viral conjunctivitis initially affects only one eye and is accompanied by intense redness, copious amounts of mucus, and lacrimation. In some cases, there is an increase in temperature and inflammation of the upper respiratory tract. Then follicles and papillae appear, blood is poured into the mucous membrane of the eye, and dark films may appear. With the viral nature of conjunctivitis, the lymphatic parotid glands enlarge, and miniature clear formations appear on the cornea of the eye.

Bacterial conjunctivitis begins acutely, with a large amount of purulent discharge, often oozing from the edges of the eyelids and drying in the eyelashes, which causes them to stick together. When the eye is damaged by gonococci, a severe and rapid course of the disease is observed. The cornea is often involved in the inflammatory process, ulcers may appear, and rapid development is observed with damage to the second eye. The bacterial form of the disease is often diagnosed in newborns. The discharge of pus with blood clots is accompanied by damage to both eyes at the same time. When the mucous membranes of the eye are affected by chlamydia, conjunctivitis has a long-lasting course, with the appearance of a large number of mature follicles, the formation of scar tissue, clouding of the cornea, and the appearance of blood vessels on the surface. comes with of the skin

The cause of the pathology may be *Pseudomonas aeruginosa*. In this case, severe damage to the cornea with the appearance of abundant purulent discharge, redness of the eyelids, severe swelling, and the appearance of ulcers and erosions is characteristic.

### **Stages of disease development**

Pathology develops in several stages:

Acute swelling of the mucous membrane, which is accompanied by thickening and swelling of the mucous membrane (in some cases, the swelling is so strong that it protrudes beyond the palpebral fissure, and the shade of the inflamed tissue has a normal or yellowish color).

Purulent, watery or mucous discharge. Pathological secretion accumulates at night and appears again within 10-15 minutes after removal in the morning. This process is accompanied by redness and tension of the eyelids, their adhesion, the feeling of a foreign body and the appearance of a yellow-white fibrin film, which in some cases leads to bleeding.

A decrease in the volume of discharge on the 4th or 5th day after the start of the inflammatory process. In addition, there is a decrease in redness and swelling.

Hypertrophy of epithelial cells. Many follicles and papillae are formed, which are clearly visible when the eyelid is turned inward, and the conjunctiva is uneven and uneven.

Erosion of the cornea of the eye. Appears with long-term conjunctivitis and lack of treatment. As a result, keratitis develops, the surface of the cornea of the eye becomes cloudy, sores and redness appear, and severe pain occurs.

Depending on the stage of development, the disease can be manifested as a mild inflammation of the cornea or partial (in the most severe cases, complete) visual impairment.

### **Diagnosis of pathology**

Diagnosis of conjunctivitis is made taking into account the suspected type that the patient has. The doctor evaluates the current clinical picture. If the disease is severe or the person's immunity is weakened, a bacterial culture of purulent and watery discharge is prescribed. A similar procedure is performed in the presence of certain chronic eye diseases.

Often, diagnostic measures include collecting anamnesis, complete examination, then differential diagnosis and laboratory tests.

Taking an anamnesis includes the following questions of the specialist:

How long ago did the red eye appear?

What is the nature of the output, its amount?

Have you ever had an eye injury?

Have burning sensation, pain, blurred vision or photophobia?

Is there a sensation of a foreign body in the eye?

Does the patient wear contact lenses?

Have you had vision problems in the past?

Has the patient recently been in contact with an infected patient or visited hotspots of infection (North Africa, India, Southeast Asia)?

Has the person had diseases of the organs of vision, upper respiratory tract or ENT organs?

Does the patient have co-morbidities?

Has he recently used drugs? (Special attention is paid to topical corticosteroid therapy.)

The next stage of diagnosis is examination of the organs of vision using a slit lamp. During the procedure, the doctor evaluates the degree of redness, the color of the discharge, the amount of swelling of the conjunctiva, the presence of bleeding and films. If the presence of a foreign body is suspected, the specialist will conduct an appropriate examination. A test using a fluorescent test strip is also performed. It stains damaged epithelial cells and helps determine the degree of corneal damage. If there is no heavy purulent discharge and the cornea is not damaged, the doctor can measure the intraocular pressure.

