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Conditions of the Eyelids and Ocular Adnexa in Dogs and Cats

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The eyelids and ocular adnexa comprise the primary surface defense for the globe, specifically the cornea. Physical or functional abnormalities of the lids or adnexal ocular structures may result in abnormalities of the cornea and subsequently vision. This commentary will discuss diagnosis and treatment of the more common abnormalities affecting the lids and ocular adnexa in dogs and cats.

Anatomy

The eyelids represent a composite structure composed of skin and cutaneous appendages, including hair follicles and glandular structures. Dogs have eyelashes only on the upper lid and cats lack upper and lower eyelashes. The palpebral conjunctiva is a highly vascular mucous membrane that lines the inner aspect of the lids. Interposed between the surface skin and palpebral conjunctiva is skeletal muscle and fibrous tissue. Eyelids are highly vascularized, therefore they are fairly resistant to microbial infection and have the property of healing rapidly after suffering trauma, but may enlarge considerably from transvascular exudation of fluid into lid tissue when irritated. Since skin comprises a substantial portion of the eyelid, a plethora of dermatologic conditions may affect the eyelids.¹ The adnexa consists of all segments of conjunctiva (palpebral, nictitans, bulbar and fornix), and the nictitating membrane. The conjunctiva is the most exposed mucous membrane of the body. It is most frequently an “innocent bystander” in the dog, and conjunctival hyperemia is a nonspecific secondary response to ocular or systemic disease processes. However conjunctival hyperemia in the cat is most frequently caused by infectious pathogens that directly affect the conjunctiva (e.g., Feline Herpesvirus-1, *Chlamydia felis*).

Although the histologic anatomy of the canine eyelid is similar among different canine breeds, substantial variation in eyelid carriage and conformation among different breeds creates considerable challenges for the veterinarian. Conformational eyelid abnormalities in cats are uncommon but are very common abnormalities of the eyelids in dogs. Presence of a conformational lid abnormality in a given canine breed may eliminate this dog from competitive show by a judge, while absence of the identical abnormality in another breed would serve as grounds for elimination from competitive show. Surgical correction of a conformational eyelid or ocular adnexal abnormality may also constitute grounds for disqualifying a dog from show by some national breed clubs (see <http://www.akc.org/dic/clubs/showrule.cfm?page=12>). Knowledge of the variety of eyelid conformations among different purebred dogs is essential.

It is important to properly evaluate eyelid anatomy and function prior to undertaking any blepharoplastic procedure attributable to any of the above conditions. A “no-touch” eyelid evaluation should be performed initially. Eyelid function should then be assessed by stimulating a blink reflex. The examiner should note the amount of eyelid margin misalignment. Next, ophthalmic anesthetic solution should be instilled topically and the examination repeated in the same manner. It is critical to compare results of the initial examination with results of the examination after instillation of topical anesthetic solution for changes in eyelid function, carriage or anatomy. Eyelid surgery should never be performed

by a veterinarian who has not personally evaluated eyelid conformation and carriage in an awake, non-sedated animal. Evaluation must be done prior to general anesthesia.

Abnormalities of the eyelids and adnexa are divided arbitrarily into categories that denote general etiologic considerations, including congenital, acquired, structural/conformational, inflammatory, and neoplastic conditions; category overlap is common.

Structural/Conformational Abnormalities

Abnormalities in eyelid structure or conformation may be congenital or acquired.

Congenital

1. **Eyelid Agenesis (coloboma).** Eyelid agenesis is a congenital defect of that occurs most frequently in cats. The upper temporal eyelid (lateral 1/3 to 2/3) fails to develop resulting in a full- or partial-thickness defect (Figure 1). Absence of eyelids results in secondary trichiasis and exposure keratoconjunctivitis. If the agenesis is mild, cryoepilation or entropion surgery can be performed to limit trichiasis. If severe, surgical correction requires use of grafting procedures, using the lower eyelid and the conjunctiva of the nictitating membrane as the donor site, to construct a functional eyelid.
2. **Ankyloblepharon.** Ankyloblepharon is adhesion of the eyelid margins to each other. Dogs and cats have physiologic ankyloblepharon until 10-14 days of age. If it persists past 15 days of age, infection of the conjunctival sac (ophthalmia neonatorum) may occur and is typified clinically by excessive swelling and/or discharge at the medial canthus (Figure 2). The eyelids should be separated using gentle (digital) traction. I recommend massaging the fused lids toward the medial canthus with a warm, wet cotton ball to effect separation. Exudate should be submitted for bacterial culture. The palpebral fissure should be flushed with sterile saline and a broad-spectrum antibiotic ointment applied topically q 6 h. Untreated neonatal conjunctivitis can lead to severe corneal scarring or loss of the globe.
3. **Micropalpebral fissures.** Narrowing of the palpebral fissures is usually associated with other concurrent congenital defects (entropion, microphthalmos) in the Shar Pei, Chow chow, Kerry blue terrier and Collie. Correction usually requires blepharoplastic surgical procedure in which conjunctiva is sutured to the incised eyelid surfaces to enlarge the fissure.
4. **Macropalpebral fissures.** Excessively large palpebral fissures is common in brachycephalic dog breeds with congenital exophthalmos (shallow orbits), the Bloodhound, St. Bernard, American and English Cocker spaniel. The dorsal sclera may be exposed and prominence of the globe may prevent closure of the eyelids while sleeping (nocturnal lagophthalmos). Secondary exposure keratitis may result in corneal pigmentation and fibrosis. Surgical shortening the palpebral fissure is indicated but must be performed where the abnormality exists (permanent lateral or medial canthoplasty).
5. **Dermoid.** A dermoid is a choristoma (normal tissue in an abnormal location). Dermoids may be present on the eyelid (Figure 3) but most frequently they are located on the lateral conjunctiva or cornea. Treatment requires surgical excision and is curative.

