PREFERRED PRACTICE PATTERN®

Conjunctivitis

Limited Revision

AMERICAN ACADEMY OF OPHTHALMOLOGY
The Eye M.D. Association

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As a service to its members and the public, the American Academy of Ophthalmology has developed a series of clinical practice guidelines called Preferred Practice Patterns that **identify characteristics and components of quality eye care.** Appendix 1 describes the core criteria of quality eye care.

The Preferred Practice Pattern® (PPP) guidelines are based on the best available scientific data as interpreted by panels of knowledgeable health professionals. In some instances, such as when results of carefully conducted clinical trials are available, the data are particularly persuasive and provide clear guidance. In other instances, the panels have to rely on their collective judgment and evaluation of available evidence.

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Innovation in medicine is essential to assure the future health of the American public, and the Academy encourages the development of new diagnostic and therapeutic methods that will improve eye care. It is essential to recognize that true medical excellence is achieved only when the patients' needs are the foremost consideration.

All PPPs are reviewed by their parent panel annually or earlier if developments warrant and updated accordingly. To ensure that all PPPs are current, each is valid for 5 years from the "approved by" date unless superseded by a revision. Preferred Practice Pattern guidelines are funded by the Academy without commercial support. Authors and reviewers of PPPs are volunteers and do not receive any financial compensation for their contributions to the documents. The PPPs are externally reviewed by experts and stakeholders before publication.

The intended users of the Conjunctivitis Preferred Practice Pattern guideline are ophthalmologists.

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INTRODUCTION

The Preferred Practice Pattern® (PPP) guidelines have been written on the basis of three principles.

- Each Preferred Practice Pattern should be clinically relevant and specific enough to provide useful information to practitioners.
- Each recommendation that is made should be given an explicit rating that shows its importance to the care process.
- Each recommendation should also be given an explicit rating that shows the strength of evidence that supports the recommendation and reflects the best evidence available.

In the process of revising this document, a detailed literature search of articles in the English language was conducted in December 2007 in PubMed and the Cochrane Library on the subject of conjunctivitis for the years 2002 to 2007. To complete this limited revision, PubMed and the Cochrane Library were searched on February 10, 11, and 14, 2011 on the subject of conjunctivitis, limited to English language and publication date of 2008 to the date of the search. Details of the literature search are available at www.aao.org/ppp. The results were reviewed by the Cornea/External Disease Panel and used to prepare the recommendations, which they rated in two ways.

The panel first rated each recommendation according to its importance to the care process. This "importance to the care process" rating represents care that the panel thought would improve the quality of the patient's care in a meaningful way. The ratings of importance are divided into three levels.

- Level A, defined as most important
- Level B, defined as moderately important
- Level C, defined as relevant but not critical

The panel also rated each recommendation on the strength of evidence in the available literature to support the recommendation made. The "ratings of strength of evidence" also are divided into three levels.

- Level I includes evidence obtained from at least one properly conducted, well-designed, randomized, controlled trial. It could include meta-analyses of randomized controlled trials.
- Level II includes evidence obtained from the following:
  - Well-designed controlled trials without randomization
  - Well-designed cohort or case-control analytic studies, preferably from more than one center
  - Multiple-time series with or without the intervention
- Level III includes evidence obtained from one of the following:
  - Descriptive studies
  - Case reports
  - Reports of expert committees/organizations (e.g., PPP panel consensus with external peer review)

The evidence cited is that which supports the value of the recommendation as something that should be performed to improve the quality of care. The panel believes that it is important to make available the strength of the evidence underlying the recommendation. In this way, readers can appreciate the degree of importance the committee attached to each recommendation and they can understand what type of evidence supports the recommendation.

The ratings of importance and the ratings of strength of evidence are given in bracketed superscripts after each recommendation. For instance, "[A:II]" indicates a recommendation with high importance to clinical care [A], supported by sufficiently rigorous published evidence, though not by a randomized controlled trial [II].

The sections entitled Orientation and Background do not include recommendations; rather they are designed to educate and provide summary background information and rationale for the recommendations that are presented in the Care Process section. A summary of the major recommendations for care is included in Appendix 2.

ORIENTATION

ENTITY

Conjunctivitis (ICD-9 #372.0 - 372.3), other diseases of conjunctiva due to viruses, *Chlamydia* (077.0 - 077.99), and ophthalmia neonatorum due to gonococcus (098.4)

DISEASE DEFINITION

Conjunctivitis is an inflammation that affects the conjunctiva primarily.

ACTIVITY

Diagnosis and management of the patient with conjunctivitis.

PATIENT POPULATION

The patient population includes individuals of all ages who present with symptoms and signs suggestive of conjunctivitis, such as red eye or discharge.

PURPOSE

The purpose of diagnosing and managing patients with conjunctivitis is to undertake the following:

- Preserve visual function
- Reduce or eliminate conjunctival inflammation and its complications
- Restore patient comfort
- Minimize the spread of infectious disease

GOALS

- Establish the diagnosis of conjunctivitis, differentiating it from other causes of red eye
- Identify the cause(s) of conjunctivitis
- Establish appropriate therapy
- Relieve discomfort and pain
- Prevent complications
- Prevent the spread of communicable diseases
- Educate and engage the patient and referring healthcare providers in the management of the disease

BACKGROUND

Conjunctivitis, or inflammation of the conjunctiva, is a general term that refers to a diverse group of diseases/disorders that affect the conjunctiva primarily. Most varieties of conjunctivitis are self-limited, but some progress and may cause serious ocular and extraocular complications.

Conjunctivitis can be classified as infectious or noninfectious and as acute, chronic, or recurrent. The causes of infectious conjunctivitis include viruses and bacteria. The types of noninfectious conjunctivitis are allergic, mechanical/irritative/toxic, immune-mediated, and neoplastic. The causes for noninfectious conjunctivitis may overlap.

It is important to differentiate among processes that involve the conjunctiva primarily and those in which conjunctival inflammation is secondary to systemic or ocular diseases. For example, although dry eye and blepharitis are the most frequent causes of conjunctival inflammation, the treatment for each of these entities is directed at correcting the underlying problems.[1,2] Systemic diseases such as gonorrhea or atopy may also cause conjunctival inflammation, and treatment of conjunctivitis should include treatment of the systemic disease. Ligneous conjunctivitis is caused by plasminogen deficiency resulting in multiorgan pseudomembranous disease of mucous membranes in the mouth, nasopharynx, trachea, and female genital tract. This chronic childhood membranous conjunctivitis has been treated successfully with intravenous lysplasminogen[3] or topical plasminogen drops.[4]

This Preferred Practice Pattern addresses the following types of conjunctivitis that are most common or are particularly important to detect and treat:

Allergic

- Seasonal allergic conjunctivitis
- Vernal conjunctivitis
- Atopic conjunctivitis
- Giant papillary conjunctivitis [(GPC) also has a mechanical component]

Mechanical/Irritative/Toxic

- Superior limbic keratoconjunctivitis (SLK)
- Contact lens-related keratoconjunctivitis
- Floppy eyelid syndrome
- Pediculosis palpebrarum *(Pthirus pubis)*
- Medication-induced keratoconjunctivitis

Viral

- Adenoviral conjunctivitis
- Herpes simplex virus (HSV) conjunctivitis
- Varicella (herpes) zoster virus (VZV) conjunctivitis
- Molluscum contagiosum

Bacterial

- Bacterial conjunctivitis (including nongonococcal and gonococcal**)**
- Chlamydial conjunctivitis

Immune-mediated

- Ocular mucous membrane pemphigoid (OMMP)
- Graft-versus-host disease (GVHD)

Neoplastic

- Sebaceous gland carcinoma

EPIDEMIOLOGY

Conjunctivitis is a diagnosis that encompasses a diverse group of diseases that occur worldwide and affect all ages, all social strata, and both genders. Although there are no reliable figures that document the incidence or prevalence of all forms of conjunctivitis, this condition has been cited as one of the most frequent causes of patient self-referral.[5] Conjunctivitis infrequently causes permanent visual loss or structural damage, but the economic impact of the disease in terms of lost work time, cost of medical visits, diagnostic testing, and medication is considerable.[6,7]

RISK FACTORS

The risk factors for developing conjunctivitis depend on the etiology. The associated and predisposing factors for the types of conjunctivitis that are most common or most important to treat are listed in Table 1. Symptoms may be exacerbated by the coexistence of blepharitis, dry eye, or other causes of ocular surface inflammation.

