HOW I TREAT... EPIPHORA IN RABBITS AND RODENTS

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INTRODUCTION

The term epiphora refers to heavy and constant tearing due to an alteration in the drainage of the nasolacrimal duct or excessive tear production. This condition causes moistening of the medial canthus of the eye.

Excessive tearing is a common complaint in small mammals’ practice, especially in rabbits and hystricomorpha rodents such as chinchillas and Guinea Pigs. There are many conditions that can lead to the occurrence of epiphora, either by excessive tear production or improper drainage through the nasolacrimal duct. It is essential to implement a treatment based on an as accurate as possible diagnosis, which considerably increases the chances of success and decreases the options of chronification.

ANATOMY AND PHYSIOLOGY

The Anatomy of the lacrimal system differs between species, although the mechanism of onset of the pathologies associated with excessive tearing is similar in most mammals. The various main lacrimal glands (orbital, accessory and superficial and deep glands of the nictitating membrane in rabbits) secrete tears in various locations in the conjunctival sacs. Reference published values for Schirmer test in healthy rabbits are 5.30 ± 2.96 mm/min, and 0.36 ± 1.09 mm/min in Guinea pigs. In chinchillas, due to their poor physiological tear production, the test is unreliable. Tearing patients have increased Schirmer values, but this does not differentiate between obstruction and excess tear production.

In rabbits, the tears drain into the ventral fornix of the lower conjunctival sac. From here, they pass through a single lacrimal point (2-4 mm wide), located in the anteromedial aspect of the lower lid. A small canaliculus, 2-3 mm long, runs from the lacrimal point to dilation called the lacrimal sac. The nasolacrimal duct leaves the lacrimal sac through a small opening in the lacrimal bone (lacrimal foramen) in the maxilla, where it narrows (1mm) and runs through the bony lacrimal canal. At the height of the root of first maxillary incisor, the duct makes an abrupt bend and its diameter is again reduced (1mm). At this point the duct is progressively compressed by the alveolar bone surrounding the root of the first incisor and the nasal cartilage. The duct continues medially along with the root of the incisor and emerges into the nasal cavity, at the ventromedial aspect the alar fold. The nasolacrimal duct has a simple columnar epithelium with numerous mucus-producing glands; it is highly vascularized and has lymphatic supply.

Guinea pigs and chinchillas have two puncta per eye, located near the edge of the edges of both eyelids, similar to what occurs in dogs. They are usually so small that their cannulation is almost impossible.

The nasolacrimal duct obstruction at the level of the lacrimal foramen tends to produce the distension of the lacrimal sac. As for the obstruction at the root of the maxillary incisors, it causes distension of the entire duct, proximally to this point, including the lacrimal sac.

CAUSES OF EPIPHORA

Roughly, tearing may be caused by an excess production of tear or a dysfunction of the draining through the nasolacrimal duct. Many cases are related to inadequate drainage, mainly due to dental disease, especially in rabbits, and in hystricomorpha rodents.
The causes of overproduction of tears include painful and/or inflammatory conditions that affect the eye and its adnexa. Keratitis (with or without corneal ulcers) and conjunctivitis (or both together) usually produce increased tear production. The most frequent causes include infectious agents (mainly bacteria), trauma, allergic and toxic, or irritating products, such as cleaners or air fresheners. Trichiasis and distichiasis, eversion of the third eyelid lacrimal gland, blepharitis or alterations in the conformation of the eyelid such as entropion or ectropion, as well as painful conditions affecting the eyeball (uveitis, glaucoma) predispose to the increase in the production of tears. Strong fragrant stimuli, such as cleaning products, can cause an excessive tearing by olfactory stimulation.

Alterations of tear drainage through the nasolacrimal duct are mainly due to blockages of the duct, both inflammatory/infectious (dacryocystitis) and physical (compression by maxillary dental roots). Dacryocystitis is defined as an inflammation of the lacrimal sac, although it may affect other parts of the nasolacrimal duct in most cases. Mucous or mucopurulent secretions, sometimes profuse, are common. Sometimes, if pressure is exerted medially to the lacrimal point, exit of material can be seen through it. It is not uncommon that rabbits having dacryocystitis end up developing other ocular pathologies by contact with purulent material.

Inflammation of the wall of the nasolacrimal duct may result from a blockage due to foreign body, polyps, neoplasms, trauma (hits, compression by dental roots) or secondary inflammation by the build-up of secretions, e.g. the dense lipid component of the tear film. Vascular or lymphatic congestion can help clogging the duct. Yet, in rabbits and hystricomorpha rodents, most cases are associated with duct compression by maxillary roots; inflammation and secondary bacterial (or fungal) infection may develop subsequently.

**DIAGNOSIS**

As in any condition, the anamnesis must be as detailed as possible. The onset of clinical signs can be acute, chronic or intermittent, and unilateral or bilateral. It is important to ask the owner about the look of the secretions, and if they have changed over time. We must obtain information about the eating habits of the animal. Clinical signs may be variable depending on the cause. Some patients only show a slight epiphora, while others have purulent discharge, severe conjunctivitis and even major wounds and areas of alopecia in the medial canthus.