Acquired

1. **Entropion.** Entropion is defined as inversion of the eyelid margin. Secondary trichiasis (misdirected hairs of the eyelids) often results. The lower lateral eyelid is usually involved but depending on the breed, any part of the eyelid margin can be involved. Clinical signs vary from epiphora to corneal perforation. Entropion is classified as primary (anatomical), spastic (physiological), and cicatricial (scarring).
 - a. **Primary (anatomical).** Primary entropion results from a structural abnormality of the eyelid/tarsal plate. Primary entropion is differentiated from secondary entropion by response to topical anesthetic: If entropion persists after instillation or topical anesthetic, there is no spastic component. When entropion occurs in a puppy or foal (e.g., prior to mature facial conformation), temporary "tacking sutures" can be placed to result in eversion of the eyelid margins. Several vertical mattress sutures are placed at the haired-nonhaired junction (approximately 3-mm from the eyelid margin) at partial-thickness depth in the lid and apposed to the skin overlying the bony orbital margin.² Placement of tacking sutures often eliminates the need for surgical correction of entropion later in life. Tissue adhesives and staples have also been used to tack eyelids. Once mature facial conformation is attained, surgical correction requires use of a blepharoplastic surgical technique. The shape, size, and location of the surgical incision vary with the breed, age, severity, and location of entropion. Silk sutures have been recommended to oppose the wound. Medial canthus entropion is a common cause of epiphora in brachycephalic canine and feline breeds, and also occurs in canine breeds with tense eyelid-to-globe conformations (Toy and Miniature Poodles, Bichon Frise, Maltese,

others). The lesion may be subtle and is often overlooked as a cause of epiphora. Many of these breeds have concurrent medial canthal entropion and excessive nasal folds. Medial canthoplasty surgery is required. Care should be exercised to avoid accidentally incising the canaliculi. Use of a Buster or Elizabethan collar is recommended postoperatively to prevent self-excoriation of the surgical area.

b. **Spastic (physiological).** Spastic entropion refers to entropion caused by spasm of the orbicularis oculi muscle in response to ocular pain or irritation. Ocular pain may cause severe blepharospasm which in some instances results in entropion. Secondary trichiasis occurs from eyelid hair rubbing against the cornea, which causes further ocular pain, additional blepharospasm and subsequently more pronounced entropion. The spastic component of entropion is determined by instilling topical anesthetic; spastic entropion is that portion of entropion relieved by topical anesthetic. If persisting for long duration, spastic entropion may become cicatricial secondary to tarsal fibrosis. Treatment is directed at removing the cause of ocular pain and placement of temporary tacking sutures.

c. **Cicatricial.** Cicatricial entropion results from trauma (including previous eyelid surgery) or from chronic spastic entropion. Cicatricial entropion is less common and surgical correction more difficult to achieve long-term correction.

2. **Ectropion.** Ectropion is eversion of the eyelid margin. This may result in exposure of the conjunctiva (usually lower) but is usually less serious than entropion. The most common cause of ectropion is conformational ectropion that occurs in Spaniel and hound breeds, and surgical correction is not only unnecessary but may exclude a dog from competitive show. Neuroparalytic ectropion following facial nerve damage can occur but is uncommon. Clinical signs of ectropion include visualization of the lower conjunctiva, and may include conjunctival hyperemia, keratitis, and mucus accumulation in the lower conjunctival cul-de-sac. Ectropion frequently occurs secondary to instability of the lateral canthus and is misdiagnosed as primary ectropion. In such instances, correction of ectropion alone will not correct the abnormality. Correction of ectropion is indicated only when eyelid function (ability to blink) is intact and abnormalities of the cornea are evident. Surgical correction by full-thickness wedge resection is simple and effective. A "V to Y" blepharoplasty can also be used for cicatricial ectropion. This elevates skin overlying scar tissue and allows the eyelid margin to retract to a more normal position.

