Management of Conjunctivitis

Case Study and Commentary, Neera Singal, MD, and Allan R. Slomovic, MA, MD

Abstract
Red eye refers to a variety of distinct ocular diseases with infectious or noninfectious etiologies. Conjunctivitis is the most common cause of red eye, accounting for 2% of ambulatory visits. Patients with conjunctivitis frequently first present to their primary care physician, who must understand the differential diagnosis of red eye and be able to conduct an appropriate ophthalmic history and physical examination to distinguish among emergent and nonemergent conditions. A thorough history and pertinent ocular examination typically are all that is needed to reach a diagnosis and initiate appropriate therapy. While many causes of conjunctivitis are benign and may be managed in the primary care setting, other causes, such as globe rupture, corneal ulcer, and iritis, are potentially vision-threatening and require urgent ophthalmologic assessment.

CASE ONE
Initial Presentation
A 25-year-old woman presents with a 3-day history of right conjunctival redness, purulent discharge, and morning crusting. She is otherwise healthy and denies any change in vision.

What is the differential diagnosis of a red eye?
• What are important historical and physical examination points to cover?

The differential diagnosis of a red eye is broad and includes sight-threatening conditions such as corneal ulcer, iritis, scleritis, penetrating globe injury, and acute angle-closure glaucoma. Non-sight-threatening causes include blepharitis, dry eyes, certain types of bacterial conjunctivitis, adenoviral conjunctivitis, and mild to moderate allergic conjunctivitis. In order to prevent serious visual sequelae, a stepwise approach is helpful. The first step in reaching a provisional diagnosis is taking a thorough history. Historical features associated with...
serious ophthalmic conditions include a history of decreased vision, pain, photophobia, prior ocular history, and recent trauma (Table 1). In patients with a history of any of these, an urgent ophthalmologic referral is warranted.

The physical evaluation begins with a complete examination, paying particular attention to the ophthalmic component. Important aspects of the physical examination are the presence of fever or lymphadenopathy, particularly preauricular lymphadenopathy. The ocular examination should always begin with the measurement of the best-corrected acuity. This may be done at distance or at near and should be performed monocularly. If the vision is abnormal and cannot be corrected with a pinhole, then a serious underlying ophthalmic condition needs to be ruled out. The lids should be examined and the periorbital area should be palpated for tenderness. The pupillary response is a critical component of the ophthalmologic examination and may often provide information about the underlying etiology. A miotic and immobile pupil may suggest an underlying iritis. In contrast, a fixed and mid-dilated pupil may be more suggestive of acute angle-closure glaucoma. The cornea should also be evaluated. If an abrasion, ulcer, or herpetic infection is suspected, the cornea should be stained with fluorescein. A hazy cornea or the presence of a white spot on the cornea may be a clue to the presence of a corneal ulcer. A white fluid obscuring the inferior iris is evidence of a hypopyon and is usually evidence of an underlying corneal ulcer. These patients should be referred for ophthalmologic assessment. All ophthalmologic evaluations should also include an examination of extracocular motility as well as funduscopy. Neonates presenting with a red eye require special attention, and in all cases prompt referral to an ophthalmologist and pediatrician is warranted.

**Table 1. Serious Ophthalmic Conditions**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Etiologies to Rule Out</th>
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<tr>
<td>History of trauma</td>
<td>Globe rupture</td>
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<tr>
<td>Contact lens wearer</td>
<td>Corneal ulcer</td>
</tr>
<tr>
<td>Pain</td>
<td>Acute angle-closure glaucoma, iritis, scleritis, corneal ulcer</td>
</tr>
<tr>
<td>Severe photophobia</td>
<td>Iritis</td>
</tr>
<tr>
<td>Significant visual change</td>
<td>Acute angle-closure glaucoma, corneal ulcer</td>
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<tr>
<td>History of ocular disease</td>
<td>Iritis, scleritis, herpes simplex keratitis</td>
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</table>

The classification of conjunctivitis has traditionally been divided into infectious and noninfectious etiologies (Table 2). Common infectious etiologies include bacterial, viral, and chlamydial causes. Viral conjunctivitis is by far the most common infectious cause of conjunctivitis, accounting for the vast majority of cases [2]. The more unusual fungal and parasitic pathogens may be considered in the immunocompromised patient or contact lens wearer or occasionally in the setting of trauma [3]. Noninfectious causes of conjunctivitis include allergic and toxic etiologies.

Certain features on history are suggestive of conjunctivitis. Due to the highly contagious nature of viral conjunctivitis, patients may often describe a recent exposure to a person with a red eye. Frequently, viral or bacterial infections begin in one eye and then spread to the other eye within a few days [4]. Patients presenting with adenovirus conjunctivitis typically have had an antecedent upper respiratory tract infection [4]. In contrast to viral etiologies, bacterial conjunctivitis is more likely to present with mucopurulent discharge and morning eyelash crusting with the lids sticking together [5]. Recent exposure to topical drugs or chemicals may imply an allergic or toxic etiology. Furthermore, a history of atopy, asthma, or eczema is indicative of allergic disease.

