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We are pleased to announce the association of
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THE RED EYE: DIFFERENTIAL DIAGNOSIS

by Robert D. Gross, MD, FAAP

Patients and parents frequently call with the complaint of a red eye, or “pink eye.” The term “pink eye” is solely a descriptive term. Our task is to determine the cause of the redness.

There are a variety of causes of the Red Eye. Conjunctivitis, with its many types, is among the most common causes of ocular redness. There are many other causes of the Red Eye, such as lid disease, trauma, corneal infection, structural change, inflammation of intraocular structures, acute glaucoma, immune reactions (e.g. Stevens-Johnson Syndrome), and neoplasm.

The history provides many beneficial clues in making the diagnosis and may provide the correct diagnosis before the physical findings are known. A careful history would include inquiry into the length of time the eye has been red, associated systemic infections or disease, the presence of crusting of the eyelids, allergies, trauma, foreign body, and prior self medication with over-the-counter or prescription medications.



Figure 1

Bacterial Conjunctivitis

Bacterial conjunctivitis (Figure 1) typically presents with redness, mucopurulent discharge, and matting. Patients may complain of irritation, foreign body sensation, and tearing. Findings in bacterial conjunctivitis include diffuse hyperemia of the conjunctiva, mucopurulent discharge, and non-specific conjunctival inflammation. The condition typically persists for eight to ten days, and then resolves spontaneously. Treatment consists of topical antibiotic drops or ointment to shorten the course of the disease, provide rapid resolution of symptoms, reduce contagion, and return patients quickly to school or work. Bacterial conjunctivitis is typically treated empirically – further testing is not required unless the patient is a newborn. Patients with *Chlamydia trachomatis*, *N. gonorrhoeae* or *N. meningitidis* require systemic therapy.

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RED EYE (cont.)

Viral Conjunctivitis

Viral conjunctivitis (Figure 2) typically occurs in association with a systemic viral illness, and tends to resolve as the systemic illness resolves. Because many viral illnesses are short-lived, a significant number of cases of viral conjunctivitis never require medical attention. Ocular viral infections lasting longer than three days may represent a more significant viral illness, typically caused by adenovirus. Adenovirus type 3 may cause pharyngoconjunctival fever (PCF), associated with an intensely sore throat, fever, conjunctival hyperemia and irritation. Adenovirus types 8 and 19 may cause epidemic keratoconjunctivitis (EKC), associated with intense ocular pain, photophobia, and corneal epithelial and subepithelial inflammatory lesions. Systemic viral symptoms are uncommon in EKC.



Figure 2

Preauricular adenopathy may be present in all types of viral disease. Unlike bacterial conjunctivitis, the discharge is watery and matting uncommon unless bacterial super-infection has occurred. Patients are contagious for up to twelve days, and appropriate precautions must be taken in the household during this time.

Hemorrhagic conjunctivitis presents as a result of enterovirus 70 or coxsackievirus A24 infection. Signs include conjunctival hyperemia, scattered subconjunctival hemorrhages, significant periocular swelling, and preauricular adenopathy (Figure 3). The presentation may be unilateral or bilateral, and symptoms include watery discharge, discomfort, and sensitivity to light. Unilateral cases may be confused with peri-orbital cellulitis. Like adenovirus infection, precautions should be taken due to the contagious nature of the condition.

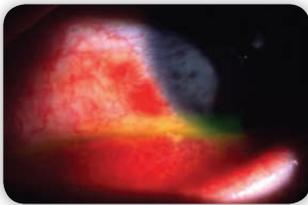


Figure 3

Most cases of viral conjunctivitis associated with the common cold resolve rapidly without treatment. Patients with suspected adenovirus infection should be counseled on methods to prevent the spread of infection within the household. If mucopurulence and matting are present, the patient may be treated as for bacterial conjunctivitis. Artificial tears may provide soothing relief for the irritation and foreign body sensation associated with adenovirus infection.

Herpes simplex virus (HSV) (Figure 4) is another cause of viral conjunctivitis and often occurs on a primary basis in children under age ten years. Primary cases are typically unilateral and are present with herpetiform eruptions of the eyelids. HSV is a challeng-



Figure 4

ing infection to manage due to its propensity for recurrence, resistance to cure, and its associated dendritic inflammation of the corneal epithelium (keratitis) (Figure 5). The keratitis will stain with fluorescein, and may recur without the skin manifestations. HSV may be controlled by antiviral agents, but is facilitated by exposure to steroids. Steroids may cause a small dendritic lesion to significantly worsen, resulting in corneal scarring which may permanently impact the visual acuity. Because HSV recurrences are often difficult to distinguish from other causes of ocular redness and may not be associated with skin manifestations, steroid-containing agents should not be placed in a red eye of any type. Patients suspected of having HSV should be referred to an ophthalmologist.