3. **Instability of the Lateral Canthus.** This condition may be attributable to a primary defect or laxity of the retractor anguli oculi lateralis muscle and/or the lateral canthal tendon. Many affected dogs have abnormal tarsal plate development. Concurrent entropion and ectropion of one or both eyelids is common. The normal position of the lateral canthus varies by breed but is usually lateral and slightly ventral to a horizontal line drawn across the cornea. This frequently occurs in the St. Bernard, Newfoundland, Chow chow, Bloodhound, and Bullmastiff, but can occur in most breeds. Correction involves creation of new lateral canthus (lateral canthoplasty), removal of excess eyelid tissue and/or primary entropion repair.²

4. **Brow Ptosis** - Certain canine breeds have a very heavy brow which induces secondary entropion of the upper eyelid. When present and inducing entropion and secondary corneal abnormalities, a brow lift procedure is indicated. Various surgical procedures have been described to correct brow ptosis. I recommend that you consider referring dogs to a veterinary ophthalmologist for brow ptosis surgery.

5. **Lagophthalmos.** The inability to blink may result in exposure keratitis. Facial nerve dysfunction (idiopathic, traumatic – following bulla osteotomy) are common causes. Temporary lagophthalmos (facial neuropraxia) after total ear canal ablation and bulla osteotomy surgery is common. If eyelid function is absent, the cornea should be kept moist using a bland, preservative-free tear ointment. Permanent lagophthalmos may require permanent lateral tarsorrhaphy surgery to decrease tear evaporation by decreasing the tear film meniscus between the upper and lower eyelids.

Eyelash Abnormalities

1. **Distichiasis.** Distichia are cilia that arise from Meibomian gland openings (Figure 4). Both upper and lower eyelids can be affected. Animals with distichiasis must be evaluated carefully; the mere presence of distichia is not justification for removal (e.g., most American Cocker spaniels). Treatment is indicated only when cilia are inducing corneal irritation (ulceration, vascularization, fibrosis, pigmentation, epiphora or persistent blepharospasm). Soft, fine, tapered or silky cilia which float in the tear film usually do not cause irritation. Correction involves electroepilation or cryoepilation. Thermocautery is contraindicated as it destroys normal eyelid structures and results in scarring. Manual epilation is effective only temporarily but may aide in determining if the cilia are causing clinical signs or disease.

2. **Districhiasis.** Districhiasis is defined as two or more cilia emanating from a single Meibomian gland opening. For treatment see Distichiasis above.

3. **Ectopic cilia** – Ectopic cilia is a hair or bundle of hairs that emanate through the palpebral conjunctiva (usually the upper central eyelid) usually near the base of the Meibomian gland. Ectopic cilia are usually diagnosed in young dogs; they are exceedingly rare in cats. The cilia cause corneal irritation or ulceration in the area that they overlie, and are usually located in the perilimbal cornea. Spastic entropion and epiphora are common. Examination with magnification may reveal a pigmented area of conjunctiva surrounding the orifice of the ectopic cilia. Excision of the palpebral conjunctiva, including the cilia and its follicle, is usually curative.

4. **Trichiasis**. Trichiasis is a cilia which originates from a normal location that is misdirected toward the cornea, conjunctiva, or eyelids. This may result secondary to entropion, or as a primary entity (e.g., excessive nasal skin folds in brachycephalic breeds). If trichiasis occurs secondary to entropion, a modified Hotz-Celsus procedure may be indicated. If trichiasis results from nasal skin folds contacting the cornea, excision of skin folds or medial canthoplasty is the treatment of choice.

Inflammatory Eyelid Diseases

1. **Chalazion** (ka-lay-zee-on). Retention or blockage of oily secretions from the Meibomian gland extravasates into surrounding eyelid tissues and induce a granulomatous inflammatory response. Clinically a chalazion appears as a firm, nodular, yellow-gray mass through the palpebral conjunctival surface (Figure 5) and is painless. Chalazia occur more frequently in dogs than in cats and most commonly occur secondary to a Meibomian gland adenoma which block secretion of the Meibomian gland. Treatment requires surgical curettage through the conjunctiva.² The skin is *not* incised. Aftercare consists of topical antibiotic-steroid solution for 5-7 days.

2. **Hordeolum** (stye). A hordeolum is inflammation of the glands of Zeis or Moll (external hordeolum) or Meibomian gland (internal hordeolum). The hallmark clinical sign of a hordeolum is pain upon manipulation. Treatment includes drainage, topical antibiotic ointment, and hot packs.

