



Conjunctivitis (Red Eye)

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Conjunctivitis is the most common eye condition treated by primary care providers and represents a special problem for those who live in homeless shelters or outdoors because it results from infectious or environmental exposures. The conjunctiva is a protective mucous membrane that covers the inner surface of the eyelid and extends over the eyeball to the perimeter of the cornea. This vascular tissue is a site of immune activity that responds to infection or other insults by classic inflammatory pathways, that culminate in the usual symptoms. Vasodilation renders the eye red; hypersecretion, vascular leak, and immune cells produce discharge; and inflammatory mediators provoke the patient's sense of ocular discomfort.

Prevalence and Distribution

Millions of Americans suffer from conjunctivitis every year. *Staphylococcus aureus* is the common bacterial cause in adults. *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Moraxella catarrhalis* are more common in children. All are readily contagious and transmitted by contact with secretions, fomites (bed linens), or contaminated surfaces. *Pseudomonas* is an infrequent cause. *Gonococcus* and *Chlamydia* species, which can cause serious forms of conjunctivitis, tend to spread sexually or vertically (from mother to child). Clinicians should consider these organisms in any newborn with ocular inflammation. *Chlamydia* is also the cause of trachoma, a cause of blindness endemic to the Middle East, North Africa, the Indian Subcontinent, and Southeast Asia; in the USA it occurs infrequently in Appalachian and Native American communities.

Mode of Transmission

Adenovirus is responsible for most cases of viral conjunctivitis. Adenovirus is endemic in emerging nations and sporadically epidemic in the industrialized world. Often associated with upper or lower respiratory tract infections, this virus is notoriously contagious and spread by direct contact, fomites, and contaminated surfaces; nosocomial infections are also common. Herpes simplex and zoster (shingles) are less common causes of viral conjunctivitis, but more serious because they can involve the cornea and cause blindness.

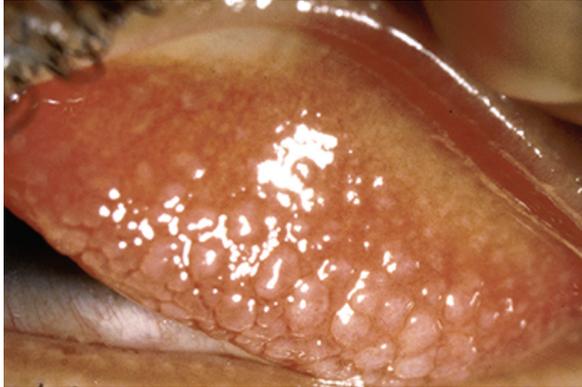
Noninfectious conjunctivitis is also common. Allergic conjunctivitis is evoked by seasonal or perennial allergens, including pollen, mold, dust, house mites, and animals. It is often associated with atopic conditions such as asthma, dermatitis, and rhinitis. Classically, allergic conjunctivitis develops in young adults, but severe variants can afflict

Conjunctivitis. Both eyes are reddened and tearing in this man with gonococcal conjunctivitis, one of the many infectious causes of this common eye condition. Photo courtesy of the CDC

Acute Bacterial Conjunctivitis.
This severe case of conjunctivitis shows engorged and reddened conjunctiva. Note the diffuse hyperemia.



Allergic Conjunctivitis.
Note the papillae (raised inflammatory tissues) on the everted eyelid. Photos by Deborah Pavan-Langston MD



children or older adults. Nonspecific conjunctivitis results from dry eyes, pollution, chemical irritants, ultraviolet light, or other mechanical insults. Contact lenses, particularly when worn too much or too long, intensify the risk and repercussions of most types of conjunctivitis.

Symptoms and Diagnosis

Patients with conjunctivitis typically complain of: (1) a red eye; (2) a sensation of sand or a foreign

Table 1. When to Refer to Ophthalmology
History of ocular disease or systemic inflammatory condition
History of foreign body or other eye trauma
Neonate
Qualitative loss in visual acuity
Marked photophobia
Ciliary flush
Asymmetric or nonreactive pupil
Inability to open eye or keep it open
Copious, rapidly progressive discharge
Corneal opacity

body in the eye; and (3) a purulent, watery, or stringy discharge. Itching is the cardinal symptom of allergic conjunctivitis. Providers should bear in mind that these symptoms, particularly a red eye, also occur in less common, sight-threatening conditions. Most patients are preoccupied with discomfort and cosmetic disturbances, but the clinician's first concern should be to ensure that the patient's visual acuity is not in jeopardy (see Table 1). A brief history and exam should be done, focusing on the following areas of concern.