On physical examination, signs of conjunctivitis are relatively nonspecific. Clues to the presence of conjunctivitis are mucoid or mucopurulent discharge, lid and conjunctival edema, and conjunctival redness.

**Physical Examination**

On physical examination, the patient is afebrile. Her vision is 20/20 ou. Her pupils are equally reactive to light and accommodation. There is some crusting of her lashes bilaterally, although it is more marked on the right side. Her conjunctiva is diffusely inflamed and there is no global tenderness to palpation. There is mild lid and conjunctival edema and a mucoid purulent yellowish discharge (Figure 1). Her extraocular motility is normal. Funduscopy is unremarkable.

**Table 2. Classification of Conjunctivitis**

<table>
<thead>
<tr>
<th>Category</th>
<th>Etiologies</th>
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<tbody>
<tr>
<td>Infectious</td>
<td>Viral</td>
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<tr>
<td></td>
<td>Bacterial</td>
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<td></td>
<td>Fungal</td>
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<td></td>
<td>Parasitic</td>
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<td></td>
<td>Chlamydial</td>
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<tr>
<td>Noninfectious</td>
<td>Allergic</td>
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<tr>
<td></td>
<td>Toxic</td>
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<td></td>
<td>Autoimmune</td>
</tr>
</tbody>
</table>

• How is conjunctivitis classified?
• Which features suggest the diagnosis?
What are characteristic features of bacterial conjunctivitis?

Bacterial conjunctivitis, occurring much less commonly than viral, can be classified as acute, hyperacute, or chronic [6]. This classification is important because the pathogens, clinical course, and treatment are distinct for each subgroup (Table 3). Rapid onset of copious mucopurulent discharge, chemosis, as well as significant conjunctival erythema are the hallmark of hyperacute conjunctivitis. The most common pathogen is *Neisseria gonorrhoeae*, and the patients are often young and sexually active [7]. Acute bacterial conjunctivitis typically presents with foreign body sensation, burning, tearing, and a mucopurulent or purulent discharge. The most common pathogens responsible for acute bacterial conjunctivitis are *Streptococcus pneumoniae* and *Haemophilus influenzae* in children, whereas *Staphylococcus aureus* most frequently affects adults [4]. Chronic conjunctivitis will be discussed in a later section.

How can one distinguish between viral and acute bacterial conjunctivitis?

In the first 24 to 36 hours, an acute bacterial infection may be indistinguishable from a viral infection [8]. Both adenoviral conjunctivitis and acute bacterial conjunctivitis are highly contagious, starting in one eye and then involving the second. In addition, both can occur following previous exposure to an affected individual. A key feature that may help distinguish between the two is the precedence of a recent upper respiratory tract infection, which occurs more commonly with adenovirus [4]. Similarly on clinical examination, the presence of a tender preauricular lymph node and mucoid (as opposed to mucopurulent) discharge is characteristic of adenoviral conjunctivitis [9], although this finding is also present in cases of hyperacute bacterial conjunctivitis. These features are usually not seen in cases of acute bacterial conjunctivitis. A diagnosis of herpes simplex keratitis should be considered if there has been a past history of ipsilateral unilateral conjunctivitis or a history of labial cold sores. In these cases a prompt referral to an ophthalmologist should be made. Topical corticosteroids should be avoided because of the risk of virus proliferation. The treatment of adenovirus conjunctivitis is primarily supportive. Cool compresses and artificial tears should be recommended to the patient since this can often improve comfort [4]. Both bacterial and viral cases need to be counseled with regard to strategies to help reduce transmission to others. Such strategies include frequent hand washing, avoidance of sharing drinking glasses, towels, pillows, and utensils, and avoidance of others at work for at least 1 week [10]. It is also important for the physician to immediately disinfect the examination room with dilute bleach in order to prevent a viral outbreak.

Are routine cultures helpful in guiding treatment?

The routine use of conjunctival cultures in suspected cases of acute bacterial conjunctivitis is not recommended because in approximately 50% of patients with conjunctivitis, cultures do not yield a pathogen, thereby falsely implying a viral etiology [11]. Furthermore, the usual organisms causing infection are part of the normal flora of a healthy eye [3]. Nevertheless, there are a number of cases in which conjunctival cultures should be performed. Neonates with neonatal conjunctivitis should be cultured since conjunctivitis in neonates can be associated with serious systemic infections, such as chlamydia or *N. gonorrhoeae* infection [6]. In addition, any case of hyperacute hyperpurulent conjunctivitis should be
cultured because *N. gonorrhoeae* and *N. meningitidis* conjunctivitis may be vision- or life-threatening [11,12]. Both of these conditions require immediate systemic treatment. Finally, any case of chronic conjunctivitis that has failed empiric therapy should be cultured after the antibiotics have been discontinued for at least 48 hours [6].