3. **Meibomitis** - Staphylococcal infection usually associated with generalized dermatoses. The Meibomian glands exude a yellow, purulent material instead of a clear oily secretion (Figure 6). Examination of the conjunctival surface shows linear yellow-white inflammatory infiltrates perpendicular to the eyelid margin. Material should be expressed for bacterial culture and susceptibility testing. Topical and systemic antibiotics and warm compresses are indicated. Oral corticosteroids may also be necessary.

4. **Blepharitis** - inflammation of the eyelids, especially the eyelid margins, is common but may be overlooked if it is part of a more generalized dermatitis.³

a. Etiologies:

1) **Bacterial** - most commonly *Staphylococcus aureus*. Juvenile pyoderma/puppy stranglers in puppies or staphylococcal hypersensitivity in the adult. Topical and systemic antibiotics are indicated. Systemic corticosteroids in refractory or severe acute cases are also indicated. In generalized dermatological disease, the underlying cause should be established and treated accordingly.

2) **Parasitic** - mites, e.g., *Demodex* or *Sarcoptes* in young dogs, *Notoedres* in cats.

3) **Metabolic** - seborrheic blepharitis associated with generalized seborrhea or allergic dermatitis.

4) **Actinic** - related to sunlight.

5) **Fungal** - dermatomycoses.

6) **Traumatic** - lye, acids, fire.

7) **Immune-mediated/allergic** - pemphigus, toxic epidermal necrolysis, atopy.

8) **Viral** - FHV-1 in young kittens. Substantial cicatricial lid deformation and corneal fibrosis may result.

b. Diagnosis and treatment: Diagnosis requires testing similar to that for other dermatologic diseases including skin scrapings, cultures (bacterial and fungal), and biopsy if necessary. Treatment is based on diagnosis of the underlying cause.

5. **Blepharedema**. Blepharedema is a clinical sign rather than a disease entity. Causes include trauma, allergies/hypersensitivity reactions, insect bites, secondary to orbital cellulitis/abscess, and vasculitis. Treatment depends on the underlying cause but may consist of corticosteroids (topical and systemic), non-steroidal anti-inflammatory drugs, antihistamines, and topical and oral antibiotics (e.g., secondary to cellulitis).

Traumatic Eyelid Abnormalities

Eyelid lacerations occur frequently in many domesticated animals. Bite wounds or automobile trauma is the most common causes. The animal must be carefully evaluated for concurrent systemic abnormalities. The globe should also be examined thoroughly to determine if concurrent ocular trauma is evident. Eyelid lacerations should be repaired as soon as possible. Eyelids are extremely vascular and post-traumatic swelling can be extensive. However, beneficial properties

of highly vascular tissues include rapid rate of healing and resistance to infection. When lacerations of the medial aspect of the eyelids occurs, the lacrimal puncta should be cannulated and flushed to determine if the nasolacrimal duct is involved. Eyelid wounds should be cleaned of all debris and prepared with a dilute Betadine solution. The wound should not be debrided (or minimally debrided). If the wound is not fresh or is extremely swollen and edematous, the wound should be irrigated gently. Application of a topical broad-spectrum antibiotic and atropine should be applied to the globe and lids, and a nitrofurazone bandage placed for 12 to 24 hours. This will provide dramatic improvement in the appearance of the wound. The wound should then be closed with a two-layer closure to ensure adequate physiologic and cosmetic results. 5-0 or 6-0 polyglactin 910 is recommended to oppose the tarsoconjunctiva, taking care to bury the knots in the tissue to avoid corneal irritation or damage. Simple interrupted sutures of 4-0 or 5-0 silk are used for the skin.² The first suture is placed at the eyelid margin in a figure-8 pattern to ensure accurate apposition. The next suture is placed 1-2 mm from the appositional suture. The remaining wound is closed with simple interrupted sutures. Aftercare consists of topical and systemic antibiotics for 7-10 days.

Neoplastic Eyelid Diseases

The biological behavior of eyelid neoplasms of dogs and cats differ substantially.^{4,5} Canine eyelid neoplasms generally have a benign biological behavior and can usually be differentiated based on clinical appearance. In stark contrast to eyelid neoplasms of dogs, those of cats have a malignant biological behavior and can not be differentiated from each other based solely on clinical appearance. Feline eyelid neoplasms may all be raised, alopecic, and eventually ulcerate. Cytologic examination of fine needle aspiration and biopsy samples of feline eyelid masses may reveal a specific type of neoplasm. Feline eyelid neoplasms should always be submitted for histologic identification. The most common skin neoplasms of dogs and cats also apply to those of the eyelid. Histologic examination of all lid masses is recommended.

Canine Eyelid Neoplasms

Meibomian (Sebaceous) Adenoma. The most common eyelid neoplasm of dogs is a Meibomian adenoma.⁴ This neoplasm arises from the Meibomian gland but is observed at the eyelid margin, near the Meibomian orifice (Figure 5). Treatment is recommended when corneal irritation results from contact. Simple excision parallel to the eyelid margin is not effective. Treatment requires debulking and adjuvant cryosurgery or full-thickness eyelid resection. The amount of lid shortening that may be done is dependent upon the conformation of the lids in a given breed. Very little tissue may be removed without inducing iatrogenic ectropion or entropion in canine breeds that have a taut lid-to-globe conformation (Miniature poodle, Bichon Frise, other brachycephalics).