- *Past ophthalmic history*
A history of eye disease, particularly keratitis, iritis, or glaucoma, often merits ophthalmic referral. The same applies for people with recurrent or refractory symptoms.
- *Past medical history*
Patients with autoimmune, rheumatic, or vasculitic conditions can have ocular complications of systemic disease. Immunocompromised hosts or those with systemic infections require close evaluation.
- *Review of symptoms*
Fever or upper respiratory symptoms implicate a virus. Rhinitis, asthma, or dermatitis suggest an allergic etiology. Symptoms of urethritis or cervicitis should raise suspicion for Chlamydia or gonococcus. Herpetic lesions on the face or elsewhere point to herpes virus infection. A blistering skin rash on the forehead and around the eye usually indicates zoster (shingles). History of contact with others with a red eye can be useful, especially for adenovirus. A sexual history is helpful whenever Chlamydia or gonococcus are suspected.
- *History of trauma*
For any patient with known or suspected trauma to the eye, the provider should be careful not to diagnose conjunctivitis too hastily. Foreign body and corneal perforation should be ruled out by a fluorescein exam under cobalt blue light. The iris should be intact, and the pupils should be equally round and reactive.
- *History of chemical exposure*
The provider should be sure not to miss any history of chemical or toxic exposure, which requires different management beyond the scope of this chapter.
- *Visual disturbances*
Can the patient read ordinary print with

Table 2: Therapeutic Options for Conjunctivitis

Type	Therapy	Dose
Empiric	polymyxin-bacitracin (Polysporin™)	0.5 inches QID for 7 days
	trimethoprim-polymyxin B (Polytrim™)	1-2 drops QID for 7 days
Bacterial	Polysporin™ or Polytrim™	See under Empiric
	ciprofloxacin (Ciloxan™)	1-2 drops QID for 7 days
	ofloxacin (Ocuflox™)	1-2 drops QID for 7 days
		1-2 drops QID for 7 days
Gonococcal	Ophthalmic referral necessary	Systemic
	Treat other complications and partners	
Chlamydial	Ophthalmic referral necessary	Systemic
	Treat other complications and partners	
Viral	Ocuhist™, Naphcon-A™, Visine AC™	1-2 drops QID PRN < 21 days
Allergic	Ocuhist™, Naphcon-A™, Visine AC™	1-2 drops QID PRN < 21 days
	Patanol™ or Alocril™ (2nd line)	1-2 drops BID
	Acular™ (2nd line)	1-2 drops QID PRN < 21 days
	Alomide™, Opticrom™ (3rd line)	1-2 drops QID (slow onset)
	Crolom™ (3rd line)	1-2 drops QID (slow onset)
Nonspecific	artificial tears	1-2 drops Q 1-6 hours PRN

the affected eye? Near vision should be checked in each eye with a newspaper held at a distance the patient prefers. A Snellen chart is not necessary. The patient should wear any corrective reading lenses. Low visual acuity can be described by the ability to count fingers, detect hand motions, or perceive the beam from a penlight. A discharge can cloud the patient's vision, but if it is cleansed (for example, with a damp cloth) the patient with common conjunctivitis should be able to approximate his or her baseline visual acuity. A decline in visual acuity is reason for referral to an ophthalmologist. Other visual symptoms that merit referral are photophobia, which implicates deeper inflammation, or complaints of colored halos, which suggest acute angle closure glaucoma.

The "Red Eye"

Conjunctivitis always leads to a red (hyperemic) eye, but not all red eyes imply conjunctivitis. Close inspection of the hyperemic eye shows numerous discrete, dilated blood vessels that contribute to

the pink or red appearance when viewed from a distance. The dilated blood vessels spread diffusely over the mucous membrane, including the underside of the eyelid. This is in contrast to ciliary flush, where the hyperemia is concentrated within 1-3 mm of the circumference of the cornea but less on the periphery of the eye and under the eyelid. This finding, which indicates inflammation of the cornea or deeper structures, merits referral. Dilated vessels limited to a portion of the orbit usually indicate a foreign body, pterygium, episcleritis, or scleritis. A patch of blood without blood vessel definition is more consistent with subconjunctival hemorrhage; this condition is usually benign and self-limited. A layered pool of blood is called a *hyphema* and can reflect serious ocular trauma. Likewise, a layered pool of purulent fluid, or *hypopyon* implies infection of the cornea or aqueous chamber. Both hyphema and hypopyon require immediate referral.