TABLE 1 **ASSOCIATED/PREDISPOSING FACTORS FOR CONJUNCTIVITIS**

Type of Conjunctivitis	Associated/Predisposing Factors
Allergic	
Seasonal	Environmental allergens
Vernal	Hot, dry environments such as West Africa; parts of India, Mexico, Central, North, and South America; and the Mediterranean area Environmental allergens for acute exacerbations
Atopic	Genetic predisposition to atopy Environmental allergens and irritants for acute exacerbations
Giant papillary conjunctivitis (GPC)	Contact lens wear. (Risk factors include soft contact lenses, infrequent lens replacement, prolonged wearing time, poor lens hygiene, allergenic contact lens solutions, high water content or poor contact lenses fit.) Also occurs with irritation from exposed sutures and prostheses.
Mechanical/Irritative/Toxic	
Superior limbic keratoconjunctivitis (SLK)	Frequently associated with dysthyroid states, female gender
Contact lens-related keratoconjunctivitis	Occurs in association with contact lens wear as reaction to mechanical irritation, chronic hypoxia, or preservatives
Floppy eyelid syndrome	Obesity, sleep apnea, upper eyelid laxity, upper eyelid excursion over lower eyelid (eyelid imbrication)
Pediculosis palpebrarum *(Pthirus pubis)*	Typically sexually transmitted. May have associated pubic lice or other sexually transmitted diseases. In children, may be an indication of sexual abuse.
Medication-induced keratoconjunctivitis	Glaucoma medications, antibiotics, antivirals, others; may be associated with preservatives in all eye medications. Most common with multiple eye medications and/or frequent dosing.
Viral	
Adenoviral	Exposure to infected individual (especially in school setting), recent ocular testing, concurrent upper respiratory infection
Herpes simplex virus (HSV)	Prior infection with HSV: trigger for reactivation such as stress, other acute viral or febrile illnesses, ultraviolet exposure, or trauma Primary HSV infection: exposure to infected individual
Varicella (herpes) zoster virus (VZV)	Acute chicken pox, exposure to an individual with active chicken pox or recurrent VZV (shingles)
Molluscum contagiosum	Predominantly older children and young adults. Immunocompromised state (e.g., human immunodeficiency virus) may predispose to multiple and/or large molluscum lesions
Bacterial	
Neonate	Vaginal delivery by infected mother. Inadequate prenatal care.
Infant	Nasolacrimal duct obstruction, concomitant bacterial otitis media or pharyngitis, exposure to infected individual
Child	Contact with infected individual; concomitant bacterial otitis media, sinusitis, or pharyngitis; nasopharyngeal bacterial colonization; oculogenital spread with sexual abuse
Adult	Contact with infected individual, oculogenital spread, infection or abnormality of adnexal structure, lid malposition, severe tear deficiency, immunosuppression, trauma
Chlamydial	Oculogenital spread or other intimate contact with infected individual; neonates by vaginal delivery in infected mothers
Immune-mediated	
Ocular mucous membrane pemphigoid (OMMP)	Unknown (genetic predisposition may exist) Topical drugs may produce OMMP-like disease, with spectrum of severity ranging from self-limited to progressive disease indistinguishable from OMMP. Associated drugs include pilocarpine and timolol. Cicatrizing conjunctivitis appearing similar to OMMP can be associated with other disorders including atopic disease and underlying neoplasms, such as paraneoplastic pemphigus and paraneoplastic lichen planus.[8,9]
Graft-versus-host disease (GVHD)	Patients who have undergone allogeneic stem cell transplantation
Neoplastic	
Sebaceous gland carcinoma	Unknown (rarely follows radiation therapy)

NATURAL HISTORY

The natural history of each type of conjunctivitis depends on its etiology. Table 2 lists the natural history for the types of conjunctivitis that are most common or most important to treat.

TABLE 2 NATURAL HISTORY OF CONJUNCTIVITIS

Type of Conjunctivitis	Natural History	Potential Sequelae
Allergic		
Seasonal	Recurrent	Minimal, local
Vernal	Onset in childhood; chronic course with acute exacerbations during spring and summer. Gradual decrease in activity within 2 to 30 years.	Eyelid thickening; ptosis; conjunctival scarring; corneal neovascularization, thinning, ulceration, infection; visual loss; keratoconus
Atopic	Onset in childhood; chronic course with acute exacerbations	Eyelid thickening or tightening, loss of lashes; conjunctival scarring; corneal scarring, neovascularization, thinning, keratoconus, infection, ulceration; cataract; visual loss
Giant papillary conjunctivitis (GPC)	Chronic gradual increase in symptoms and signs with contact lens wear, exposed corneal or scleral sutures, ocular prosthesis	Ptosis
Mechanical/Irritative/Toxic		
Superior limbic keratoconjunctivitis (SLK)	Subacute onset of symptoms, usually bilateral. May wax and wane for years.	Superior conjunctival keratinization, pannus, filamentary keratitis
Contact lens-related keratoconjunctivitis	Subacute to acute onset of symptoms. May take months or longer to resolve.	Superior epitheliopathy and corneal scarring; may progress centrally into the visual axis
Floppy eyelid syndrome	Chronic ocular irritation caused by nocturnal eyelid ectropion causing upper tarsal conjunctiva to come in contact with bedding	Punctate epithelial keratitis; corneal neovascularization, ulceration, and scarring; keratoconus
Pediculosis palpebrarum *(Pthirus pubis)*	Blepharitis and conjunctivitis persists until treated	Chronic blepharitis, conjunctivitis, and rarely, marginal keratitis
Medication-induced keratoconjunctivitis	Gradual worsening with continued use	Corneal epithelial erosion, persistent epithelial defect, corneal ulceration, pannus, corneal and conjunctival scarring
Viral		
Adenoviral	Self-limited, with improvement of symptoms and signs within 5–14 days	Mild cases: none. Severe cases: conjunctival scarring, symblepharon, and subepithelial corneal infiltrates.
Herpes simplex virus (HSV)	Usually subsides without treatment within 4–7 days unless complications occur	Epithelial keratitis, stromal keratitis, neovascularization, scarring, thinning, perforation, uveitis, trabeculitis
Varicella (herpes) zoster (VZV)	Primary infection (chicken pox), as well as conjunctivitis from recurrent infection, usually subsides in a few days. Vesicles can form at the limbus, especially in primary infection. The conjunctivitis is generally papillary in nature.	Necrosis and scarring from vesicles on the eyelid margins, conjunctiva, and in the corneal stroma in primary disease in children. Conjunctival scarring from secondary infection can lead to cicatricial ectropion. In recurrent disease, keratitis of the epithelium or stroma and late corneal anesthesia or dry eye.
Molluscum contagiosum	Conjunctivitis is associated with eyelid lesions, which can spontaneously resolve or persist for months to years	Conjunctival scarring, epithelial keratitis, pannus; less commonly subepithelial infiltrates/haze/scar, occlusion of the puncta, follicular conjunctivitis

TABLE 2 NATURAL HISTORY OF CONJUNCTIVITIS (CONTINUED)

Type of Conjunctivitis	Natural History	Potential Sequelae
Bacterial		
Nongonococcal	Mild: self-limited in adults. May progress to complications in children.	Rare, but possibly corneal infection, preseptal cellulitis
	Severe: may persist without treatment, rarely hyperacute	Corneal infection; may be associated with pharyngitis, otitis media, meningitis
Gonococcal		
Neonate	Manifests within 1–7 days after birth, later if a topical antibiotic was used. Rapid evolution to severe, purulent conjunctivitis.	Corneal infection, corneal scarring, corneal perforation, septicemia with arthritis, meningitis
Adult	Rapid development of severe hyperpurulent conjunctivitis	Corneal infection, corneal scarring, corneal perforation, urethritis, pelvic inflammatory disease, septicemia, arthritis
Chlamydial		
Neonate	Manifests 5–19 days following birth, earlier if placental membranes have ruptured prior to delivery. Untreated cases may persist for 3–12 months.	Corneal scarring, conjunctival scarring; up to 50% have associated nasopharyngeal, genital, or pulmonary infection
Adult	May persist if untreated	Corneal scarring, neovascularization, conjunctival scarring, urethritis, salpingitis, endometritis, perihepatitis, follicular conjunctivitis
Immune-mediated		
Ocular mucous membrane pemphigoid (OMMP)	Onset generally over age 60. Slowly progressive chronic course, sometimes with remissions and exacerbations.	Conjunctival scarring and shrinkage; symblepharon; trichiasis; corneal scarring, neovascularization, ulceration; ocular surface keratinization; bacterial conjunctivitis; cicatricial lid changes; severe tear deficiency; severe vision loss
Graft-versus-host disease (GVHD)	Can involve multiple tissues including skin, liver, gastrointestinal system, lung, and eye. GVHD may follow acutely within the first 3 months following hematopoietic stem cell transplantation, but ocular disease is more common in the chronic phase.	Conjunctivitis; subconjunctival fibrosis; symblepharon; lacrimal gland involvement; keratoconjunctivitis sicca; cicatricial lid disease. Less commonly limbal stem cell deficiency, corneal scarring, or intraocular involvement.
Neoplastic		
Sebaceous gland carcinoma	Occurs in fifth to ninth decades of life with fairly rapid progression[10]	Orbital invasion, metastases

EARLY DETECTION AND PREVENTION

The most important reason for early detection of conjunctivitis is that prompt, appropriate treatment, available for most types of conjunctivitis, speeds resolution of the disease, minimizing both the sequelae of untreated conjunctivitis and time away from work or school. Early detection of conjunctivitis is also important because conjunctivitis can herald serious systemic disease. For example, some types of neonatal conjunctivitis are associated with pneumonia, otitis media, or Kawasaki disease. In adults, conjunctivitis caused by OMMP, GVHD, gonococcus, and *Chlamydia* is important to detect early because it is necessary to treat the concomitant systemic disorder. Diagnosis of SLK may lead to further investigations that reveal a thyroid disorder. Early detection of conjunctivitis associated with neoplasms may be lifesaving.

Individuals can protect against some chemical and toxin exposures with adequate eye protection. Contact lens wearers can be instructed in appropriate lens care and frequent lens replacement to reduce the risk or severity of GPC.