Melanoma. Lid melanomas are usually superficial and benign. They occur most frequently in older dogs of heavily pigmented breeds. They are usually slow growing, may be multiple, and are cryosensitive.

Papilloma – Papilloma are usually superficial and affect young dogs. Surgical removal is recommended if a rapid increase in size or irritation to the cornea occurs. Papilloma are cryosensitive but may spontaneously regress in young dogs.

Adenocarcinoma – Adenocarcinoma can not be differentiated from Meibomian gland adenoma based on clinical appearance. Although histologically malignant, benign biological behavior is the rule. Adenocarcinoma are also cryosensitive.

Histiocytoma. Histiocytoma is primarily a tumor of young growing dogs. Histiocytoma has a characteristic clinical appearance in the dog – it is always raised, less than 1 cm in diameter, pink in color, hairless, and has a characteristic rapid growth pattern (Figure 7). Histiocytoma frequently regresses spontaneously between 3 and 5 weeks after it appears.

Feline Eyelid Neoplasms

Squamous cell carcinoma. – The most common eyelid neoplasm of cats is squamous cell carcinoma.⁵ The biological behavior is that of very rapid growth, highly invasive locally, with a tendency to ulcerate early, and occasionally late metastasis to regional lymph nodes or organs. Wide surgical excision and adjuvant radiation, cryosurgery, interstitial brachytherapy, or hyperthermia is indicated.

Basal cell carcinoma. Initially basal cell carcinoma forms a discrete circular nodule that develops an ulcerated surface. Eyelid basal cell carcinoma in cats ulcerates with equal frequency as other eyelid neoplasms, unlike those located elsewhere on the body. The biological behavior is that of being locally invasive but rarely metastasizes.

Fibrosarcoma. Fibrosarcoma is a firm, raised, alopecic, mass that also may ulcerate. It may be associated with FeLV infection.

Mast cell tumor. May appear identical to those listed above, but this neoplasm generally has the best prognosis of all eyelid neoplasms in the cat. Local excision with appropriate surgical margins may be curative.

Conjunctivitis

It is important to differentiate conjunctival from episcleral hyperemia/injection. Conjunctival vasculature can be differentiated from underlying episcleral vasculature based on several characteristic differences:

Conjunctival vasculature:

- a) has extensive branching
- b) appears bright red in color
- c) is freely mobile and tends to move over the surface of the globe with eyelid manipulations
- d) will blanch when a sympathomimetic (e.g. phenylephrine) is applied topically

Episcleral vasculature:

- a) has a radial pattern from the limbus
- b) appears dark red in color
- c) is not freely mobile - conjunctival vessels move over the underlying episcleral vessels
- d) does not readily blanch when a sympathomimetic is applied topically

These characteristics are important when differentiating bulbar conjunctival hyperemia from episcleral congestion associated with serious intraocular disease (iritidocyclitis, intraocular neoplasms, and glaucoma).

Nonspecific Conjunctival Responses to Disease

1. **Conjunctival Hyperemia** frequently occurs in response to a variety of local and systemic diseases. Unless other criteria for inflammation are fulfilled, conjunctival hyperemia should not be used synonymously with conjunctivitis.
2. **Conjunctival Hemorrhage** - conjunctival capillaries rupture easily when traumatized. Hemorrhage usually occurs into the subconjunctival tissue. Treatment is not necessary and the hemorrhage will spontaneously resolve in several days. However, conjunctival hemorrhage should alert the clinician to perform a complete ophthalmic examination to determine if concurrent intraocular damage has occurred.
3. **Chemosis** - edema of the conjunctiva may result from local allergic reactions, irritating/traumatic stimuli, in concert with infectious (upper respiratory) disease (chlamydiosis in cats), or obstruction of orbital venous drainage. Affected tissue appears pale or dark and swollen, often "ballooning" through the palpebral fissure. Chemosis will resolve without complication following correction of its underlying cause.
4. **Lymphoid Follicle Formation** - proliferation of small lymphoid follicles are normally present on the bulbar surface of the nictitating membrane. Under pathologic conditions, they can also appear on any of the conjunctival surfaces. In most situations, follicles suggest chronic physical irritation (e.g., entropion, trichiasis) or antigenic stimulation (e.g., allergies).
5. **Pigmentation** – chronic irritation (trichiasis, ectopic cilia, keratoconjunctivitis sicca [KCS]) or inflammation may result in hyperpigmentation of the conjunctival epithelium.
6. **Ocular Discharge** - varies with the type of disease: serous (viral, allergic); mucoid to mucopurulent (KCS); purulent (bacterial).