Discomfort

The patient with conjunctivitis typically describes a foreign body sensation "like sand in the eye." This sensation is more pronounced when a virus is involved. The clinician should check to be

Allergic Conjunctivitis.
This man lives on
Boston's streets
and has severe
eosinophilic
dermatitis and
recurrent bouts of
allergic conjunctivitis.
Photo by
James O'Connell MD



sure that the patient is able to open the eye and keep it open. If not, the cornea is likely to be involved. Corneal abrasions are caused by trauma, contact lens overuse, or vigorous eye rubbing, and should be confirmed by fluorescein exam. Otherwise, ophthalmic referral is needed to rule out bacterial keratitis (corneal infection). Itching is a classic symptom of allergic conjunctivitis. Frank pain, headache, or nausea should raise suspicion for other disorders, including uveitis or acute angle closure glaucoma.

Discharge

The quality and quantity of discharge provide clues to the type of conjunctivitis. Physical exam usually yields more reliable information than the history. An opaque discharge, with pus-like fluid pooled between the eyeball and lower lid margin, is typical of bacterial infection. A purulent discharge that is copious and rapidly progressive should arouse suspicion of a hyperacute bacterial conjunctivitis, such as gonorrhea, which requires immediate referral. A watery discharge is characteristic of viral infections. A thick, stringy discharge is more common in allergic disorders.

Preauricular nodes

A tender, inflamed preauricular node (anterior to the ear) is a clue that a virus, most likely adenovirus, is involved. Preauricular adenopathy is less common in bacterial infections.

Unilateral or bilateral symptoms

Bacterial conjunctivitis is usually bilateral. Adenoviral conjunctivitis usually starts in one eye and soon involves the other, whereas herpes is usually unilateral. Allergic conjunctivitis tends to be bilateral.

Pupil size and shape

The pupils should be equally round and reactive to light. An asymmetric, mid-dilated pupil, red eye, hazy cornea, vomiting, and patient in distress are classic signs of acute angle closure glaucoma. An asymmetric, constricted pupil and red eye are typical of uveitis.

Corneal clarity and integrity

The cornea should be examined for a white spot or other opacity, which suggests infectious keratitis. Foreign bodies can also be detected in this manner. A fluorescein exam should be done if there is any suspicion of corneal abrasion or herpes simplex or zoster keratitis; herpes will usually display a distinctive branching pattern under cobalt blue light.

Laboratory diagnosis

Discharge can be sampled for Giemsa or Gram stain and bacterial or viral culture, but in practice most conjunctivitis is treated empirically (see below). Laboratory diagnosis is preferable in suspected cases of gonococcus or Chlamydia. A tear film assay for IgE is available to diagnose allergic conjunctivitis, although history and exam are usually sufficient.

Treatment and Complications

Most conjunctivitis is self-limited. Regardless of the etiology, cold compresses can alleviate some of the symptoms. Medical therapy is summarized in Table 2.

Without treatment, bacterial conjunctivitis can require 14 days or longer to resolve or possibly become chronic. Healing is hastened with empiric therapy using polymyxin-bacitracin (Polysporin™) ophthalmic ointment, or trimethoprim-polymyxin B (Polytrim™) drops. Bacterial cases should improve within three days of treatment; if they do not, the provider should consider alternative diagnoses. Topical fluoroquinolones are also available and appropriate for empiric bacterial therapy. Aminoglycosides such as tobramycin are not first-line agents for conjunctivitis.

Gonococcal conjunctivitis requires systemic treatment with ceftriaxone (Rocephin™) or ciprofloxacin (Cipro™). Empiric therapy for Chlamydia is also recommended. Chlamydia conjunctivitis requires systemic treatment with a macrolide, such as azithromycin (Zithromax™). For both conditions, treatment of sexual partners is recommended.

No specific therapy is available for non-herpetic viral conjunctivitis. Symptoms generally worsen

over the first few days and then gradually resolve within 14-21 days. Some patients report relief from over-the-counter antihistamine or decongestant eye drops. Patients with suspected herpes conjunctivitis should be referred to specialty care.

Contact lenses should not be worn until bacterial or viral infection has resolved.