Infectious conjunctivitis in neonates can be prevented by prenatal screening and treatment of the expectant mother and prophylactic treatment of the infant at birth. Single-use tubes of ophthalmic ointment containing 0.5% erythromycin is used as the standard prophylactic agent to prevent ophthalmia neonatorum.[11] Povidone-iodine solution 2.5% has been suggested as an alternative to antibiotic ointments for the prevention of neonatal conjunctivitis,[12,13] but may be less effective and more toxic to the ocular surface.[14]

The ophthalmologist plays a critical role in breaking the chain of transmission of epidemic adenoviral conjunctivitis, primarily by educating the patient and family about proper hygiene. Infected individuals should be counseled to wash hands frequently and use separate towels, and to avoid close contact with others during the period of contagion. Avoiding contact with others is especially important for individuals in professions with high potential for transmission, such as health care workers and child care providers. While the exact length of the period of infectivity is variable, many consider 7 days from the onset of symptoms as the contagious period, because the recovery of virus from infected cases drops off after 7 days of infection.[15] However, other studies have suggested that patients should be considered potentially contagious for at least 10 to 14 days.[16,17]

Health care facilities have occasionally been associated with epidemic outbreaks of adenoviral keratoconjunctivitis.[16-19] To avoid cross-contamination, multiple-dose eyedrop containers should be discarded when inadvertent contact with the ocular surface occurs.[20] Hand-washing procedures with antimicrobial soap and water[21] and disinfecting ophthalmic equipment may reduce the risk of transmission of viral infection, as the virus can remain infectious in a desiccated state on surfaces for up to 28 days.[22,23] Exposed surfaces on equipment can be decontaminated by wiping with sodium hypochlorite (a 1:10 dilution of household chlorine bleach) or other appropriate disinfectants.[20,21,24] Disinfecting agents recommended for routine decontamination of tonometer tips include 70% ethyl alcohol and sodium hypochlorite (a 1:10 dilution of household chlorine bleach), but there is no consensus on the best method. The Centers for Disease Control and Prevention suggest that tonometer tips be wiped clean, and then disinfected by immersing for 5 to 10 minutes in either 70% ethyl ethanol or 1:10 sodium hypochlorite.[25] After disinfection, the tonometer should be thoroughly rinsed in tap water and air dried before use.[25] The common practice of wiping the tonometer tip with a 70% isopropyl alcohol wipe does not provide adequate disinfection for a patient with adenoviral keratoconjunctivitis.[21,26] Any disinfecting agent can result in iatrogenic corneal de-epithelialization and haze if not properly removed from the tonometer tip before use by thorough rinsing in tap water and air drying. Disinfecting agents can also cause damage to the tonometer tip. After examining a patient with known or suspected adenoviral keratoconjunctivitis, it may be prudent to disinfect the tonometer tip with 70% ethyl alcohol or a 5-minute soak of 1:10 sodium hypochlorite, which have been shown to be effective against adenovirus.[21] Though not in wide use, disposable tonometer tips can also be considered to eliminate cross infections.[26] Intraocular pressure, alternatively, can be checked with a Tono-Pen (Reichert, Inc., Depew, NY) with a disposable coverlet. Despite the use of reasonable measures, it may not be possible to prevent all transmission of viral infection.

CARE PROCESS

PATIENT OUTCOME CRITERIA

Outcome criteria for treating conjunctivitis include the following:

- Eliminating or reducing signs and symptoms of conjunctivitis
- Restoring or maintaining normal visual function
- Detecting and treating the underlying systemic disease process when applicable

DIAGNOSIS

All patients should have a comprehensive medical eye evaluation at the recommended intervals.[27,28 [A:III]] The initial evaluation of a patient should include the relevant aspects of the comprehensive medical eye evaluation,[27,28 [A:III]] but some elements of the evaluation may be deferred in patients with symptoms and signs suggestive of infectious conjunctivitis.

History

Questions about the following elements of the patient history may elicit helpful information:

- Symptoms and signs:[A:III] e.g., itching, discharge, irritation, pain, photophobia, blurred vision
- Duration of symptoms[A:III]
- Exacerbating factors[A:III]
- Unilateral or bilateral presentation[A:III]
- Character of discharge[A:III]
- Recent exposure to an infected individual[A:III]
- Trauma:[A:III] mechanical, chemical, ultraviolet
- Contact lens wear:[A:III] lens type, hygiene and use regimen
- Symptoms and signs potentially related to systemic diseases:[A:III] e.g., genitourinary discharge, dysuria, upper respiratory infection, skin and mucosal lesions
- Allergy, asthma, eczema[A:III]
- Use of topical and systemic medications[A:III]

The ocular history includes details about previous episodes of conjunctivitis[A:III] and previous ophthalmic surgery.[B:III]

The medical history takes into account the following:

- Compromised immune status:[B:III] e.g., human immunodeficiency virus, chemotherapy, immunosuppressants
- Current or prior systemic diseases:[B:III] e.g., atopy, Stevens-Johnson syndrome, carcinoma, leukemia, chicken pox

The social history incorporates pertinent information about the patient's lifestyle, which may include smoking habits,[C:III] occupation and hobbies,[C:III] travel,[C:III] and sexual activity.[C:III]

Examination

The initial eye examination includes measurement of visual acuity,[A:III] an external examination,[A:III] and slit-lamp biomicroscopy.[A:III] The typical clinical signs for the types of conjunctivitis that are most common or most important to treat are listed in Table 3.

The external examination should include the following elements:

- Regional lymphadenopathy,[29 [A:III]] particularly preauricular
- Skin:[A:III] signs of rosacea, eczema, seborrhea
- Abnormalities of the eyelids and adnexae:[A:III] swelling, discoloration, malposition, laxity, ulceration, nodules, ecchymosis, neoplasia
- Conjunctiva:[A:III] pattern of injection, subconjunctival hemorrhage, chemosis, cicatricial change, symblepharon, masses, discharge

The slit-lamp biomicroscopy should include careful evaluation of the following:

- Eyelid margins:[A:III] inflammation, ulceration, discharge, nodules or vesicles, blood-tinged debris, keratinization
- Eyelashes:[A:III] loss of lashes, crusting, scurf, nits, lice
- Lacrimal puncta and canaliculi:[B:III] pouting, discharge
- Tarsal and forniceal conjunctiva:[30,31 [A:III]]
  - Presence and size of papillae, follicles
  - Cicatricial changes, including foreshortening and symblepharon
  - Membranes and pseudomembranes
  - Ulceration
  - Hemorrhages

    - Foreign material
    - Masses
    - Lid laxity
- Bulbar conjunctiva/limbus:[30,31 [A:III]] follicles, edema, nodules, chemosis, laxity, papillae, ulceration, scarring, phlyctenules, hemorrhages, foreign material, keratinization
- Cornea:[31 [A:III]]
    - Epithelial defects
    - Punctate keratopathy and dendritic keratitis
    - Filaments
    - Ulceration
    - Infiltration, including subepithelial infiltrates and phlyctenules
    - Vascularization
    - Keratic precipitates
- Anterior chamber/iris:[[A:III]] inflammatory reaction, synechiae, transillumination defects
- Dye-staining pattern:[[A:III]] conjunctiva and cornea (see Appendix 3)

Diagnostic Tests

Most cases of conjunctivitis can be diagnosed on the basis of history and examination. However, in some cases additional diagnostic tests are helpful.

Cultures

Cultures of the conjunctiva are indicated in all cases of suspected infectious neonatal conjunctivitis.[32 [A:I]] Bacterial cultures also may be helpful for recurrent or severe purulent conjunctivitis in any age group and in cases where the conjunctivitis has not responded to medication.

Viral Diagnostic Tests

Viral cultures are not routinely used to establish a diagnosis. A rapid, in-office immunodiagnostic test using antigen detection is available for adenovirus conjunctivitis. In a study of 186 patients with acute conjunctivitis, this test had a sensitivity of 88% to 89% and a specificity of 91% to 94%.[33] Immunodiagnostic tests may be available for other viruses, but these are not validated for ocular specimens. Polymerase chain reaction (PCR) may be used to detect viral deoxyribonucleic acid. Availability will vary depending on laboratory policy.

Chlamydial Diagnostic Tests

Suspected cases of adult and neonatal chlamydial conjunctivitis can be confirmed by laboratory testing.[34,35] Immunologically based diagnostic tests are available, including a direct immunofluorescent antibody test and enzyme-linked immunosorbent assay.[35,36] These tests have been largely supplanted by PCR for genital specimens, and, therefore, their availability for conjunctival specimens is more limited. The availability of PCR for testing ocular samples varies. Although specimens from the eye have been used with satisfactory performance,[37-39] these applications have not been cleared by the Food and Drug Administration (FDA).[35]

Smears/Cytology

Smears for cytology and special stains (e.g., gram, giemsa) are recommended in cases of suspected infectious neonatal conjunctivitis, chronic or recurrent conjunctivitis, and in cases of suspected gonococcal conjunctivitis in any age group.[10,32 [A:II]]

Biopsy

Conjunctival biopsy may be helpful in cases of conjunctivitis unresponsive to therapy. Because such eyes may harbor a neoplasm, directed biopsy may be both vision-saving and lifesaving.[40] Conjunctival biopsy and immunofluorescent staining diagnostic tests may be helpful to establish the diagnosis of diseases such as OMMP and paraneoplastic syndromes.[41,42] A biopsy of bulbar conjunctiva should be performed and a sample should be taken from an uninvolved area adjacent to the limbus in an eye with active inflammation when OMMP is suspected.[41 [A:III]] In cases of

suspected sebaceous gland carcinoma, a full-thickness lid biopsy is indicated.[43 [A:II]] When considering a biopsy, a preoperative consultation with the pathologist is advised to ensure proper handling and staining of specimens.