Conjunctivitis

Primary conjunctivitis attributable to infectious pathogens is exceedingly rare in dogs.⁶ In contrast to canine conjunctivitis, feline conjunctivitis is almost always primary and attributable to infectious pathogens (viral, chlamydial, or bacterial).⁷⁻⁹ Bacterial conjunctivitis in dogs almost always occurs secondary to an underlying disease that alters normal resident conjunctival flora and favors bacterial proliferation. Common causes of conjunctivitis in the dog include:

Allergy/Hypersensitivity - associated with atopy and other forms of allergic dermatitis.

- a. **Follicular conjunctivitis:** usually from chronic antigenic stimulation (entropion, allergy). Small, clear vesicles are typically present in the ventral conjunctival cul-de-sac of young, large-breed dogs. Topical treatment with corticosteroids is indicated. In severe, acute situations, allergic conjunctivitis may cause a serous ocular discharge and profound chemosis. In chronic cases, hyperemia and mucoid discharge are more typical and less likely to resolve in response to topical corticosteroid administration.
- b. **Plasma cell conjunctivitis** occurs most frequently in German shepherds and appears as a thickened, "cobblestone" appearance to the surface of the nictitating membrane. It may occur in conjunction with

subepithelial corneal infiltration (pannus). This is a treatable disease but is not curable. Topical corticosteroids and/or topical cyclosporine are indicated.

Common causes of conjunctivitis in the cat include:

1. **Herpesvirus (FHV-1).** Feline herpesvirus-1 is the most common cause of conjunctivitis in cats.⁷⁻⁸ It may appear similar clinically to chlamydial conjunctivitis but chemosis is not dramatic except in young cats or naïve adults. In young cats, the disease is bilateral but is usually unilateral in adult cats. The virus establishes latency in neurosensory ganglia and recurrences are common. In young kittens, symblepharon formation or KCS may occur secondary to ulcerative disease. FHV-1 conjunctivitis usually has a clinical course of 10-21 days, but persistent infection is possible. Immunosuppression (FIV, FeLV, stress, and treatment with corticosteroids or immunosuppressive drugs) may be evident in chronically affected cats. Diagnosis is based primarily on typical clinical signs and results of PCR testing is supportive of the diagnosis. Topical tetracycline may be prescribed for cats with mild acute disease to prevent secondary *Mycoplasma* overgrowth. Antiviral drugs (trifluridine) should be administered to cats with severe acute or chronic, unresponsive disease. Recent evidence suggests that L-lysine (250–500 mg PO, q 12 h) is effective in preventing shedding of the virus and decreasing the severity of clinical signs in experimentally infected cats.¹⁰⁻¹¹
2. **Chlamydia** – *Chlamydia felis* is a primary conjunctival pathogen in cats. Chlamydiosis may be associated with upper respiratory disease in adolescent cats but is rarely clinically evident in adult cats. The hallmark signs of chlamydial conjunctivitis is chemosis that begins unilaterally but becomes bilateral in 4-7 days.⁸ Another clinical sign described as being suggestive of chlamydiosis is conjunctival lymphoid follicle formation. Conjunctival cytology may reveal inclusion bodies during the acute disease. *Chlamydia* can be diagnosed from conjunctival scraping samples by PCR testing. Immunofluorescent antibody IFA, which used to be the “gold standard,” is still offered by many diagnostic laboratories. If selected as diagnostic test, do not instill fluorescein prior to collection of samples for IFA analysis; doing so will result in false positive test results. Treatment requires administration of topical tetracycline (mature cats) or chloramphenicol (juvenile cats) q 6 h for 14 - 21 days.
3. **Mycoplasma** - In cats, *Mycoplasma felis* has been incriminated in causing conjunctivitis, but may be normal resident bacteria of the feline conjunctiva. Attempts to experimentally induce mycoplasmal conjunctivitis in cats is invariably unsuccessful. Mycoplasmal conjunctivitis in cats may occur secondary to viral (feline herpesvirus-1, FHV-1) or chlamydial conjunctivitis. *Mycoplasma* is an opportunistic organism and may be responsible for bacterial overgrowth in concert with other ocular disease (FHV-1, Chlamydia). *Mycoplasma felis* is frequently susceptible to tetracycline, gentamicin, or chloramphenicol.
4. **Calicivirus** – is a very rare cause of conjunctivitis in cats.⁸ Most reports detail experimental infection, not naturally occurring infection.
5. **Eosinophilic conjunctivitis.** Eosinophilic conjunctivitis is characterized by raised follicles in the bulbar conjunctiva near limbus, or a more generalized thickened, friable conjunctival surface.¹² Concurrent corneal stromal infiltration may be evident. Cytologic examination of samples acquired from conjunctival scraping reveals eosinophils. Approximately 76% of cats with eosinophilic keratitis are positive by PCR analysis for FHV-1.¹³ I recommend treating with topical alpha interferon (1 drop q 6 h) and L-lysine 250 mg PO, q 12 h.