The mainstays in treating allergic conjunctivitis are: (1) avoidance of allergens, such as animals, dust, or pollens; (2) ophthalmic or systemic antihistamines or mast cell stabilizers; and (3) lubricating drops. Patients should be instructed not to rub their eyes. A cold wet compress (facecloth) provides some symptomatic relief. For isolated allergic conjunctivitis, the first line of therapy is an over-the-counter antihistamine or decongestant; however, rebound can result if these are used more than a month. The second line of therapy is a mast cell stabilizer, e.g. olopatadine (PatanolTM), nedocromil (AlocrilTM), or NSAID ketorolac (AcularTM). A third line is available in more potent mast cell stabilizers, e.g. cromolyn sodium (CrocomTM) or ledoxamide tromethamune (AlomideTM). Many patients with allergic conjunctivitis suffer from concurrent rhinitis or dermatitis, for which they will often take systemic antihistamines. While these agents tend to quell the ocular inflammatory reaction, they also reduce eye secretions and lead to dryness, which aggravates allergic conjunctivitis. Solutions to this problem include non-prescription artificial tears or non-sedating antihistamines, which are less likely to dry the eye.

Nonspecific conjunctivitis is treated with lubricating eye drops. Topical antihistamines or decongestants can provide some relief.

Topical steroids are rarely indicated for conjunctivitis, with the exception of some severe allergic conditions. Steroids carry significant risk and should not be prescribed by primary care providers. Topical anesthetics, such as tetracaine, facilitate the eye exam but should never be prescribed because they inhibit the eye's protective reflexes.

The long-term complications of acute conjunctivitis are relatively few. Occasionally there is dry eye or residual corneal haze, which resolves over time. Chronic conjunctivitis in its most severe form can lead to blood vessel growth over the cornea (pannus) and lasting visual impairment.

Prevention and Control

Bacterial and viral conjunctivitis

Prompt treatment of bacterial conjunctivitis

minimizes the transmission of this infection. Infected persons should be instructed to wash their hands frequently and try not to touch their eyes. They should not share towels, linens, handkerchiefs, clothes, sunglasses, makeup, or eyedrops. Anyone with a concurrent upper respiratory tract infection should take steps to minimize airborne droplets. Gonococcal and Chlamydial transmission can be minimized by safe sex practices and careful handwashing.

Allergic conjunctivitis

Patients should be educated on how to avoid pollens, animals, dust, or other known allergens. Artificial tears, which dilute allergens in the tear film, can be beneficial. Patients should be instructed to avoid rubbing the eye, which can introduce more allergens, aggravate the inflammatory response, and increase the risk of long-term corneal complications.

Special Considerations for Homeless Populations

Adenoviral conjunctivitis is highly contagious. Outbreaks occur frequently in schools, hospitals, and other shared facilities. Since homeless shelters are at similar risk, staff and guests should be sure to follow infection control guidelines outlined in this chapter and elsewhere in this book. Allergic conjunctivitis is a special problem for homeless people, who have less control over the air quality in their surroundings. Special arrangements should be made to keep sleeping quarters free from dust and animal dander. Linens should be laundered frequently in hot water. A plastic bag between pillow and pillowcase forms a barrier to dust mites. Staff should be aware that significant amounts of cat and dog dander can be delivered on the clothing of other guests. For patients with seasonal allergies, shelters should provide a space indoors, particularly in the morning, on days when pollen counts are high. ■■

The authors of this chapter gratefully acknowledge the invaluable contribution of the late Thomas Bennett, MD, who authored this chapter in the original Manual.

Conjunctivitis Medication List

Generic	Brand	Cost
polymyxin B + bacitracin	Polysporin	\$
polymyxin B + trimethoprim	Polytrim	\$
ciprofloxacin	Ciloxan	\$\$
ofloxacin	Ocuflox	\$\$
olopatadine	Patanol	\$\$\$
nedocromil	Alocril	\$\$
ketorolac	Acular	\$\$\$
lodoxamide	Alomide	\$\$\$
cromolyn sodium	Crolom, Opticrom	\$\$\$
artificial tears	Hypotears, Tears Naturale	\$

References

Leibowitz HM. The red eye. *New England Journal of Medicine* 2000;343(5):345-351.

Pavan-Langston D. *Manual of Ocular Diagnosis and Treatment*. Philadelphia: Lippincott, Williams, and Wilkins; 2002. Also available in Spanish.