Confocal Microscopy

Confocal microscopy may be helpful as a non-invasive tool to evaluate some forms of conjunctivitis (e.g., atopic, SLK).[44,45]

Blood Tests

Thyroid function tests are indicated for patients with SLK who do not have known thyroid disease.[46]

TABLE 3 TYPICAL CLINICAL SIGNS OF CONJUNCTIVITIS

Type of Conjunctivitis	Clinical Signs
Allergic	
Seasonal	Bilateral. Conjunctival injection, chemosis, watery discharge, mild mucous discharge.
Vernal	Bilateral. Giant papillary hypertrophy of superior tarsal conjunctiva, bulbar conjunctival injection, conjunctival scarring, watery and mucoid discharge, limbal Trantas dots, limbal "papillae", corneal epithelial erosions, corneal neovascularization and scarring, corneal vernal plaque/shield ulcer.
Atopic	Bilateral. Eczematoid blepharitis; eyelid thickening, scarring; lash loss; papillary hypertrophy of superior and inferior tarsal conjunctiva; conjunctival scarring; watery or mucoid discharge; boggy edema; corneal neovascularization, ulcers and scarring; punctate epithelial keratitis; keratoconus; subcapsular cataract.
Giant papillary conjunctivitis (GPC)	Laterality associated with contact lens wear pattern. Papillary hypertrophy of superior tarsal conjunctiva, mucoid discharge. Papillae with white fibrotic centers can be seen in patients with long-standing disease. In severe cases: lid swelling, ptosis.
Mechanical/Irritative/Toxic	
Superior limbic keratoconjunctivitis (SLK)	Bilateral superior bulbar injection, laxity, edema, and keratinization. Superior corneal punctate epitheliopathy and filaments.
Contact lens-related keratoconjunctivitis	Ranges from mild to diffuse conjunctival injection, focal or diffuse corneal neovascularization, peripheral or circumferential corneal neovascularization, focal or diffuse superficial punctate keratopathy. Papillary hypertrophy of tarsal conjunctivitis is variable.
Floppy eyelid syndrome	Upper eyelid edema; upper eyelid easily everted, sometimes by simple elevation or lifting of lid; diffuse papillary reaction of superior tarsal conjunctiva; punctate epithelial keratopathy; pannus. Bilateral often asymmetric.
Pediculosis palpebrarum *(Pthirus pubis)*	Unilateral or bilateral follicular conjunctivitis. Adult lice at the base of the eyelashes, nits (eggs) adherent to the eyelash shafts, blood-tinged debris on the eyelashes and eyelids.
Medication-induced keratoconjunctivitis	Laterality based on drug use. Conjunctival injection, inferior fornix conjunctival follicles. Distinctive signs: contact dermatitis of eyelids with erythema, scaling in some cases.
Viral	
Adenoviral	Abrupt onset. Unilateral or bilateral (often sequentially bilateral). Varies in severity. Bulbar conjunctival injection, watery discharge, follicular reaction of inferior tarsal conjunctiva, chemosis, eyelid swelling. Distinctive signs: preauricular lymphadenopathy, petechial and subconjunctival hemorrhage, corneal epithelial defect, multifocal epithelial punctate keratitis evolving to anterior stromal keratitis, membrane/pseudomembrane formation, eyelid ecchymosis
Herpes simplex virus (HSV)	Unilateral. Bulbar conjunctival injection, watery discharge, mild follicular reaction of conjunctiva. May have palpable preauricular node. Distinctive signs: vesicular rash or ulceration of eyelids, pleomorphic or dendritic epithelial keratitis of cornea or conjunctiva

TABLE 3 TYPICAL CLINICAL SIGNS OF CONJUNCTIVITIS (CONTINUED)

Type of Conjunctivitis	Clinical Signs
Viral (continued)	
Varicella (herpes) zoster virus (VZV)	Unilateral or bilateral. Bulbar conjunctival injection, watery discharge, mild follicular reaction of conjunctiva. May have palpable preauricular node. Typically punctate keratitis in primary disease; punctate or dendritic keratitis in recurrent disease. Distinctive signs: vesicular rash or ulceration of eyelids, pleomorphic or dendritic epithelial keratitis of cornea or conjunctiva
Molluscum contagiosum	Typically unilateral but can be bilateral. Mild to severe follicular reaction, punctate epithelial keratitis. May have corneal pannus, especially if longstanding. Distinctive signs: single or multiple shiny, dome-shaped umbilicated lesion(s) of the eyelid skin or margin
Bacterial	
Nongonococcal	Unilateral or bilateral. Bulbar conjunctival injection, purulent or mucopurulent discharge.
Gonococcal	Unilateral or bilateral. Marked eyelid edema, marked bulbar conjunctival injection, marked purulent discharge, preauricular lymphadenopathy. Important sign to detect: corneal infiltrate or ulcer, which often begins superiorly
Chlamydial	
Neonate/Infant	Unilateral or bilateral. Eyelid edema, bulbar conjunctival injection, discharge may be purulent or mucopurulent, no follicles.
Adult	Unilateral or bilateral. Bulbar conjunctival injection, follicular reaction of tarsal conjunctiva, mucoid discharge, corneal pannus, punctate epithelial keratitis, preauricular lymphadenopathy. Distinctive sign: bulbar conjunctival follicles
Immune-mediated	
Ocular mucous membrane pemphigoid (OMMP)	Bilateral. Bulbar conjunctival injection, papillary conjunctivitis, conjunctival subepithelial fibrosis and keratinization, conjunctival scarring beginning in the fornices, punctal stenosis and keratinization, progressive conjunctival shrinkage, symblepharon, entropion, trichiasis, corneal ulcers, neovascularization, and scarring.
Graft-versus-host disease (GVHD)	Bilateral. Conjunctival injection, chemosis, pseudomembranous conjunctivitis, keratoconjunctivitis sicca, superior limbic keratoconjunctivitis, cicatricial eyelid disease, episcleritis, corneal epithelial sloughing, limbal stem cell failure, calcareous corneal degeneration; rare intraocular involvement.
Neoplastic	
Sebaceous gland carcinoma	Unilateral. Intense bulbar conjunctival injection, conjunctival scarring. May have a mucopurulent discharge. Corneal epithelial invasion may occur. Eyelids may exhibit a hard nodular, nonmobile mass of the tarsal plate with yellowish discoloration; may appear as a subconjunctival, multilobulated yellow mass, may resemble a chalazion

NOTE: Typical clinical signs may not be present in all cases. Distinctive signs are most useful in making a clinical diagnosis but may occur uncommonly. In all entities, laterality may vary and may be asymmetrical.

TREATMENT

Treatment of conjunctivitis is ideally directed at the root cause. Indiscriminate use of topical antibiotics or corticosteroids should be avoided, because antibiotics can induce toxicity and corticosteroids can potentially prolong adenoviral infections and worsen herpes simplex virus infections. Treatment methods are described for the most common types of conjunctivitis and for those types that are particularly important to treat.

Seasonal Allergic Conjunctivitis

Mild allergic conjunctivitis can be treated with an over-the-counter antihistamine/vasoconstrictor agent or with the more effective second-generation topical histamine H_1-receptor antagonists.[47] [A:I] Newer topical medications are more efficacious and better tolerated.[48] If the condition is frequently recurrent or persistent, mast-cell stabilizers can be utilized.[47] [A:I] Many new medications combine

antihistamine activity with mast-cell stabilizing properties and can be utilized for either acute or chronic disease.[48-53] If the symptoms are not adequately controlled, a brief course (1 to 2 weeks) of low-potency topical corticosteroid can be added to the regimen. The lowest potency and frequency of corticosteroid administration that relieves the patient's symptoms should be used.[A:III] A nonsteroidal anti-inflammatory agent (ketorolac) has also been FDA-approved for the treatment of allergic conjunctivitis.[54] Table 4 lists topical medications that can be used. Additional measures include using artificial tears, which dilute allergens and treat co-existing tear deficiency; cool compresses; oral antihistamines, and allergen avoidance. Frequent clothes washing and bathing/showering before bedtime may also be helpful.[B:III]

Consultation with an allergist or dermatologist may be helpful for patients with disease that cannot be adequately controlled with topical medications and oral antihistamines.

The use of topical mast cell inhibitors can also be helpful in alleviating the symptoms of allergic rhinitis.[55] Intranasal corticosteroid therapy, however, is not effective for the treatment of seasonal allergic conjunctivitis.[56]

TABLE 4 **TOPICAL MEDICATIONS FOR SEASONAL ALLERGIC CONJUNCTIVITIS**

Generic Name	Trade Name	Class	Typical Daily Dose
Azelastine HCl	Optivar Available generically	H_1-Antagonist/Mast-cell inhibitor	2
Bepotastine besilate	Bepreve	H_1-Antagonist/Mast-cell inhibitor	2
Cromolyn sodium	Crolom Available generically	Mast-cell inhibitor	4–6
Emedastine difumarate	Emadine	H_1-Antagonist	4
Epinastine HCl	Elestat	H_1- and H_2-Antagonist/Mast-cell inhibitor	2
Ketoralac tromethamine	Acular, Acular LS, Acular PF	NSAID	4
Ketotifen fumarate	Alaway, Zaditor (OTC)	H_1-Antagonist/Mast-cell inhibitor	2
Lodoxamide tromethamine	Alomide	Mast-cell inhibitor	4
Loteprednol etabonate	Alrex	Corticosteroid	4
Naphazoline/antazoline	Vasocon-A (OTC)	Antihistamine/decongestant	4
Naphazoline/pheniramine	Naphcon-A (OTC) Opcon-A (OTC) Visine-A (OTC)	Antihistamine/decongestant	4
Nedocromil sodium	Alocril	Mast-cell inhibitor	2
Olopatadine HCl 0.1%	Patanol	H_1-Antagonist/Mast-cell inhibitor	2
Olopatadine HCl 0.2%	Pataday	H_1-Antagonist/Mast-cell inhibitor	1
Pemirolast potassium	Alamast	Mast-cell inhibitor	4

OTC = over the counter

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Frequency of follow-up visits is based on the severity of disease presentation, etiology, and treatment. A follow-up visit should include an interval history, measurement of visual acuity, and slit-lamp biomicroscopy.[A:III] If corticosteroids are used in chronic or recurrent conjunctivitis, baseline and periodic measurement of intraocular pressure and pupillary dilation should be performed to evaluate for cataract and glaucoma.[A:III]

Vernal/Atopic Conjunctivitis

General treatment measures include modifying the environment to minimize exposure to allergens or irritants, and using cool compresses and ocular lubricants. Topical and oral antihistamines and topical mast-cell stabilizers can be useful to maintain comfort.

