

## THIRD EYELID

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### Reading Assignments

**Required:** This handout

**Recommended:** Third Eyelid in Slatter's Fundamentals of Veterinary Ophthalmology by David J Maggs, Paul E. Miller and Ron Ofri.

### Objectives:

1. To describe the normal clinical anatomy, examination, and function of the third eyelid.
2. To discuss diagnostic and therapeutic techniques for disorders of the third eyelid.

### I. Surgical Anatomy

- A. Synonyms** - Nictitating membrane, membrana nictitans, palpebra tertia, haw.
- B. Anatomy**--A modified conjunctival fold in the medial canthus of most domestic mammals.
  - 1. Conjunctiva**
    - a. bulbar surface - the concave side facing the globe.
    - b. palpebral surface - the convex side facing the lids.
  - 2. Lymphoid tissue**--Diffuse lymphoid follicles are located under the bulbar conjunctival surface and may give the surface a cobblestone appearance.
  - 3. Cartilage**- The flat T-shaped hyaline cartilage structurally supports the third lid.
    - a. The arms of the cartilage are near, and parallel with, the leading margin of the lid.
    - b. The stem of the cartilage extends to the medial canthus and is embedded in the gland of the 3rd lid.
  - 4. Gland of the third eyelid**--Contributes 30-50% of the aqueous portion of the tear film via multiple very small ductules that enter the bulbar conjunctival surface near the fornix. Fine fibrous attachments between the gland of the third eyelid and the periorbital tissue limit the gland's movement and prevent it from prolapsing.
  - 5. Vasculature** --A small artery entering the base of the third eyelid may need ligation when

performing an enucleation.

#### 6. **Innervation**

- a. Sensation is mediated by CN 5.
- b. Sympathetic fibers.

#### 7. **Smooth muscle** - variable amounts near the base of the lid

### C. **Movement of the third eyelid**

#### 1. **Dog and Cat**

- a. Primarily passive as globe retraction by the retractor bulbi muscle results in a superio-temporal movement.
- b. Sympathetic tone plays a role as the third eyelid elevates with sympathetic denervation in Horner's syndrome.

#### 2. **Birds**

- a. Movement voluntarily controlled via skeletal muscles.
- b. Movement is from dorsonasal to ventrotemporal.

### D. **Function**

1. Spread tear film over the corneal surface.
2. Protection of the cornea and removal of foreign material from the corneal surface.
3. Accessory lacrimal gland that secretes 30-50% of the pre-corneal tear film.
4. Immunologic activity via the lymphoid follicles on the bulbar surface of the third lid.

### E. **Examination**

1. Retropulse globe - Lets you examine the palpebral surface.
2. Topical anesthesia and eversion with a forceps is needed to see the bulbar surface. Topical anesthesia often just anesthetizes the conjunctival surface and repeated application just increases the duration of anesthesia and not its depth. A cotton tipped applicator soaked in anesthetic and held against the area may give a deeper level of anesthesia. If this fails,

sedation or general anesthesia may be necessary.

## **II. Congenital defects**

**A. Pigment variations** - The margin of the third eyelid may or may not be pigmented.

1. A nonpigmented 3rd lid can give the false impression of inflammation especially if one 3rd lid is pigmented and the other is not.
2. A nonpigmented 3rd lid may predispose to squamous cell carcinoma.

**B. Encircling Third Eyelid**--A band and/or ridge of tissue on the bulbar conjunctiva encircling the globe to a varying degree. Common and does not cause any problem. Occasionally is mistaken for a foreign body or conjunctival laceration.

**C. Inversion Or Eversion of the Cartilage**--A spontaneous bend in the stem of the cartilage of the third eyelid affecting young (<6 mos) large breed dogs. The horizontal arm or just the edges of the arm is occasionally affected. Its usually not a problem and only the abnormal portion of cartilage should be excised if the owner wants a more cosmetic appearance or there is a chronic low grade irritation. Is differential diagnosis for prolapse of the gland of the third eyelid, and may complicate "cherry eye".

## **III. Acquired Defects**

**A. Prolapse of the Gland of the Third Eyelid ("Cherry Eye"). Common**

1. The gland everts over the free margin of the third eyelid while remaining attached to the cartilage and base of the lid. May be the result of aplasia or hypoplasia of the connective tissue attachments between the base of the gland and the periorbital tissues, and may be congenital/inherited.
2. Unilateral or bilateral. One gland may prolapse a few days to months before the other. Often seen in dogs 3-12 months of age. In older dogs you should rule out neoplasia.
3. Any breed but most often in Cocker Spaniel, Bulldog, Basset Hound, and Beagle.
4. Therapy - Many practitioners excise the gland because it is technically simpler, because they are uncomfortable with replacement procedures, and because they feel that they do not see KCS as a sequelae. I would encourage you to replace the gland as KCS really does occur in many of these dogs following excision (but usually several years later) and life-long medication is a lot more complicated than the replacement procedures.
  - a. In one study, of 160 dogs presented for dry eye, 38 had the gland of the third eyelid resected (this percentage is obviously much greater than the frequency of gland

excision in the general population).

- b. In another study of 89 cases of "cherry eye" by Rhea Morgan: 48% of dogs treated by excision of the gland developed KCS but did so an average of 3 years later (the earliest was 6 months). Possibly the remaining lacrimal gland "burns itself out" from chronic overproduction over time. If the gland was left prolapsed, 43% developed KCS. If the gland was replaced, 14% developed KCS; and 5% of the "normal" eyes (those without a prolapsed gland), developed KCS. Dogs with a tendency for "cherry eye" are at a higher risk for KCS than the general population.
- c. See surgery manual for surgical technique. Multiple procedures for replacement exist but I prefer the techniques outlined on pp 153-154 in Slatter's for most cases.