Conjunctival Foreign Bodies

Foreign bodies may become trapped behind the nictitating membrane and induce conjunctival irritation and inflammation, and ulceration of the ventronasal cornea. Always evaluate behind the nictitating membrane after topical anesthetic is instilled. Foreign body should be removed using fine forceps and treatment with a broad-spectrum topical and oral antibiotic is indicated.

Abnormalities of the Nictitating Membrane

Movement or protrusion of the nictitating membrane is passive in the dog. Protrusion occurs secondary to retraction of the globe into the orbit which causes forward displacement of orbital fat and protrusion of the membrane. The cat is capable of active protrusion of the nictitating membrane. The nictitating membrane has sympathetic innervation which acts to retract the membrane. Sympathetic denervation (Horner’s syndrome) results in protrusion of the membrane. Excursion of the membrane distributes the tear film and protects the cornea. The palpebral surface can be examined by retropulsion of the globe. Examination of the bulbar surface requires topical anesthesia and gentle use of non-toothed forceps.

Congenital Abnormalities

1. **Encircling third eyelids** - considered a normal in the American Cocker spaniel.
2. **Congenital hypopigmentation** - often misdiagnosed as protrusion when unilateral.

3. **Eversion or Inversion of the Cartilage** – Abnormalities of the cartilage of the nictitating membrane occurs most frequently in the Great Dane, Irish Wolfhound, St. Bernard, and German shorthaired pointer. A scroll-like curling of the cartilage results in inward or outward rolling of the nictitating membrane. This may result in decreased function and chronic irritation due to exposure. Epiphora may result if tear outflow is compromised. Treatment requires careful excision of the abnormally scrolled segment of cartilage. Scrolled cartilage may occur concurrently with prolapsed gland of the nictitating membrane.

Acquired Abnormalities

1. **Prolapse of the Gland of the Nictitating Membrane** (“cherry eye”) - occurs secondary to weak supportive connective tissues which normally anchor the base of the gland to the ventral orbital rim. The gland may subsequently undergo hypertrophy after prolapse. The Beagle, English bulldog, Boston terrier, Cocker spaniel, and Shar Pei are predisposed. It is important to note that all breeds that are predisposed to prolapse of the gland of the nictitating membrane are also predisposed to development of keratoconjunctivitis sicca (KCS). Excision may predispose dogs to development of KCS. For this reason, the preferred treatment is replacement of the gland. Restoration of the gland to its normal position preserves tear production. Techniques described² for replacement include suturing the gland to: 1) adjacent sclera; 2) extraocular muscle tendon; 3) ventral endorbita of the orbital rim. The best technique to use in instances where the gland has recently prolapsed or has not been surgically replaced previously is the conjunctival imbrication (“Pocket”) technique.¹⁴

2. **Protrusion of the Nictitating Membrane**

Protrusion may occur secondary to:

- active retraction of the globe (ocular pain response)
- orbital mass effect (e.g., a space-occupying mass in the orbit)
- loss of orbital mass (starvation, dehydration – always bilateral)
- sympathetic denervation (Horner’s syndrome)
- decreased ocular mass (microphthalmia, phthisis bulbi)
- skull conformation-related phenomenon (dolichocephalics)
- dysautonomia
- tetanus
- gastrointestinal disease (parasites, diarrhea)

3. **Neoplasia**

Neoplasia of the nictitating membrane is uncommon in small animals. Adenoma/adenocarcinoma of the gland of the nictitating membrane, melanoma, fibrosarcoma, and lymphoma have been reported in dogs and cats. The only indication for removal of the entire third eyelid is confirmed neoplasia.