For acute exacerbations of vernal/atopic conjunctivitis, topical corticosteroids are usually necessary to control severe symptoms and signs.[57] The minimal amount of corticosteroid should be used based on patient response and tolerance.[A:III] Topical cyclosporine 2% is effective as adjunctive therapy to reduce the amount of topical corticosteroid used to treat severe atopic keratoconjunctivitis.[58-60] In a randomized controlled trial of 22 patients who were followed for 4 weeks, patients treated with cyclosporine 0.05% had fewer signs and symptoms than patients using artificial tears.[61] A Japanese study evaluated cyclosporine 0.1% ophthalmic solution and found that 30% of topical corticosteroid users were able to discontinue their use when using adjunctive topical cyclosporine 0.1%.[62] For entities such as vernal keratoconjunctivitis, which may require repeat short-term therapy with topical corticosteroid, patients should be informed about potential complications of corticosteroid therapy and general strategies to minimize corticosteroid use should be discussed.[A:III]

For severe sight-threatening atopic keratoconjunctivitis that is not responsive to topical therapy, systemic immunosuppression may be warranted rarely. In patients 2 years old or older, eyelid involvement can be treated with pimecrolimus cream 1% or topical tacrolimus ointment applied to the affected eyelid skin.[63-66] Tacrolimus ointment 0.03% is used for children 2 years to 15 years old; either 0.03% or 0.1% is used for patients 16 years and older. A randomized, placebo controlled clinical trial of topical tacrolimus 0.1% showed efficacy in patients who had failed therapy with topical corticosteroids and topical antiallergy medications.[67]

Patients using these medications should be told to keep them away from the conjunctival and corneal surface and from the tear film.[63] [A:III] Both agents are rarely associated with development of skin cancer or lymphoma.[68,69]

Frequency of follow-up visits is based on the severity of disease presentation, etiology, and treatment. Consultation with a dermatologist is often helpful. A follow-up visit should include an interval history, measurement of visual acuity, and slit-lamp biomicroscopy.[A:III] If corticosteroids are prescribed, baseline and periodic measurement of intraocular pressure and pupillary dilation should be performed to evaluate for glaucoma and cataract.[A:III] Discussion of treatment of complications such as corneal plaques and ulceration is beyond the scope of this document.

Giant Papillary Conjunctivitis

The treatment of GPC generally involves modifying the causative entity. Protruding suture knots can be treated by removing, moving, or replacing the sutures, rotating the knots, or using a therapeutic contact lens. However, long-term use of therapeutic contact lenses may be associated with an increased risk of microbial keratitis. Ocular prostheses that cause GPC can be cleaned, polished, or replaced. Mild contact lens-related GPC may respond to replacing lenses more frequently, decreasing contact lens wearing time, increasing the frequency of enzyme treatment, using preservative-free lens care systems, administering mast-cell stabilizing agents,[70] refitting contact lenses, switching to disposable lenses (recommending daily-wear disposables), and/or changing the contact lens polymer. Associated abnormalities such as aqueous tear deficiency and meibomian gland dysfunction should be treated.[A:III] For patients with moderate or severe GPC, discontinuation of contact lens wear for several weeks to months and a brief course of topical corticosteroid treatment may also rarely be necessary. If corticosteroids are used for conjunctivitis, baseline and periodic measurement of intraocular pressure and pupillary dilation should be performed to evaluate for cataract and glaucoma.[A:III]

Frequency of follow-up visits is based on the severity of disease and treatment used. At the follow-up visit, an interval history, measurement of visual acuity, and slit-lamp biomicroscopy should be performed.[A:III]

Superior Limbic Keratoconjunctivitis

Mild cases of SLK may respond to treatment of concomitant dry eye with lubricants, mast-cell stabilizers, cyclosporine,[71] soft contact lenses, and/or punctal occlusion; however, the response may be temporary. Filamentary keratopathy may occasionally respond to topical 10% acetylcysteine.[72]

Persistent symptoms may necessitate surgical intervention such as cautery (chemical or thermal) to tighten redundant conjunctiva or conjunctival resection.[73] Up to 65% of patients with SLK may have underlying thyroid dysfunction, and many of these have associated ophthalmopathy.[74] An underlying thyroid disorder should be investigated by means of thyroid function tests.[46,74] [A:III] Because SLK may persist with exacerbations over a period of years, treatment and frequency of follow-up are driven by the patient's symptoms. Patients should be informed that this is a chronic and recurrent condition that rarely can decrease vision.[A:III]

Contact Lens-Related Keratoconjunctivitis

In cases of contact lens-related keratoconjunctivitis, contact lens wear should be discontinued for 2 or more weeks.[A:III] A brief (1 to 2 weeks) course of topical corticosteroid may be prescribed. At the follow-up evaluation, the contact lens fit and lens care regimen should be reviewed (e.g., nonpreserved lens-care systems, daily disposable contact lenses) and consideration given to alternatives to contact lenses (e.g., refractive surgery) once the keratoconjunctivitis has resolved.[A:III]

Floppy Eyelid Syndrome

Temporary relief of floppy eyelid syndrome is afforded by taping the patient's eyelids shut or by having the patient wear a protective shield while sleeping.[75,76] Lubricants may help in managing mild cases. Definitive therapy involves surgical procedures such as full-thickness horizontal shortening of the upper eyelid to prevent the upper eyelid from everting.[77] Follow-up depends on the patient's clinical course. Floppy eyelid syndrome has been associated with keratoconus and sleep apnea,[78,79] and referral for evaluation of sleep apnea should be considered.[80] [A:III]

Pediculosis Palpebrarum *(Pthirus pubis)*

Jeweler's forceps can be used to mechanically remove the adult lice and nits (eggs) from the eyelids and eyelashes. Adherent nits may require epilation of the involved lashes. A bland ophthalmic ointment (e.g., petrolatum, erythromycin, bacitracin) applied 2 to 3 times a day for 10 days will smother the adult lice and nits. Patients and close contacts should be advised to use antilice lotion and shampoo for nonocular areas and to wash and dry clothing and bedding thoroughly (using the highest temperature of the dryer for 30 minutes). Patients and sexual contacts should be informed about the possibility of concomitant disease and should be referred appropriately.[A:III] Sexual abuse should be considered in children with this condition.

Medication-Induced Keratoconjunctivitis

Discontinuation of the agent responsible for medication-induced keratoconjunctivitis results in resolution over a period of weeks to months. If severe inflammation of the conjunctiva or eyelid is present, a brief course of topical corticosteroid is indicated. Nonpreserved artificial tears may be beneficial.

Adenoviral Conjunctivitis

Patients with adenoviral conjunctivitis need to understand that the condition is highly contagious and should be informed of appropriate measures to reduce the risk of spreading the infection to their other eye or to other people.[B:III] Due to its ability to infect multiple members of a family or a classroom, this infection is often termed epidemic keratoconjunctivitis (EKC).

There is no effective treatment for adenovirus infection; however, artificial tears, topical antihistamines, or cold compresses may be used to mitigate symptoms. Available antiviral agents are not effective in treating adenoviral conjunctivitis.

Topical corticosteroids are helpful to reduce symptoms and may reduce scarring in severe cases of adenoviral keratoconjunctivitis with marked chemosis or lid swelling, epithelial sloughing, or membranous conjunctivitis. Close follow-up is warranted for patients with adenoviral conjunctivitis who are being treated with corticosteroids. In an animal model of adenoviral conjunctivitis, administration of topical corticosteroids led to prolonged viral shedding.[81] Patients who use topical corticosteroids should be instructed to maintain precautions against the spread of the virus for 2

additional weeks after symptoms resolve.[A:III] For patients with membranous conjunctivitis, debridement of the membrane can be considered to improve comfort.

Patients with severe disease who have corneal epithelial ulceration or membranous conjunctivitis should be re-evaluated within 1 week.[A:III] The follow-up visit should include an interval history, measurement of visual acuity, and slit-lamp biomicroscopy.[A:III] Patients who are prescribed prolonged topical corticosteroids should be monitored using periodic measurement of intraocular pressure and pupillary dilation to evaluate for glaucoma and cataract.[A:III] Topical corticosteroids should be tapered once inflammation is controlled.[A:III]

Patients who are not treated with topical corticosteroids should be instructed to return for follow-up if they continue to experience symptoms of red eye, pain, or decreased vision after 2 to 3 weeks.[A:III] This follow-up visit should include an interval history, measurement of visual acuity, and slit-lamp biomicroscopy.[A:III]

During follow-up, patients should be evaluated for the presence of corneal subepithelial infiltrates, which typically occur 1 or more weeks after the onset of conjunctivitis. Treatment of subepithelial infiltrates varies with the severity of the disease. In mild cases, observation is sufficient. In cases with blurring, photophobia, and decreased vision, topical corticosteroids at the minimum effective dose may be considered.