Figure 5

Treatment of HSV includes antiviral eye drops or ointment. Because steroids exacerbate corneal inflammation in patients with herpes simplex virus, steroids are contraindicated in the primary management of any type of conjunctivitis.

Phlyctenular Conjunctivitis

Phlyctenular conjunctivitis (Figure 6) is characterized by a tender solitary nodule with surrounding dilated conjunctival vessels. Lesions may appear on the conjunctiva or cornea and are typically the result of an immune response to antigens associated with staphylococcal blepharitis. Tuberculosis, chlamydia and parasitic diseases have also been implicated as etiologies for phlyctenu-



Figure 6a

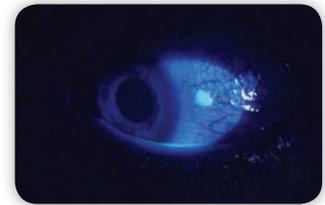


Figure 6b

lar disease. Phlyctenules are very sensitive to topical steroids. Antibiotic-steroid combination agents are commonly used for topical therapy. Skin testing for tuberculosis and management of lid disease and other causative systemic conditions are important components of effective therapy for phlyctenular disease.

Allergy

Patients with seasonal and perennial allergic conjunctivitis (Figure 7) present with itchy, watery eyes, swollen eyelids, and conjunctival hyperemia. This may occur seasonally or perennially. Physical findings include conjunctival papillae, chemosis, and hyperemia. Rhinitis is typically associated and patients under treatment for allergic rhinitis may continue to demonstrate ocular signs and symptoms. Histamine is the primary mediator, and there is typically no effect on the visual acuity.

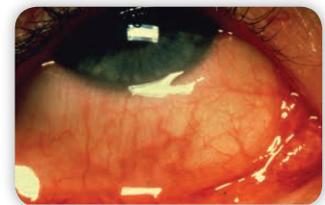


Figure 7

Meet Our Doctors



Cynthia Beauchamp, MD, FAAP Dr. Beauchamp, a board certified ophthalmologist, joined the practice in 2008 after completing a Fellowship in Pediatric Ophthalmology & Strabismus at the University of Texas Southwestern and Children's Medical Center of Dallas and Residency in Ophthalmology at the University of Texas Southwestern. She received her MD from Northwestern University Medical Center in Chicago, where she was elected to the Alpha Omega Alpha Honor Society in her junior year. Dr. Beauchamp received both Bachelors and Masters Degrees in Organizational Behavior from Stanford University in Palo Alto, CA.

Dr. Beauchamp has authored several articles in referenced medical literature and a chapter in a major ophthalmology reference book. She has served as an associate examiner for the American Board of Ophthalmology.



George Beauchamp, MD, FAAP Dr. Beauchamp obtained his medical degree at Northwestern University School of Medicine and completed his residency at Walter Reed Army Medical Center. Dr. Beauchamp was fellowship trained in corneal surgery and pediatric ophthalmology at the Washington Eye Center and Children's National Medical Center in Washington, D.C. Dr. Beauchamp is Board Certified in Ophthalmology. He served as a Director of the American Association for Pediatric Ophthalmology and Strabismus and of the American Board of Ophthalmology from 1981 through 1988.

Currently he is Professor of Clinical Ophthalmology at the University of Texas Southwestern Medical Center at Dallas where he teaches ethics. He serves as Chairman of the Board and Chief Executive Officer of the Children's Eye Foundation. He has published over 80 articles in peer review medical journals, including several book chapters.



Alan D. Davis, MD Dr. Davis obtained his medical degree from Duke University School of Medicine in Durham, North Carolina and completed his residency at the University of California at San Francisco. Dr. Davis was fellowship trained in Pediatric Ophthalmology at Indiana University and Sydney University in Australia. He is Board Certified in Ophthalmology. Dr. Davis belongs to the American Association of Ophthalmology, Texas Pediatric Ophthalmology Society, American Association of Pediatric Ophthalmology and Strabismus, American Medical Association, Texas Medical Association and Dallas County Medical Society.

Dr. Davis holds Board positions for Dallas Services, Pearle Vision Foundation, Dallas Services for Visually Impaired Children and PediPlace.



John T. Tong, MD, FACS, FAAP Dr. Tong is double specialized in both Ophthalmic Plastic Surgery and Pediatric Ophthalmology & Strabismus. He obtained his medical degree from Jefferson Medical College in Philadelphia through an accelerated program finishing college in 2 years. He was elected to Alpha Omega Alpha Honor Society during his junior year in medical school. Dr. Tong completed his residency at the University of California in Los Angeles. He finished his first fellowship in Pediatric Ophthalmology & Strabismus with Dr. Marshall Parks at the Children's National Medical Center in Washington, D.C. Dr. Tong then completed his fellowship in Ophthalmic Plastic Surgery at the University of California in Los Angeles and in Beverly Hills where he received extensive experience in facial rejuvenation including Botox and facial fillers.