References

- Angarano DW. Dermatologic disorders of the eyelid and periocular region. In: Kirk RW, ed: *Current Veterinary Therapy X*. Philadelphia: WB Saunders, 1989, pp. 678-681.
- Moore CP, Constantinescu GM. Surgery of the adnexa. *Vet Clin N Am Small Anim Prac* 27(5):1011-1066, 1997.
- Bedford PGC. Diseases and surgery of the canine eyelid. In: Gelatt KN, ed: *Veterinary Ophthalmology* 3rd ed. Philadelphia: Lea & Febiger, 1999, pp.535-568.
- Roberts SM, Severin GA, Lavach JD. Prevalence and treatment of palpebral neoplasms in the dog: 200 cases (1975-1983). *J Am Vet med Assoc* 189:1355, 1986.
- McLaughlin, SA, Whitley RD, Gilger BC, et al. Eyelid neoplasm in cats: a review of demographic data (1979-1990). *J Am Vet med Assoc* 29:63-67, 1993.
- Gilger BC. Diagnosis and treatment of canine conjunctivitis. In: Bonagura JD, ed. *Kirk’s Current Veterinary Therapy XIII Small Animal Practice*. Philadelphia: WB Saunders, 2000, pp.1053-1054.
- Stiles J. Feline Herpesvirus. *Vet Clin N Am Small Anim Prac* 30(5):1001-1014, 2000.
- Ramsey DT. Feline chlamydia and calicivirus infections. *Vet Clin N Am Small Anim Prac* 30(5):1015-1028, 2000.
- Whitley RD. Canine and feline primary ocular bacterial infections. *Vet Clin N Am Small Anim Prac* 30(5):1151-1167, 2000.
- Maggs DJ, Collins BK, Thorne JG, et al. Effects of L-lysine and L-arginine on in vitro replication of feline herpesvirus type-1. *Am J Vet Res* 61(12):1474-1478:2000.
- Stiles J, Townsend W, Rogers Q, et al. The effect of L-lysine on the course of feline herpesvirus conjunctivitis. *Proc Am Coll Vet Ophthalmol* 31:30:2000.
- Pentlauge VW. Eosinophilic conjunctivitis in five cats. *J Am Anim Hosp Assoc* 27:21-28:1991.

Nasisse MP, Luo H Wang YJ, et al. The role of feline herpesvirus-1 (FHV-1) in the pathogenesis of corneal sequestration and eosinophilic keratitis. *Proc Am Coll Vet Ophthalmol* 27;80:1996.

Morgan RV, Duddy JM, McClurg K. Prolapse of the gland of the third eyelid in dogs: A retrospective study of 89 cases(1980-1990). *J Am Anim Hosp Assoc* 29;56-62:1993.

Figure Legends

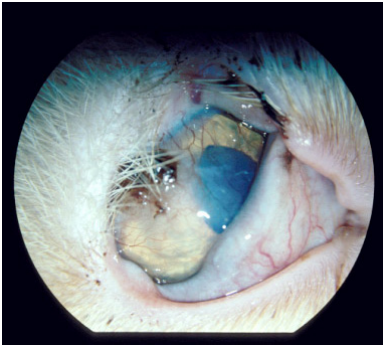


Figure 1. Agenesis (coloboma) of the upper lateral 2/3 of the eyelid is evident in this 6-month-old cat. Only the upper medial 1/3 of the lid is present. Trichiasis and fibrovascular keratitis are also present.

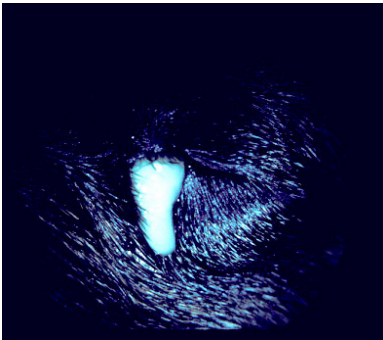


Figure 2. Ophthalmia neonatorum is present in this 16-day-old German Shepherd puppy. Purulent exudate is emanating from the medial aspect of the palpebral fissure after gently massaging the fused lids with a moist, warm cotton ball.



Figure 3. Two dermoids of the lower eyelid are present in this 5-month-old Shetland Sheepdog. Surgical excision and a blepharoplastic procedure were necessary to correct the defect.

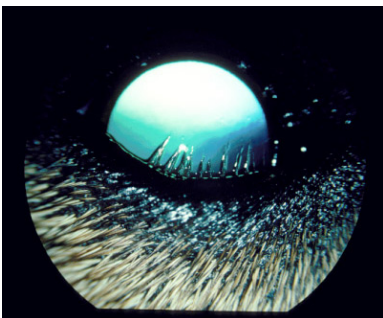


Figure 4. Distichiasis is characterized by cilia arising from the Meibomian gland openings along the eyelid margin. Distichia in this dog resulted in profound epiphora but the cornea appeared normal

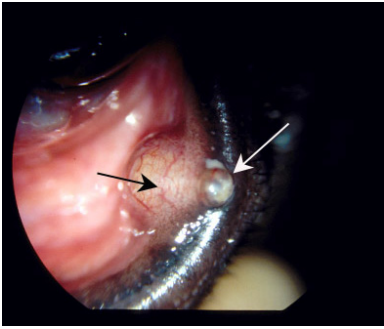


Figure 5. A chalazion (arrow) is present secondary to a Meibomian gland adenoma (small arrow) of the upper eyelid of this dog.



Figure 6. Meibomitis is characterized clinically as yellow to cream colored purulent material emanating from the Meibomian gland openings along the eyelid margin. Blepharitis is also present



Figure 7. A histiocytoma of the central part of the lower eyelid is present in this 9-month-old male Miniature Schnauzer. The histiocytoma regressed spontaneously without treatment.

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