The physical examination must be complete and include a comprehensive examination of both eye as well as the oral cavity. It is interesting to take a sample of eye secretion, especially in the case of dense and pus-like discharges. This must always be performed before applying eye drops in the eye. Although omitted in many cases, a simple cytology (for example, Diff-Quick) provides a lot of information about the nature of the condition. We can find secretions without cells (tear) or smears of inflammatory/infectious nature. In the case of purulent secretions and the presence of bacteria, it is interesting to perform a gram stain to guide the initial antibiotic choice; both bacterial and fungal cultures can be performed.

Some patients with chronic conditions (skin wounds) or ulcers manifest severe pain in the area and have blepharospasm. The use of anaesthetic eye drops for the ophthalmologic examination can be interesting. Depending on the case, specific tests such as measuring the intraocular pressure or stains (fluorescein) will be required. In the latter case, if the outflow of the dye through the nostril will be indicative that there is no complete blockage of the duct; the contrary does not confirm the blockage.

The presence of nasolacrimal duct obstruction, whether total or partial, requires the cannulation of the duct. This procedure is performed mainly in rabbits due to their size. The cannulation allows the realization of flushes in order to unclog the duct and getting samples for cytology and culture. In addition, it allows the instillation of iodinated contrast medium (1-2 ml) for image diagnosis (dacryocystography) to evaluate the duct. The time for cannulation depends on the case; in most cases you can postpone the procedure until you see the progression after the establishment of medical treatment.
TREATMENT

The treatment of epiphora will depend on the predisposing causes. In any case, it is essential to keep the area clean, preventing hair clumping at the canthus, causing dermatitis. Normal saline, or preferably specific solutions with hyaluronic acid, can be used for cleaning the eyes. The environment should be kept as clean as possible, avoiding substrates releasing dust, or high concentrations of urea that predispose to eye irritation.

The specific eye diseases (e.g., entropion) require a specific treatment. Processes associated with elongation of the maxillary roots are usually difficult to solve. Reducing the length of the crown by drilling can reduce the pressure on the apices of the roots; definitive treatment can mean the extraction of teeth, especially in the case of incisor compressions producing an important malocclusion.

In mild cases of epiphora, duct cannulation and flushing may be sufficient to eliminate the build-up of material such as cellular debris or foreign bodies. Those cases with a greater obstruction, especially those associated with severe inflammation, can benefit from serial cannulations and flushings. Calm rabbits calm or those with moderate inflammation will accept cannulation after the instillation of topical anaesthetic eye drops, although many others require sedation or anaesthesia for handling. In cases requiring additional procedures, such as duct contrast, x-rays of the skull, or an exam of the oral cavity, it will always be preferable to use sedation/anaesthesia straightforward.

Steps for the cannulation of the nasolacrimal duct (flushing):

1. Apply several drops of topical anaesthetic eye drops in the area of the conjunctival sac (2 separate applications, 5 minutes apart, and wait for 5 additional minutes).
2. Evert the lower eyelid and identify the lacrimal point.
3. Insert a lacrimal cannula, or an intravenous catheter (22-24 G) with the stylet removed. The size of the catheter must be adequate to the size of the duct to produce a correct pressure during irrigation. It is generally not necessary to use any lubricant. The catheter is inserted in a ventromedial direction until there is some resistance.
4. Attach a syringe with saline to the catheter. Apply gentle pressure until material or discharge comes through the nostril. The retrieved material can be used to perform cytology and culture. If no liquid can be passed through the cannula, this must be removed 1-2 mm, since the tip may be occluded. Avoid excessive pressure that could cause the rupture of the duct.
5. Then, therapeutic agents such as antibiotic eye drops may be instilled. In some cases, the use of eye drops with acetylcysteine can be interesting due to its liquefying properties and its cytoprotectant activity; specific formulations must always be used since they can be irritating.

Topical antibiotic treatments (eye drops, ointments) are particularly interesting for the control of the conjunctivitis and skin lesions associated with the constant tearing. Although part of the treatment eye drops can pass to the duct, the proportion in patients with total or partial obstruction is low and will be preferable to administer systemic antibiotic therapy. Whenever possible, treatment should be chosen based on a culture or, at least, driven by a cytology. Common pathogen isolates include Pasteurella, Staphylococcus aureus, Bordetella or Pseudomonas. First choice antibiotics (eye drops) include gentamicin, ciprofloxacin or tobramycin (or combinations thereof).

Most cases often benefit from anti-inflammatory drugs, since the decrease of inflammation can increase the diameter of the lumen of the duct, allowing potential drainage of the obstructing material. Its use previously to duct cannulation is recommended in the majority of cases since it tends to facilitate it. Despite the greater anti-inflammatory activity of steroids, the author prefers NSAIDs (diclofenac, ketorolac trometamol) as first choice treatment to avoid the systemic effects of steroids and the risk of corneal ulcers in patients with conjunctivitis or dacryocystitis (trauma, infections). Mild cases can be resolved with topical treatment, but most cases require the combination with systemic anti-inflammatory drugs (NSAIDs) such as meloxicam.
REFERENCES