Lake Shore Pet Hospital

Nonulcerative Keratitis

(Type of Inflammation of the Cornea)

Basics

OVERVIEW

- "Keratitis" is inflammation of the cornea; the "cornea" is the clear outer layer of the front of the eye
- The "corneal epithelium" is the top surface layer of the cornea; the "corneal stroma" is the thick, clear middle layer of the cornea; the "corneal endothelium" is the inner lining layer of the cornea
- "Nonulcerative keratitis" is an inflammatory disorder of the cornea that does not retain fluorescein stain; "fluorescein stain" is a dye that is used to identify ulcers of the cornea—if the very top layer of the cornea has been disrupted (as with an ulcer), the dye will enter the lower layers of the cornea and will cause a temporary stain that glows under an ultraviolet light; in nonulcerative keratitis, the top layer of the cornea is not disrupted, so no dye enters the lower layers of the cornea

GENETICS

- No proven genetic basis in dogs or cats
- Long-term (chronic) superficial inflammation of the cornea (keratitis), also known as "pannus"—inherited susceptibility considered in the German shepherd dog

SIGNALMENT/DESCRIPTION OF PET

Species

- Dogs
- Cats

Breed Predilections

Dogs

- Long-term (chronic) superficial inflammation of the cornea (keratitis), also known as "pannus"—may occur in any breed; high likelihood in German shepherd dogs and sight hounds
- Inflammation characterized by the presence of pigment (melanin) that is deposited in the cornea (known as "pigmentary keratitis")—seen in short-nosed, flat-faced (known as "brachycephalic") breeds of dogs with inflammation of the cornea due to exposure to air and irritants (known as "exposure keratopathy") from a condition in which the eyelids do not close completely (known as "lagophthalmos") and tear-film deficiencies; prominent folds of skin around the nose; abnormal eyelashes that turn inward, against the cornea (known as

"trichiasis"); identified in Lhasa apsos, shih tzus, Pekingese, and other brachycephalic breeds
- Pigmentary keratitis of pugs—suspect genetic condition; results in progressive pigmentation of the cornea
- Inflammation usually involving the area where the cornea (clear part of the eye) and the sclera (white part of the eye) come together, characterized by the presence of nodules (condition known as "nodular granulomatous episcleritis")—may occur in any breed; more likely in cocker spaniels, collies, and Shetland sheepdogs
- "Dry eye" (known as "keratoconjunctivitis sicca" or KCS)—seen in short-nosed, flat-faced (brachycephalic) breeds; cocker spaniels, English bulldogs, West Highland white terriers, Cavalier King Charles spaniels

Cats

- Inflammation of the cornea, characterized by the presence of eosinophils (known as "eosinophilic keratitis")—domestic shorthair; the "eosinophils" are a type of white blood cell; they are involved in allergic responses by the body and are active in fighting larvae of parasites
- Herpesvirus (stromal form)
- Condition in which part of the cornea tissue dies, leaving a pigmented lesion and fluid buildup (known as edema; condition known as "corneal sequestration")—most prevalent in Persians, Siamese, Burmese, and Himalayans
- KCS uncommon in cats, usually following long-term herpesvirus infection

Mean Age and Range

- Long-term (chronic) superficial inflammation of the cornea (keratitis), also known as "pannus"—may occur at any age; higher risk at 3–6 years of age (younger in greyhounds)
- Inflammation characterized by the presence of pigment (melanin) that is deposited in the cornea (pigmentary keratitis)—may occur at any age
- Inflammation usually involving the area where the cornea (clear part of the eye) and the sclera (white part of the eye) come together, characterized by the presence of nodules (nodular granulomatous episcleritis)—may occur at any age; in collies—young to middle-aged dogs (mean age, 3.8 years)
- "Dry eye" (KCS)— usually middle-aged to older dogs
- Herpesvirus in cats—all ages
- Eosinophilic keratitis and condition in which part of the cornea tissue dies, leaving a pigmented lesion and fluid buildup (known as "corneal sequestration") in cats—all ages, except newborns

Predominant Sex

- Dogs—female dogs more likely to develop pannus or KCS than male dogs
- Cats—neutered male cats have been reported to be more likely to have inflammation of the cornea, characterized by the presence of eosinophils (eosinophilic keratitis) than other cats