Dr. Tong is one of only a few physicians in the nation who is both a Fellow of the American Society of Ophthalmic Plastic and Reconstructive Surgery, and a Member of the American Association of Pediatric Ophthalmology and Strabismus.

In addition to seeing children for pediatric ophthalmology and strabismus, Dr. Tong sees both children and adults for ophthalmic plastic surgery. These include droopy eyelids / ptosis / dermatochalasis, droopy eyebrows, eyelid cancer, tearing / nasolacrimal duct problems, in-turning / entropion and out-turning / ectropion of the eyelids.



Robert D. Gross, MD, FAAP Dr. Gross received his training in ophthalmology at Northwestern University in Chicago and Boston University in Boston. His fellowship training in pediatric ophthalmology was completed at the Children's Hospital and Harvard Medical School in Boston. He began his teaching career on the faculty of Harvard Medical School and trained medical students, residents and fellows at The Children's Hospital and the Massachusetts Eye and Ear Infirmary.

Dr. Gross is currently Clinical Associate Professor of Ophthalmology at the University of Texas Southwestern Medical School in Dallas and the Texas Tech Health Science Center in Lubbock and is board certified in ophthalmology.

Dr. Gross is past chair of the Section of Ophthalmology of the American Academy of Pediatrics and past President of the Children's Eye Foundation. He has lectured and trained throughout Europe, Asia and South America and has authored or co-authored over 40 peer reviewed papers and textbook chapters. He received the Honor Award of the American Association for Pediatrics Ophthalmology and Strabismus in 2005.



Lori Dao, MD, FAAP Dr. Dao graduated Magna Cum Laude in 2001 from Texas Christian University and completed her medical degree at the University of Texas Southwestern Medical School in 2006. Following medical school, she completed residency in ophthalmology at UT Southwestern Medical Center where she was recognized as "Superb Clinical Teacher." She finished fellowship training in pediatric ophthalmology and strabismus at Children's Medical Center in Dallas. Dr. Dao is board certified in ophthalmology.

Dr. Dao serves on the Board of Directors of the Retina Foundation of the Southwest, is involved in clinical research, and has authored several articles. She is a clinical assistant professor at UT Southwestern Medical School and is a member of the American Association for Pediatric Ophthalmology and Strabismus, Texas Ophthalmology Association, Dallas Academy of Ophthalmology, and the American Academy of Ophthalmology.

RED EYE (cont.)

Mild cases of ocular allergy may respond to scheduled administration of artificial tears. When artificial tears do not suffice, a prescription eye drop such as olopatidine is often beneficial. When allergic rhinitis is present, an over-the-counter nasal steroid may be considered.

Vernal keratoconjunctivitis (VKC) is a severe form of ocular allergy presenting in the spring and early summer and occasionally in the fall. It is more typical in boys and improves with age. The condition presents with marked itching, photophobia, ptosis, and a thick ropy discharge. Eosinophil-mediated shield corneal ulcers may occur and result in a permanent reduction in visual acuity. Physical findings include large cobblestone papillae of the superior tarsal conjunctiva or papillary hypertrophy at the limbus along with whitish lesions at the limbus (Trantas dots) (Figure 8). VKC will often require topical steroids to control and long-term management with olopatidine and other agents. The cornea must be closely monitored.



Figure 8

Giant Papillary Conjunctivitis (GPC) (Figure 9) is usually associated with soft contact lens wear. Patients present with redness, itching, and foreign body sensation. GPC results from both the mechanical irritation of the conjunctiva and an immune response

to deposits on the surface of the contact lenses. GPC resulting from persistent soft contact lens wear may result in significant vascularization of the cornea. The most important aspect of management for GPC is removal of the source of conjunctival irritation--soft contact lenses should be promptly discontinued upon diagnosis. Patients may be refit with new lenses once the GPC has become inactive.



Figure 9

Irritative Conjunctivitis (Figure 10) is associated with large amounts of particulate matter in the air, such as an occupational setting or smoke-filled room. Patients may complain of foreign body sensation, irritation, redness and burning. Physical findings include only hyperemia and increased tearing. These cases are commonly confused with ocular allergy. Appropriate treatment consists of scheduled use of artificial tears three to four times daily and as needed. Protective eyewear should be considered in cases of occupational exposure. 

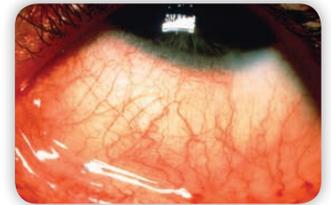


Figure 10



Pediatric Ophthalmology, P.A. and the Center for Adult Strabismus

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We welcome your input. If you have questions or topics of interest you would like addressed in our next issue, please contact one of our physicians.

A clinical newsletter dedicated to North Texas physicians, Viewpoint is published for the information and use of colleagues and friends. It is intended as a general guide. Physicians with specific questions should consult one of our doctors.