Patients who are being treated with topical corticosteroids should have the dosage slowly tapered to the minimum effective dose.[A:III] Corticosteroids with poor ocular penetration, including fluorometholone or site-specific corticosteroids such as rimexolone or loteprednol, may be less likely to result in elevated intraocular pressure or cataract formation. A follow-up examination should be conducted every 4 to 8 weeks, and visits should include an interval history, measurement of visual acuity and intraocular pressure, and slit-lamp biomicroscopy.[A:III] Recurrence of subepithelial infiltrates has been reported in patients with a history of adenoviral infection who have undergone photorefractive keratectomy or LASIK.[82,83]

Herpes Simplex Virus Conjunctivitis

Topical and/or oral antiviral treatment is recommended for HSV conjunctivitis to prevent corneal infection.[A:III] Possible options include topical ganciclovir 0.15% gel used 3 to 5 times per day,[84-87] trifluridine 1% solution 5 to 8 times per day or oral acyclovir 200 to 400 mg 5 times per day.[88] Oral valacyclovir (500 mg 2 or 3 times a day) and famciclovir (250 mg twice a day) also can be used.[89,90] Topical antiviral agents may cause toxicity if used for more than 2 weeks. Topical corticosteroids potentiate HSV infection and should be avoided.[A:III] Within 1 week of treatment patients should have a follow-up visit consisting of an interval history, visual acuity measurement, and slit-lamp biomicroscopy.[A:III] Neonates require prompt consultation with the pediatrician or primary care physician, because systemic HSV infection is a life-threatening condition.[91] [A:III]

Varicella (Herpes) Zoster Virus Conjunctivitis

Children with chicken pox may present with conjunctivitis that is generally papillary in nature[92] and sometimes associated with eyelid ulceration and/or limbal or conjunctival vesicles. Many clinicians treat such patients with topical antibiotics to prevent secondary infection, since the vesicles will undergo necrosis before healing. Severe conjunctival scarring from secondary bacterial infection can even lead to cicatricial ectropion.[92] Topical antivirals have not been shown to be helpful in treating VZV conjunctivitis. In rare cases, dendritic or stromal keratitis can occur. Recurrent cases of VZV conjunctivitis are generally also papillary, but they can be pseudomembranous or vesicular.[93] Varicella zoster virus conjunctivitis can be associated with other forms of intraocular disease including iritis, segmental iris atrophy, and secondary glaucoma.[94] When treatment seems justified for the immunocompetent patient, oral antivirals are recommended at a dose of 800 mg five times daily for 7 days for acyclovir, 1000 mg every 8 hours for 7 days for valacyclovir, or 500 mg three times daily for 7 days for famciclovir. Immunocompromised patients may need to be treated more aggressively. Caution is advised in patients with impaired renal clearance. Late sequelae include dry eye and corneal anesthesia with neurotrophic keratitis.[91]

Molluscum Contagiosum

Conjunctivitis and keratitis from molluscum contagiosum are due to viral shedding from the eyelid lesion(s) onto the surface of the eye. Molluscum lesions may spontaneously resolve, but they can also persist for months to years. Treatment to remove the lesions is indicated in symptomatic patients. Treatment options include incision and curettage (aggressive enough to cause bleeding), simple excision, excision and cautery, and cryotherapy. The conjunctivitis may require weeks to resolve after elimination of the lesion. In adults, large and multiple molluscum lesions with relatively little conjunctival inflammation may indicate an immunocompromised state.[95] Follow-up is not usually necessary unless the conjunctivitis persists.

Bacterial Conjunctivitis

Mild bacterial conjunctivitis may be self-limited and resolve spontaneously without specific treatment in immune-competent adults.[96] Use of topical antibacterial therapy is associated with earlier clinical and microbiological remission compared with placebo in days 2 to 5 of treatment.[96] These advantages persist over days 6 to 10, but the extent of benefit over placebo lessens over time.[96] The choice of antibiotic is usually empirical. Since a 5-to-7-day course of a broad-spectrum topical antibiotic is usually effective, the most convenient or least expensive option can be selected.

Severe bacterial conjunctivitis is characterized by copious purulent discharge, pain, and marked inflammation of the eye. Conjunctival cultures and slides for gram staining should be obtained if gonococcal infection is a possibility.[A:III] In these cases, the choice of antibiotic is guided by the results of laboratory tests. Methicillin-resistant *Staphylococcus aureus* (MRSA) has been isolated with increasing frequency from patients with bacterial conjunctivitis.[97,98] Increasing colonization of MRSA has been found in nursing home residents,[99] and the incidence of community-acquired MRSA infections also has risen.[100] Methicillin-resistant *S. aureus* organisms are resistant to many commercially available topical antibiotics.[97,98,101] Systemic antibiotic therapy is necessary to treat conjunctivitis due to *Neisseria gonorrhoeae* and *Chlamydia trachomatis* (see Table 5).[10 [A:II]] Topical therapy, while not necessary, is usually used. Saline lavage may promote comfort and more rapid resolution of inflammation in gonococcal conjunctivitis. If corneal involvement is present, the patient should also be treated topically as for bacterial keratitis (see Bacterial Keratitis Preferred Practice Pattern[102]).[A:III] Patients and sexual contacts should be informed about the possibility of concomitant disease and referred appropriately.[A:III] Sexual abuse should be considered in children with this condition.

Patients with gonococcal conjunctivitis should be seen daily until resolution of the conjunctivitis.[A:III] At each follow-up visit, an interval history, visual acuity measurement, and slit-lamp biomicroscopy should be performed.[A:III] For other types of bacterial conjunctivitis, patients should be asked to return for a visit in 3 to 4 days if they note no improvement.[A:III]

An epidemiologic study found that infants with conjunctivitis in the neonatal intensive care setting with low birth weight and/or low gestational age have an increased incidence of gram negative conjunctivitis, often resistant to gentamicin.[103]

Chlamydial Conjunctivitis

Table 5 contains recommendations for the treatment of chlamydial conjunctivitis. Because more than 50% of infants with chlamydial conjunctivitis may also be infected at other sites such as the nasopharynx, genital tract, or lungs, systemic therapy is indicated.[10 [A:II]] Empiric antibiotic therapy can be considered in patients with symptoms and signs highly suggestive of chlamydia (e.g., follicular conjunctivitis that persists for several weeks). There are no data to support the use of topical therapy in addition to systemic therapy. Since the incidence of treatment failure can be as high as 19%,[32] patients should be re-evaluated following treatment.[A:III] The follow-up visit should consist of an interval history, visual acuity measurement, and slit-lamp biomicroscopy.[A:III] Adult conjunctivitis usually responds to systemic therapy, and sexual contacts should be treated at the same time.[A:III] Patients and sexual contacts should be informed about the possibility of concomitant disease and should be referred appropriately.[A:III] Sexual abuse should be considered in children with this condition.

TABLE 5 **SYSTEMIC ANTIBIOTIC THERAPY FOR GONOCOCCAL AND CHLAMYDIAL CONJUNCTIVITIS**

Cause	Drug of Choice	Dosage
Adults		
Gonococcus*	Ceftriaxone	1 g IM, single dose
		Consider lavage of infected eyes with saline solution once
	For cephalosporin-allergic patients:	
	Spectinomycin†	2 g IM, single dose
Chlamydia‡	Azithromycin	1 g orally, single dose
	or	
	Doxycycline	100 mg orally twice a day for 7 days
Children§ (<18 years)		
Gonococcus		
Children who weigh <45 kg	Ceftriaxone	125 mg IM, single dose
	or	
	Spectinomycin‖	40 mg/kg (maximum dose 2 g) IM, single dose
Children who weigh ≥45 kg	Same treatment as adults	
Chlamydia		
Children who weigh <45 kg	Erythromycin base or ethylsuccinate	50 mg/kg/day orally divided into 4 doses daily for 14 days
Children who weigh ≥45 kg but are aged <8 years	Azithromycin	1 g orally, single dose
Children ≥8 years	Azithromycin	1 g orally, single dose
	or	
	Doxycycline	100 mg orally, twice daily for 7 days
Neonates		
Ophthalmia neonatorum caused by *N. gonorrhoeae*	Ceftriaxone	25-50 mg/kg intravenous or IM, single dose, not to exceed 125 mg
Chlamydia	Erythromycin base or ethylsuccinate	50 mg/kg/day orally divided into four doses daily for 14 days¶

* The Centers for Disease Control and Prevention (CDC) currently recommends that patients treated for gonococcal infection also be treated routinely with a regimen effective against uncomplicated genital *Chlamydia trachomatis* infection, because patients infected with *Neisseria gonorrhoeae* often are coinfected with *C. trachomatis*.

† Spectinomycin is not available in the United States; updated information from the CDC on the availability of spectinomycin will be available at www.cdc.gov/std/treatment. A single oral dose of azithromycin 2 g is effective against uncomplicated gonococcal infections, but the CDC does not recommend widespread use of azithromycin because of concerns over emerging antimicrobial resistance to macrolides. Because data are limited regarding alternative regimens for treating gonorrhea among persons who have severe cephalosporin allergy, providers treating such patients should consult infectious disease specialists.

‡ The CDC recommends advising all women and men with chlamydial or gonococcal infection to be retested approximately 3 months after treatment.

§ Sexual abuse must be considered a cause of infection in preadolescent children. A diagnosis of *C. trachomatis* or *N. gonorrhoeae* infection in preadolescent children should be documented by standard culture.