SIGNS/OBSERVED CHANGES IN THE PET

- May cause variable change in color of the cornea
- Variable eye discomfort

Dogs

- Long-term (chronic) superficial inflammation of the cornea (keratitis), also known as "pannus"—usually involves both eyes; often new blood vessels grow onto cornea (known as "corneal vascularization"); thick tissue spots with variable pigmentation; usually seen on the outer and/or lower part of the cornea; third eyelids may be affected and appear thickened or lose their color (depigmented); white deposits may be present at the leading edge of the lesion; may lead to blindness in advanced disease
- Inflammation characterized by the presence of pigment (melanin) that is deposited in the cornea (pigmentary keratitis)—appears as focal to diffuse brown discoloration of the cornea; often associated with corneal vascularization or scarring
- Pigmentary keratopathy of pugs—brown pigment forms on the cornea on the side near the eyes, and progresses towards the center of the eyes
- Inflammation usually involving the area where the cornea (clear part of the eye) and the sclera (white part of the eye) come together, characterized by the presence of nodules (nodular granulomatous episcleritis)—usually involves both eyes; raised pink to tan lesions of the outer part of the cornea; slow to rapidly progressive; deposits and fluid buildup (corneal edema)also may occur in adjacent corneal tissue; third eyelids may appear thickened
- "Dry eye" (KCS)—variable findings; may involve one or both eyes; discharge from the eye(s) may have mucusy

eye discharge; redness of the moist tissues of the eye (known as “conjunctival hyperemia”); encroachment of blood vessels into corneal tissue (corneal vascularization); pigmentation; scarring; loss of surface corneal tissue (corneal ulceration) may occur

Cats

- Herpesvirus (stromal form; involves the thick, clear middle layer of the cornea [known as the “stroma”])—may involve one or both eyes; fluid buildup in the cornea (known as “corneal edema”), infiltrates, encroachment of blood vessels deep into corneal tissue (corneal vascularization), scarring; often occurs with ulceration; may threaten vision, if severe scarring
- Inflammation of the cornea, characterized by the presence of a type of white blood cell, called an “eosinophil” (condition known as “eosinophilic keratitis”)—usually involves only one eye; appears as raised white-pink gritty corneal plaque with roughened surface; may retain fluorescein stain at the edge of the lesion
- Condition in which part of the cornea tissue dies, leaving a pigmented lesion and fluid buildup (known as edema; condition known as “corneal sequestration”)—usually involves only one eye, but can involve both eyes; appears as amber, brown, or black plaques at or near the center of the cornea; can vary in size and corneal depth; edges may appear raised because of fluid buildup in the cornea (corneal edema); thickened tissue; encroachment of blood vessels into corneal tissue (corneal vascularization) is variable; may retain fluorescein at edge of lesion

CAUSES

Dogs

- Long-term (chronic) superficial inflammation of the cornea (keratitis), also known as “pannus”—presumed to be immune-mediated; high altitude and subsequent greater ultraviolet radiation exposure increase the likelihood and severity of the disease
- Inflammation characterized by the presence of pigment (melanin) that is deposited in the cornea (pigmentary keratitis)—secondary to long-term (chronic) corneal irritation; evaluate for primary underlying eye conditions; more frequently associated with exposure corneal disease (exposure keratopathy) and “dry eye” (KCS)
- Pug pigmentary keratopathy—thought to be genetic
- Inflammation usually involving the area where the cornea (clear part of the eye) and the sclera (white part of the eye) come together, characterized by the presence of nodules (nodular granulomatous episcleritis)—presumed to be immune-mediated
- “Dry eye” (KCS)—involving both eyes: usually caused by immune-mediated inflammation of the lacrimal gland that produces tears (condition known as “dacryoadenitis”) or secondary to administration of certain medications (that is, a side-effect of the drug); involving one eye: congenital (present at birth), of unknown cause (known as “iatrogenic KCS”), or caused by an abnormality involving the nervous system (known as “neurogenic KCS”)

Cats

- Herpesvirus (stromal form)—believed to be immune-mediated reaction to herpesvirus antigen rather than an actual effect of the viral infection
- Eosinophilic keratitis—possible allergic (hypersensitivity) reaction; many cats test positive for feline herpesvirus-1 (FHV-1), with fewer positive for Chlamydophila-like agents
- Corneal sequestration—unknown; likely due to long-term (chronic) corneal irritation or ulceration; suggested relationship with previous herpesvirus infection

RISK FACTORS

- Dogs—long-term (chronic) superficial inflammation of the cornea (keratitis), also known as “pannus”—more likely to occur at high altitudes secondary to greater ultraviolet radiation exposure

Treatment

HEALTH CARE

- Outpatient—generally sufficient
- Inpatient—cases that warrant surgery due to inadequate response to medical therapy

SURGERY

Dogs

- Pannus—surgical removal of the surface of the cornea (known as “superficial keratectomy”) for severe disease, in which vision is impaired due to corneal pigmentation; even if surgery is performed, pets still require indefinite medical treatment to prevent recurrence; radiation therapy (using β-irradiation with a strontium-90 probe) in severe cases
- Pigmentary keratitis—surgical removal of the surface of the cornea (superficial keratectomy) may be performed only after initial underlying cause is corrected; surgery only in severe cases in which inflammation threaten vision
- Pigmentary keratitis of pugs—high likelihood of recurrence after superficial keratectomy
- Nodular granulomatous episcleritis)—surgical removal of the surface of the cornea (superficial keratectomy) is diagnostic; usually unnecessary; only temporarily resolves clinical signs; medical treatment still is required
- “Dry eye” (KCS)—surgically move the duct from the parotid salivary gland to the eye (procedure known as a “parotid duct transposition”), the saliva then acts as “tears” in the eye, or permanent partial closure of the eyelids (surgical procedure known as a “tarsorrhaphy”) may be indicated