**B. Foreign bodies**--Always look behind the 3<sup>rd</sup> lid in cases of unexplained corneal ulcers--especially in hunting dogs.

**C. Trauma**--Lacerations often after fights with cats. Try to preserve the function of the eyelid.

1. Minor lacerations with only small tears of the free edge of the lid can be treated by trimming the edge under topical anesthesia to remove any trailing edges only if it will not interfere with the function of the lid.
2. Extensive lacerations should be carefully reconstructed under general anesthesia with minimal debridement, magnification, and fine suture material placed on the palpebral surface to avoid corneal irritation.

**D. Lymphoid hyperplasia (follicular conjunctivitis)** -- Very common. Is due to chronic irritation and immunologic stimulation initiating proliferation of the normally present follicles on the bulbar aspect of the lid. In chronic cases follicles may develop on the palpebral or bulbar conjunctiva and may become self-perpetuating as the follicles create irritation.

1. **Dog** --Most common species affected.
  - a. Usually young dogs with a grey mucoid discharge.
  - b. Etiologies include any chronic irritation, dust, pollens, allergens etc. It does not necessarily indicate an infectious process but in some cases it is secondary to bacterial or viral infections.
  - c. Therapy
    - 1) mild cases -- topical antibiotic/corticosteroids alone.
    - 2) Severe/chronic cases -- usually the follicles are removed by abrasion with a gauze or scraping with a scalpel blade then use a topical corticosteroid/Abx.

2. **Cats** -- Usually an infectious etiology is present in these species. Follicles are very suggestive of chlamydial infections (and occasionally mycoplasma).

#### **E. Inflammatory Hyperplasia**

1. **Plasma cell infiltration (Plasmoma)**--Often in the German Shepherd where the third lid is diffusely infiltrated and thickened by plasma cells. It may be seen in conjunction with degenerative pannus lesions of the cornea or by itself. Treatment is with topical corticosteroids and it usually more difficult to manage than corneal pannus.
2. **Fibrous Histiocytoma**-- Most common in Collies and Collie crosses. Lesions can be seen on the third eyelid, or cornea/sclera/conjunctiva to varying degrees. It is a smooth, raised, benign lesion which is locally invasive and disfiguring if extensive. A biopsy is usually necessary to confirm the diagnosis and to rule out other tumors. Most are steroid responsive but recurrent; and chronic anti-inflammatory therapy is usually needed.

#### **F. Neoplasia** –Rare. The main indication for surgical excision of part or all of the third eyelid.

1. **squamous cell carcinoma**- most common, especially in cattle, horses, and cats.
2. **adenoma/adenocarcinoma of the gland** - rule out in old dogs with "cherry eye".
3. **Melanomas** of the third eyelid - potentially malignant and behave as oral melanomas.
4. other neoplasms.

#### **G. Differential Diagnosis of Protrusion of the 3rd Lid**--Since movement of the third eyelid is passive, lesions which result in protrusion of the third eyelid usually reflect conditions affecting the orbital contents or smooth muscle tone.

1. **Physiologic**-- Animals which are relaxed (near sleep) or very tired from exercise etc..
2. **Pathologic**
  - a. Secondary to enophthalmia
    - 1). pain-- results in retraction of the globe via stimulation of the retractor bulbi muscle. Most common reason for pathological prolapse.
    - 2). loss of orbital mass from atrophy, dehydration, debilitating disease, microphthalmia, phthisis bulbi
    - 3). neurologic: Horner's syndrome, "Haws" in cats, Tetanus, rabies, canine distemper,

meningitis

- 4). drugs: tranquilizers, local irritants like pilocarpine
- b. Exophthalmia - secondary to increased orbital contents
- 1). inflammation, hemorrhage etc.
  - 2). neoplasia
- c. "Haws" Syndrome in cats (and occasionally dogs)
- 1). The third eyelid may become prominent following transient upper respiratory infection or gastroenteritis. The etiology is unknown but may be due to decreased sympathetic tone (possibly via a superior cervical ganglionitis).
  - 2). Some associate it with parasites such as *Dipylidium caninum* (tapeworms) and *Spirometra* spp
  - 3). Is a bilaterally symmetrical condition in which all other etiologies have been ruled out. Usually self-limiting with a 2-8 week course. If the patient is blinded by the protrusion, symptomatic relief can usually be obtained with 1% (not 10%) topical phenylephrine twice a day until it spontaneously resolves.
  - 4). Permanent protrusion of the third eyelid which impairs the visual axis can be treated surgically by excising a full thickness ellipse of tissue from the mid portion of the lid. This restricts the motion of the lid and prevents it from cleaning off the corneal surface and spreading the tear film, therefore this procedure should only be performed when vision is significantly impaired and there is no hope of a return of function.

#### **IV. Third Eyelid Flap** - Three techniques are available.

**A. Suturing to the bulbar conjunctiva**--Provides a tighter seal and a lid that moves with the globe but is technically more difficult to perform.

#### **B. Suturing to the upper lid**

1. In the lateral canthus area with 2 or more sutures that pass either full or partial thickness through the third lid.
2. Suturing to the upper eyelid by using 1 suture to pass through the palpebral conjunctiva, around the stem of the T cartilage (but not through the bulbar conjunctiva) and back out the palpebral conjunctiva.