‖ Spectinomycin is not available in the United States; updated information from the CDC on the availability of spectinomycin will be available at www.cdc.gov/std/treatment.

¶ An association between oral erythromycin and infantile hypertrophic pyloric stenosis has been reported in infants aged <6 weeks who were treated with this drug. Infants treated with erythromycin should be followed for signs and symptoms of infantile hypertrohic pyloric stenosis.

NOTE: Pregnant women should not be treated with doxycycline, quinolones, or tetracyclines. Either erythromycin or amoxicillin is recommended for treatment of chlamydia during pregnancy.

Data from:

Centers for Disease Control and Prevention. Sexually transmitted diseases treatment guidelines, 2010. MMWR Morb Mortal Wkly Rep 2010;59 (No. RR-12):44-55.

Ocular Mucous Membrane Pemphigoid Conjunctivitis

If the patient is using any of the drugs associated with medication-induced mucous membrane pemphigoid, trial discontinuation of the medication should be attempted. Because OMMP is a chronic, progressive disease characterized by frequent remissions and exacerbations of disease activity, it may be difficult to gauge the response to therapy accurately. Grading systems and photographic documentation of the conjunctiva may be helpful to assess disease progression.[42,104] Although topical corticosteroid therapy may aid in controlling acute conjunctival inflammation, systemic immunosuppressive therapy is usually required to inhibit inflammation and prevent progression of conjunctival scarring.[105] The rate of disease progression, age and general condition of the patient, and the potential complications of immunosuppressive therapy should be considered and discussed with the patient before initiating therapy.[A:III] Systemic corticosteroids may be indicated to control inflammation initially, but they should be weaned as other immunosuppressive therapy becomes effective in order to avoid complications of chronic corticosteroid use.[A:III] Mild and slowly progressive disease may be treated with mycophenolate mofetil, dapsone, azathioprine, or methotrexate.[105,106] For severe inflammation or for inflammation unresponsive to treatment with other agents, cyclophosphamide should be considered.[105,107] [A:III] These therapies can be used alone or in combination. In general, a physician with expertise in immunosuppressive therapy should administer and monitor the treatment to minimize and manage side effects.[108,109] [A:III] Other less commonly used therapies that may be effective for treatment or adjunctive therapy include oral tetracycline and niacinamide,[110] sulfasalazine,[111] intravenous immunoglobulin,[112] and subconjunctival mitomycin C.[113] Associated dry eye state, trichiasis, distichiasis, and entropion should be treated.[A:III] Mucous membrane or amniotic membrane grafting for fornix reconstruction is possible if eyes are not severely dry and inflammation is under control. In advanced disease with corneal blindness, keratoprosthesis surgery may improve vision.[114]

The timing and frequency of follow-up visits is based on the severity of disease presentation, etiology, and treatment. A follow-up visit should include an interval history, visual acuity measurement, slit-lamp biomicroscopy, and documentation of corneal and conjunctival changes to monitor progression.[A:III] Ocular procedures such as cataract surgery may worsen the disease. Perioperative immunosuppression and close postoperative follow-up are warranted in such cases.[107]

Graft-versus-Host Disease

Patients with multiorgan systemic GVHD are treated with systemic immunosuppression. Systemic corticosteroid is the mainstay of initial treatment and is commonly used in conjunction with cyclosporine or tacrolimus. In corticosteroid-refractory GVHD, numerous therapies have been studied including cyclophosphamide, T-cell modulators, and photopheresis, with varied success depending on the tissues involved and the severity of disease.

For ocular GVHD, aggressive lubrication and punctal occlusion are particularly useful in the treating patients with secondary keratoconjunctivitis sicca, which is very common. There may be some role for topical corticosteroids in treating conjunctival hyperemia, but studies are lacking. Topical cyclosporine or autologous serum tears can be used to treat dry eye syndrome associated with GVHD.[115-117] In more severe cases, surgical excision of pseudomembranous tissue has been advocated versus conservative therapy.[118] Other secondary complications of ocular GVHD such as cicatricial eyelid malposition, SLK, or limbal stem cell failure should be managed on a case-by-case basis.

Sebaceous Gland Carcinoma

When a diagnosis of sebaceous gland carcinoma is confirmed by lid biopsy, local excision is indicated. The excision should be performed by a surgeon experienced in the treatment of eyelid tumors, and adjunctive therapy should be used as needed for any residual pagetoid component.[A:III]

Miscellaneous Types of Conjunctivitis

The management of other types of conjunctivitis, including chemical, genetic (ligneous conjunctivitis), and conjunctivitis caused by systemic diseases such as Stevens-Johnson syndrome is discussed elsewhere.[119]

PROVIDER AND SETTING

Because there is a spectrum of etiologies and treatment, optimal diagnosis and management of the disease require broad medical skills and experience. Some types of conjunctivitis are associated with systemic diseases and may require systemic drug treatment.

Patients with conjunctivitis who are evaluated by nonophthalmologist health care providers should be referred promptly to the ophthalmologist when any of the following occur:[A:III]

- Visual loss
- Moderate or severe pain
- Severe, purulent discharge
- Corneal involvement
- Conjunctival scarring
- Lack of response to therapy
- Recurrent episodes
- History of HSV eye disease
- History of immune compromise

A majority of patients with conjunctivitis can be treated effectively in an outpatient setting. Hospitalization may be necessary to administer parenteral therapy for severe gonococcal conjunctivitis and is mandatory for neonatal conjunctivitis.

COUNSELING/REFERRAL

Counseling is imperative for all contagious varieties of conjunctivitis to minimize or prevent spread of the disease in the community. Modes of transmission include eye-hand contact, sexual contact, exposure to contaminated droplets, and exposure to airborne pathogens. Return to school or work depends on the age of the patient, occupation, and type and severity of conjunctivitis.

When conjunctivitis is associated with sexually transmitted disease, treatment of sexual partners is essential to minimize recurrence and spread of the disease.[A:III] Patients as well as their sexual partners should be referred to an appropriate medical specialist.[A:III] The physician must remain alert to the possibility of child abuse in cases of potentially sexually transmitted ocular disease in children. In many states, sexually transmitted diseases and suspected child abuse must be reported to local health authorities or other state agencies.

In cases of ophthalmia neonatorum due to gonococcus, *Chlamydia*, and HSV, the infant should be referred to an appropriate specialist.[A:III] Infants who require systemic treatment are best managed in conjunction with a pediatrician.

When conjunctivitis appears to be a manifestation of systemic disease, patients should be referred for evaluation by an appropriate medical specialist.[A:III]

APPENDIX 1. QUALITY OF OPHTHALMIC CARE CORE CRITERIA

Providing quality care
is the physician's foremost ethical obligation, and is
the basis of public trust in physicians.
AMA Board of Trustees, 1986

Quality ophthalmic care is provided in a manner and with the skill that is consistent with the best interests of the patient. The discussion that follows characterizes the core elements of such care.

The ophthalmologist is first and foremost a physician. As such, the ophthalmologist demonstrates compassion and concern for the individual, and utilizes the science and art of medicine to help alleviate patient fear and suffering. The ophthalmologist strives to develop and maintain clinical skills at the highest feasible level, consistent with the needs of patients, through training and continuing education. The ophthalmologist evaluates those skills and medical knowledge in relation to the needs of the patient and responds accordingly. The ophthalmologist also ensures that needy patients receive necessary care directly or through referral to appropriate persons and facilities that will provide such care, and he or she supports activities that promote health and prevent disease and disability.

The ophthalmologist recognizes that disease places patients in a disadvantaged, dependent state. The ophthalmologist respects the dignity and integrity of his or her patients, and does not exploit their vulnerability.

Quality ophthalmic care has the following optimal attributes, among others.

- The essence of quality care is a meaningful partnership relationship between patient and physician. The ophthalmologist strives to communicate effectively with his or her patients, listening carefully to their needs and concerns. In turn, the ophthalmologist educates his or her patients about the nature and prognosis of their condition and about proper and appropriate therapeutic modalities. This is to ensure their meaningful participation (appropriate to their unique physical, intellectual and emotional state) in decisions affecting their management and care, to improve their motivation and compliance with the agreed plan of treatment, and to help alleviate their fears and concerns.
- The ophthalmologist uses his or her best judgment in choosing and timing appropriate diagnostic and therapeutic modalities as well as the frequency of evaluation and follow-up, with due regard to the urgency and nature of the patient's condition and unique needs and desires.
- The ophthalmologist carries out only those procedures for which he or she is adequately trained, experienced and competent, or, when necessary, is assisted by someone who is, depending on the urgency of the problem and availability and accessibility of alternative providers.
- Patients are assured access to, and continuity of, needed and appropriate ophthalmic care, which can be described as follows.
  - The ophthalmologist treats patients with due regard to timeliness, appropriateness, and his or her own ability to provide such care.
  - The operating ophthalmologist makes adequate provision for appropriate pre- and postoperative patient care.
  - When the ophthalmologist is unavailable for his or her patient, he or she provides appropriate alternate ophthalmic care, with adequate mechanisms for informing patients of the existence of such care and procedures for obtaining it.
  - The ophthalmologist refers patients to other ophthalmologists and eye care providers based on the timeliness and appropriateness of such referral, the patient's needs, the competence and qualifications of the person to whom the referral is made, and access and availability.
  - The ophthalmologist seeks appropriate consultation with due regard to the nature of the ocular or other medical or surgical problem. Consultants are suggested for their skill, competence, and accessibility. They receive as complete and accurate an accounting of the problem as necessary to provide efficient and effective advice or intervention, and in turn respond in an adequate and timely manner.
  - The ophthalmologist maintains complete and accurate medical records.