Laboratory tests are important in determining the causative agent of the disease. A smear is taken from the surface of the conjunctiva under local anesthesia. With its help, the sensitivity of pathogenic microorganisms to antibiotics is determined in the laboratory. Detection of intracellular chlamydia is carried out using the Romanovsky-Giemsa cytology method. The cellular reaction allows us to determine the nature of the inflammatory response. For example, eosinophils are found in the smear with allergic conjunctivitis, bacterial inflammation of the mucous membrane of the eye, neutrophils predominate, and viral infections are accompanied by the release of a large number of lymphocytes.

**Differential diagnosis is carried out for the following conditions caused by conjunctivitis:**

acute attack of glaucoma;

acute dacryocystitis;

inflammatory process in the area of the eyelid ("sye");

keratitis

scleritis;

bleeding under the conjunctiva;

orbital phlegmon;

iridocyclite.

Diagnostic measures include non-invasive procedures (radiography, computer tomography). The doctor prescribes them only if there is a suspicion of the main disease causing conjunctivitis (sinusitis, orbital abscess, sinusitis). In such a situation, consultation with relevant specialists (for example, ENT, maxillofacial surgeon, neurosurgeon, dentist) may be required. For gonococcal, diphtheria or tuberculous conjunctivitis, consultations are held with an infectious disease specialist, a dermatovenerologist, and a phthisiatrician.

## Treatment options

Treatment of conjunctivitis in adults and children depends on the type of pathology. For example, if there is an inflammatory process of a bacterial nature, the patient is prescribed antibacterial drops. However, antibiotics are not a panacea for allergic or viral conjunctivitis. If the inflammatory process in the area of the conjunctiva is triggered by an allergy, the patient is prescribed special drops that relieve swelling and itching.

The main goal of therapy is to eliminate clinical manifestations, fight the cause of the disease and prevent complications. One of the main rules for the treatment of conjunctivitis is the absence of a bandage. This prevents blinking, as a result of which purulent contents are removed from the conjunctival cavity. The use of a bandage for pathology creates optimal conditions for the spread of pathogenic microflora and complications in the field of the cornea.

The conjunctival cavity is washed with antiseptic solutions from purulent or watery content. The doctor chooses the necessary solution, taking into account the severity of the symptoms.

The most effective antibacterial drugs for the treatment of conjunctivitis are macrolides, fluoroquinolones (which have shown the best effectiveness in conjunctival inflammation of a bacterial nature) and aminoglycosides. In general, the treatment of the disease caused by bacteria is carried out with antibiotics in the form of eye drops. The duration and frequency of use of the funds are selected individually for each patient. For people with conjunctivitis caused by gonococci, *Pseudomonas aeruginosa* or chlamydia, mandatory hospital treatment is indicated.

For keratitis, the patient is prescribed special local ointments. They are usually used before going to bed, placed under the lower eyelid. Antibiotic treatment complex is often supplemented with antiseptics.

The therapy of the disease is based on the fight against unpleasant symptoms, allergic manifestations and inflammation in the area of the eyelids and conjunctiva. Treatment of conjunctivitis also includes anti-inflammatory therapy, which eliminates the inflammatory process and relieves swelling. If the cause of the disease is known, then therapy is carried out with corticosteroids. In other cases, non-steroids are prescribed. Complications in the form of keratitis require the use of additional drugs for therapy. For this problem, the doctor prescribes drugs to dilate the pupil, as well as drugs with a healing effect.

The viral form of the pathology is treated with special ointments. True, the effect of therapy is observed only if there is no secondary infection. Fungal conjunctivitis is treated for 4-6 weeks using a systemic or local approach. In therapy, fungicidal ointments, antimycotics and antifungal preparations in tablets are used.

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