- **What are treatment options in acute bacterial conjunctivitis?**

Most cases of bacterial conjunctivitis are self-limited, although treatment is indicated to shorten the disease course and to reduce outbreaks. A recent meta-analysis of 3 double-blind, randomized controlled trials comparing topical antibiotics with placebo demonstrated that topical antibiotics were associated with higher rates of clinical cure or improvement at days 2 to 5 and 6 to 10 days. No adverse consequences were reported in either group. Clinical remission occurred by days 2 to 5 in 64% of patients treated with placebo [13]. Therapy is empiric and is directed towards the most likely pathogens in a given patient population. Acute adult conjunctivitis treatment is aimed at *S. aureus*, *S. pneumoniae*, and *H. influenzae*.

**Diagnosis and Treatment**

A diagnosis of bacterial conjunctivitis is made and the patient is started on a broad-spectrum topical antibiotic. She makes a complete recovery within 1 week.

**CASE TWO**

**Initial Presentation**

A 16-year-old girl presents with a 5-week history of mild unilateral redness with scant mucopurulent discharge. She describes matting of the eyelashes, particularly in the morning. She denies any change in vision.

- **What is the differential diagnosis of chronic conjunctivitis?**

- **How can the history help in differentiating between the different causes?**

This is a case of chronic conjunctivitis by definition. The differential diagnosis includes infectious and toxic causes, blepharitis, and nasolacrimal duct obstruction. The most common infectious agent is chlamydia. Chlamydial conjunctivitis typically occurs in sexually active young adults. The onset of the ocular manifestations occur 1 to 2 weeks following a non-specific urethritis or cervicitis [14]. The majority of cases are unilateral but may become bilateral over time. Conjunctival injection is most marked in the inferior fornix, and a nontender preauricular node can usually be palpated [15]. In contrast to chlamydia infections, patients with blepharitis typically complain of bilateral redness with matting of the lashes most noticeable upon awakening. They may also complain of a burning sensation that worsens as the day progresses. There may be an underlying history of rosacea in these patients. Blepharitis is best initially managed with lid hygiene, warm compresses, and ocular lubricants. In cases that have coexisting rosacea, a trial of systemic tetracycline or doxycycline may significantly improve symptoms. Patients with nasolacrimal duct obstruction are usually neonates or the elderly and the primary complaint is constant tearing. These patients need a referral to an ophthalmologist for further investigation.

**History and Ocular Examination**

On further questioning, this patient admits to having multiple sexual partners. Her ocular manifestations began 1 week after her last sexual encounter. She has also been having some cervical discharge. She denies any tearing, ocular burning, or facial acne. On ocular examination, her vision is 20/20, her pupils are equal and reactive to light, and she has mild unilateral conjunctival erythema (Figure 2). Finally, a nontender preauricular lymph node is palpated on the ipsilateral side.

**Working Diagnosis**

Based on the history and ocular examination, the physician makes a probable diagnosis of chlamydial conjunctivitis.

- **What is appropriate treatment for this patient?**
All patients with chlamydial conjunctivitis should be referred to an ophthalmologist for the appropriate workup and treatment. If chlamydial conjunctivitis is suspected, the ophthalmologist will obtain conjunctival scrapings for staining as well as cell cultures. The gold standard for diagnosis is still the McCoy cell culture; however, polymerase chain reaction is slowly replacing this test [16]. All cases of chlamydial conjunctivitis represent an ocular manifestation of an underlying systemic disease. As a result, systemic therapy is mandatory. Recently, the use of a single dose of azithromycin has been shown to be as efficacious as a 10-day course of oral doxycycline, and this is now becoming the standard of care [17]. Additional topical therapy is not necessary. All sexual partners should receive treatment as well.

**CASE THREE**

**Initial Presentation**

A 10-day-old baby boy presents with bilateral mild mucopurulent discharge and conjunctival hyperemia of 3 days’ duration (Figure 3). His mother notes that she has had some difficulty breast-feeding him over the past 3 days.

- What is the differential diagnosis of conjunctivitis in the neonate?

Neonatal conjunctivitis, also known as ophthalmia neonatorum, is an uncommon cause of conjunctivitis. Its incidence is estimated to be between 0.4% and 5% in developed countries [15]. The differential diagnosis is broad; however, *Chlamydia trachomatis* is the most common cause, accounting for 40% of all cases [18]. Most evidence suggests that infants acquire this infection from the birth canal during vaginal delivery. A mother who harbors this organism has a 50% to 75% chance of passing this infection to her baby [19]. Other causes include other bacterial infections such as *S. aureus*, *S. pneumoniae*, and *N. gonorrhoeae*, viral infection with herpes simplex virus, and toxic causes from the less commonly used silver nitrate prophylaxis [15]. *N. gonorrhoeae* is the most important microorganism to rule out because of its sight-threatening sequelae.