- On appropriate request, the ophthalmologist provides a full and accurate rendering of the patient's records in his or her possession.
- The ophthalmologist reviews the results of consultations and laboratory tests in a timely and effective manner and takes appropriate actions.
- The ophthalmologist and those who assist in providing care identify themselves and their profession.
- For patients whose conditions fail to respond to treatment and for whom further treatment is unavailable, the ophthalmologist provides proper professional support, counseling, rehabilitative and social services, and referral as appropriate and accessible.

- Prior to therapeutic or invasive diagnostic procedures, the ophthalmologist becomes appropriately conversant with the patient's condition by collecting pertinent historical information and performing relevant preoperative examinations. Additionally, he or she enables the patient to reach a fully informed decision by providing an accurate and truthful explanation of the diagnosis; the nature, purpose, risks, benefits, and probability of success of the proposed treatment and of alternative treatment; and the risks and benefits of no treatment.
- The ophthalmologist adopts new technology (e.g., drugs, devices, surgical techniques) in judicious fashion, appropriate to the cost and potential benefit relative to existing alternatives and to its demonstrated safety and efficacy.
- The ophthalmologist enhances the quality of care he or she provides by periodically reviewing and assessing his or her personal performance in relation to established standards, and by revising or altering his or her practices and techniques appropriately.
- The ophthalmologist improves ophthalmic care by communicating to colleagues, through appropriate professional channels, knowledge gained through clinical research and practice. This includes alerting colleagues of instances of unusual or unexpected rates of complications and problems related to new drugs, devices or procedures.
- The ophthalmologist provides care in suitably staffed and equipped facilities adequate to deal with potential ocular and systemic complications requiring immediate attention.
- The ophthalmologist also provides ophthalmic care in a manner that is cost effective without unacceptably compromising accepted standards of quality.

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APPENDIX 2. SUMMARY OF MAJOR RECOMMENDATIONS FOR CARE

DIAGNOSIS

The initial evaluation of a patient should include the relevant aspects of the comprehensive medical eye evaluation,[27,28 [A:III]] but some elements of the evaluation may be deferred in patients with symptoms and signs suggestive of infectious conjunctivitis.

History

Questions about the following elements of the patient history may elicit helpful information:

- Symptoms and signs:[A:III] e.g., itching, discharge, irritation, pain, photophobia, blurred vision
- Duration of symptoms[A:III]
- Exacerbating factors[A:III]
- Unilateral or bilateral presentation[A:III]
- Character of discharge[A:III]
- Recent exposure to an infected individual[A:III]
- Trauma:[A:III] mechanical, chemical, ultraviolet
- Contact lens wear:[A:III] lens type, hygiene and use regimen
- Symptoms and signs potentially related to systemic diseases:[A:III] e.g., genitourinary discharge, dysuria, upper respiratory infection, skin and mucosal lesions
- Allergy, asthma, eczema[A:III]
- Use of topical and systemic medications[A:III]

The ocular history includes details about previous episodes of conjunctivitis[A:III] and previous ophthalmic surgery.[B:III]

The medical history takes into account the following:

- Compromised immune status:[B:III] e.g., human immunodeficiency virus, chemotherapy, immunosuppressants
- Current or prior systemic diseases:[B:III] e.g., atopy, Stevens-Johnson syndrome, carcinoma, leukemia, chicken pox

The social history incorporates pertinent information about the patient's lifestyle, which may include smoking habits,[C:III] occupation and hobbies,[C:III] travel,[C:III] and sexual activity.[C:III]

Examination

The initial eye examination includes measurement of visual acuity,[A:III] an external examination,[A:III] and slit-lamp biomicroscopy.[A:III]

The external examination should include the following elements:

- Regional lymphadenopathy,[29 [A:III]] particularly preauricular
- Skin:[A:III] signs of rosacea, eczema, seborrhea
- Abnormalities of the eyelids and adnexae:[A:III] swelling, discoloration, malposition, laxity, ulceration, nodules, ecchymosis, neoplasia
- Conjunctiva:[A:III] pattern of injection, subconjunctival hemorrhage, chemosis, cicatricial change, symblepharon, masses, discharge

The slit-lamp biomicroscopy should include careful evaluation of the following:

- Eyelid margins:[A:III] inflammation, ulceration, discharge, nodules or vesicles, blood-tinged debris, keratinization
- Eyelashes:[A:III] loss of lashes, crusting, scurf, nits, lice
- Lacrimal puncta and canaliculi:[B:III] pouting, discharge
- Tarsal and forniceal conjunctiva[30,31 [A:III]]
- Bulbar conjunctiva/limbus:[30,31 [A:III]] follicles, edema, nodules, chemosis, laxity, papillae, ulceration, scarring, phlyctenules, hemorrhages, foreign material, keratinization

- Cornea[31] [A:III]
- Anterior chamber/iris:[A:III] inflammatory reaction, synechiae, transillumination defects
- Dye-staining pattern:[A:III] conjunctiva and cornea

Diagnostic Tests

Cultures of the conjunctiva are indicated in all cases of suspected infectious neonatal conjunctivitis.[32] [A:I] Smears for cytology and special stains (e.g., gram, giemsa) are recommended in cases of suspected infectious neonatal conjunctivitis, chronic or recurrent conjunctivitis, and in cases of suspected gonococcal conjunctivitis in any age group.[11,32] [A:II]

A biopsy of bulbar conjunctiva should be performed and a sample should be taken from an uninvolved area adjacent to the limbus in an eye with active inflammation when OMMP is suspected.[41] [A:III] In cases of suspected sebaceous gland carcinoma, a full-thickness lid biopsy is indicated.[43] [A:II]

TREATMENT

Indiscriminate use of topical antibiotics or corticosteroids should be avoided, because antibiotics can induce toxicity and corticosteroids can potentially prolong adenoviral infections and worsen herpes simplex virus infections.[A:III] Specific treatment and follow-up recommendations are contained in the main body of the text.

Frequency of follow-up visits is based on the severity of disease presentation, etiology, and treatment. A follow-up visit should include an interval history, measurement of visual acuity, and slit-lamp biomicroscopy.[A:III] If corticosteroids are used in chronic or recurrent conjunctivitis, baseline and periodic measurement of intraocular pressure and pupillary dilation should be performed to evaluate for cataract and glaucoma.[A:III]

PROVIDER AND SETTING

Patients with conjunctivitis who are evaluated by nonophthalmologist health care providers should be referred promptly to the ophthalmologist when any of the following occur:[A:III]

- Visual loss
- Moderate or severe pain
- Severe, purulent discharge
- Corneal involvement
- Conjunctival scarring
- Lack of response to therapy
- Recurrent episodes
- History of HSV eye disease
- History of immune compromise

COUNSELING/REFERRAL

When conjunctivitis is associated with sexually transmitted disease, treatment of sexual partners is essential to minimize recurrence and spread of the disease.[A:III] Patients as well as their sexual partners should be referred to an appropriate medical specialist.[A:III] The physician must remain alert to the possibility of child abuse in cases of potentially sexually transmitted ocular disease in children. In many states, sexually transmitted diseases and suspected child abuse must be reported to local health authorities or other state agencies.

In cases of ophthalmia neonatorum due to gonococcus, *Chlamydia*, and HSV, the infant should be referred to an appropriate specialist.[A:III] Infants who require systemic treatment are best managed in conjunction with a pediatrician.

When conjunctivitis appears to be a manifestation of systemic disease, patients should be referred for evaluation by an appropriate medical specialist.[A:III]

APPENDIX 3. OCULAR SURFACE DYE STAINING

Fluorescein, rose bengal, or lissamine green dyes may be used to assess the ocular surface.

Fluorescein dye stains areas of the corneal and conjunctival epithelia where there is sufficient disruption of intercellular junctions to allow the dye to permeate into the tissue.[120] Saline-moistened fluorescein strips or 1% to 2% sodium fluorescein solution is used to stain the tear film. After instilling the dye, the ocular surface is examined through a biomicroscope using a cobalt blue filter. Staining may become more apparent after one to 2 minutes. Staining is more intense when it is observed with a yellow filter. Mild fluorescein staining can be observed in normal eyes and may be more prominent in the morning. Exposure-zone punctate or blotchy fluorescein staining is observed in dry eye, and staining is more easily visualized on the cornea than on the conjunctiva.

Rose bengal dye stains ocular surface cells that lack a mucous coating as well as debris in the tear film,[120] and may be easier to observe with a red-free filter. Rose bengal staining of the tear film may be performed using a saline-moistened strip or 1% solution (patients should be informed that the drop might irritate the eye.). The saline drop used to moisten the strip should remain in contact with the strip for at least a minute to achieve an adequate concentration of rose bengal to stain the ocular surface. Rose bengal staining is more intense on the conjunctiva than the cornea.

Lissamine green dye has a staining profile similar to that of rose bengal[121] and may cause less ocular irritation.[121] It is not recommended for evaluating corneal epithelial disease.

Diffuse corneal and conjunctival staining is commonly seen in viral keratoconjunctivitis and medicamentosa. Staining of the inferior cornea and bulbar conjunctiva is typically observed in patients with staphylococcal blepharitis, meibomian gland dysfunction, lagophthalmos, and exposure, while staining of the superior bulbar conjunctiva is typically seen in superior limbic keratoconjunctivitis. A pattern of exposure zone (interpalpebral) corneal and bulbar conjunctival staining is typically seen with aqueous tear deficiency.[122,123]

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Patient Education Brochures

Conjunctivitis (2011)

Preferred Practice Pattern

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