Cats

- Eosinophilic keratitis—surgical removal of the surface of the cornea (superficial keratectomy) is diagnostic, but not curative; medical treatment is preferred
- Corneal sequestration—surgical removal of the surface of the cornea (superficial keratectomy) may be curative; recurrence is possible; eye discomfort is primary indication for surgery

Medications

Medications presented in this section are intended to provide general information about possible treatment. The treatment for a particular condition may evolve as medical advances are made; therefore, the medications should not be considered as all inclusive

DOGS

- Pannus (chronic superficial keratitis)—steroids (1% prednisolone or 0.1% dexamethasone) applied to the eye directly (known as “topical treatment”); 0.2–2% cyclosporine ointment to decrease the immune response, applied to the eye directly (topical treatment); 1% pimecrolimus; 0.03% tacrolimus; these medications can be used alone or in combination for more severe cases; steroid (triamcinolone) injection under the moist tissues of the eye (known as “subconjunctival injection”) can be used in addition to topical therapy in severe cases
- Pigmentary keratitis— treat underlying cause; topical steroids, if primary cause is inflammatory; lubricants and cyclosporine or tacrolimus, if primary condition is “dry eye” (KCS); cyclosporine or tacrolimus may reduce pigmentation
- Nodular granulomatous episcleritis—steroids and/or cyclosporine applied to the eye directly (topical treatment); systemic azathioprine (a chemotherapeutic agent used to decrease the immune response) may be effective when used alone or in combination with topical medications
- “Dry eye” (KCS)—topical 0.2–2% cyclosporine or 0.02–0.03% tacrolimus

CATS

- Herpesvirus—topical (applied to the eye directly) antiviral agents (such as trifluridine [Viroptic™], idoxuridine, and cidofovir); for disease of the thick, clear middle layer of the cornea (the stroma); for inflammation, topical nonsteroidal anti-inflammatory drugs (NSAIDs) or cyclosporine may be used; oral lysine also may be of benefit; for severe cases, the oral antiviral agent, famciclovir, has been used
- Eosinophilic keratitis—steroids (1/8 to 1% prednisolone or 0.1% dexamethasone) applied to the eye directly (topical treatment) usually causes remission; steroids should be used with caution and the pet monitored for ulceration or worsening of clinical signs; topical antiviral medications can be used in combination with steroids, if herpesvirus infection is suspected; use of topical cyclosporine has had variable results; for severe cases that do not respond to medical treatment, megestrol acetate can be considered; megestrol acetate has side effects that you should discuss with your pet's veterinarian
- Corneal sequestration—triple antibiotic applied to the eye directly (topical treatment) as directed by your pet's veterinarian for associated corneal ulceration; artificial tear lubrication may relieve discomfort; topical antiviral medications can be used, if herpesvirus infection is suspected; topical 1% atropine ointment may be used to treat pain associated with coexistent inflammation of the front part of the eye, including the iris (known as “anterior

uveitis"), if clinical signs suggestive of uveitis are present

Follow-Up Care

PATIENT MONITORING

- Periodic eye examinations to evaluate effectiveness of treatment; likely examine at 1- to 2-week intervals, gradually lengthening the interval with remission or resolution of clinical signs

POSSIBLE COMPLICATIONS

- Continued eye discomfort
- Visual defects
- Blindness in severe cases
- Complete resolution of pigment may not occur

EXPECTED COURSE AND PROGNOSIS

- Depend on disease and underlying cause

Key Points

DOGS

- All affected pets require lifelong treatment
- Nonulcerative keratitis is controlled rather than cured
- Surgery may be needed for treatment; some pets will continue to need medical treatment following surgery
- Long-term (chronic) superficial inflammation of the cornea (keratitis), also known as "pannus"—ultraviolet light protection (such as tinted goggles) is recommended for affected dogs

CATS

- Herpesvirus—eye discomfort and inflammation of the cornea (keratitis) often recur
- Inflammation of the cornea, characterized by the presence of a type of white blood cell, called an "eosinophil" (condition known as "eosinophilic keratitis")—disease controlled rather than cured
- Condition in which part of the cornea tissue dies, leaving a pigmented lesion and fluid buildup (known as edema; condition known as "corneal sequestration")—the pigmented lesion (known as a "sequestrum") may slough spontaneously; clinical course often prolonged without surgery; removal of sequestrum by surgical removal of the surface of the cornea (superficial keratectomy) may be curative, although it may recur post-operatively