- How is the diagnosis of chlamydial conjunctivitis made in the neonate? How is it treated?

Unlike adults, most neonates will present with bilateral conjunctival hyperemia, typically occurring 5 to 14 days after birth. This period can be earlier with premature rupture of the membranes [15]. Other nonspecific signs include mucoid or mucopurulent discharge and lid edema. Although most cases of chlamydia conjunctivitis are self-limiting, correct diagnosis is essential to treat any possible concurrent systemic infection and to rule out any other more serious causes. Microbiologic data are essential. Similar to cases in adults, conjunctival scrapings and cultures are crucial in making the diagnosis.

All of these patients need an urgent ophthalmologic and pediatric referral. All cases of neonatal chlamydia conjunctivitis require systemic therapy, as there is a high incidence of concomitant systemic involvement. The incidence of concomitant chlamydia pneumonia is 30% [20]. The current recommended therapy is oral erythromycin 50 mg/kg per day in 4 divided doses for 10 to 14 days [15]. The mother and sexual partners must also be treated.

**CASE FOUR**

**Initial Presentation**

A 5-year-old boy has been complaining of bilateral conjunctival redness, mucoid discharge, and pruritus. His mother notes that the symptoms are not present all the time but seem to act up in the spring time. He does have a history of environmental allergies and mild asthma.

- What is the differential diagnosis of allergic conjunctivitis?

The differential diagnosis of allergic conjunctivitis includes all of the previously mentioned causes of a red eye. The key feature that helps to distinguish allergic from other causes of a red eye is the predominant symptom of pruritus. There may also be a personal or family history of atopy [21].
Because of the seasonal exacerbation of allergies, a previous episode of conjunctivitis, particularly in the spring or summer, is highly suggestive of allergic disease. Characteristic signs include the presence of chemosis, lid involvement, and a stringy or ropey mucoid discharge [21]. There is no lymphadenopathy, which may be a useful feature on clinical examination to help differentiate this from viral etiologies.

- **What is the treatment of allergic conjunctivitis?**

As a general principle, the treatment of ocular allergy is based on how severe the symptoms are and how much they interfere with the individual’s quality of life. For mild cases, cold compresses or ice packs several times a day can provide considerable relief. Avoidance of the allergens if possible by using air conditioning at home can also help improve symptoms. Artificial tear substitutes help improve the barrier function of the tear film, although the effect is only temporary. They also serve to dilute the allergens and help flush them out of the eye. If artificial tears are used, nonpreserved tears are recommended as they tend to be less irritating. For moderate to severe allergic conjunctivitis, a mast cell stabilizer may be useful if started a month prior to the allergic season since the therapeutic effect requires several weeks of continuous use. Mast cell stabilizers act by inhibiting the release of histamine and inflammatory cytokines from mast cells and basophils, which may help in preventing allergic conjunctivitis [21]. The newer third-generation drops possess both mast cell stabilizing and antihistamine activity [23,24]. It has been postulated that the dual mechanism may be more useful in treating patients with allergic conjunctivitis [25]. These newer third-generation drops are superior to the antihistamine and vasoconstrictor preparations because the rebound inflammatory effects of the latter preparations can now be avoided. These drops have also been shown to be safe and effective in children up to 3 years of age. Moreover, they have a longer duration of action and only need to be used 2 to 3 times a day.

- **When should a referral to an ophthalmologist be made?**

In more advanced cases or in cases that do not respond to the above measures, then more potent medications may need to be administered. This commonly includes the use of topical steroids, topical cyclosporin, and occasionally systemic steroids. Since the local administration of topical steroids may be associated with an increase in intraocular pressure, possible viral infections, and cataract development, these patients need to be monitored by an ophthalmologist.

**Summary**

The many causes of conjunctivitis may be classified into infectious and noninfectious etiologies. A thorough history and pertinent ocular examination are typically all that is necessary to reach a diagnosis and initiate appropriate management. Laboratory investigations have limited indications and in the primary care setting do not often contribute significantly beyond the history and physical exam. Although most cases of conjunctivitis are self-limiting, some will require ophthalmologic assessment. Some of the important sight-threatening causes are reviewed in Table 1. Many cases of conjunctivitis, however, may be appropriately diagnosed and managed by the primary care physician.

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Author contributions: conception and design, NS; drafting of the article, NS; critical revision of the article, NS, ARS.

**References**

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<th>Strongly Disagree</th>
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As a result of reading this case study, I . . .

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