How to Manage Excessive Tearing in the Horse

Amber L. Labelle, DVM, MS, Diplomate ACVO

Author’s address: University of Illinois Urbana-Champaign, 1008 West Hazelwood Drive, Urbana, IL 61802; e-mail: alabelle@illinois.edu. © 2013 AAEP.

1. Introduction

Tearing is a common sign of ocular disease and is frequently misdiagnosed by equine practitioners as obstruction of the nasolacrimal system. This report will focus on the anatomy of the lacrimal system, the differential diagnoses of excessive tearing, and treatment of excessive tearing in the horse.

2. Anatomy and Physiology of the Nasolacrimal System

The primary function of the lacrimal system is to produce and drain the tear film from the surface of the eye. The tear film is composed of three integrated layers: the aqueous, mucus, and lipid layers. The aqueous layer is produced by the orbital lacrimal gland and gland of the third eyelid and secreted onto the ocular surface through ductules that traverse the conjunctiva. The mucus layer is produced primarily by conjunctival goblet cells and secreted directly onto the ocular surface. The lipid layer is produced by the meibomian glands present at the eyelid margin and is also secreted directly onto the ocular surface. Tear film plays an essential role in corneal health; it provides oxygen and nutrients to the corneal epithelium while removing debris and waste products. Tear film also keeps the ocular surface lubricated and plays an important part in the optics of the eye, allowing light to pass uninterrupted from the external environment into the eye. Immunologic properties of the tear film are important for ocular surface defense and health. The old adage, “no foot, no horse,” is certainly true; its ocular equivalent is “no tear film, no eye”!

The nasolacrimal drainage system is responsible for removing the tear film from the ocular surface. The structures involved in the nasolacrimal drainage system include the ocular (proximal) puncta, the canaliculi, the lacrimal sac, the nasolacrimal duct, and the nasal (distal) puncta (Fig. 1). The ocular puncta are located in the medial canthus, with one punctum located just inside the eyelid margin of the upper eyelid and one punctum located just inside the eyelid margin of the lower eyelid. The ocular puncta are difficult to visualize without magnification. Normal tear film flow through the ocular puncta is facilitated by blinking and by the apposition between the eyelid and the ocular surface. Each punctum is drained by a canaliculus that connects to a common lacrimal sac. This lacrimal sac is drained by the nasolacrimal duct, which runs through the skull and empties through the nasal puncta, located on the ventral floor of the nasal passage (Fig. 2).

The nasolacrimal system exists in a balance between tear production and tear drainage by the nasolacrimal drainage system. Normal horses have an ocular surface tear volume of approximately 230 μL and a tear flow rate of 33.62 μL/min, with
the entire volume of the tear film recycled every 7 minutes. Any abnormality in the system can result in the tear film overflowing the system and draining onto the face. Diseases of the nasolacrimal drainage system can be roughly divided into two categories: diseases of excessive tear production and diseases of decreased tear drainage.

3. Assessment of the Nasolacrimal System

Tear production can be assessed in the horse by the Schirmer tear test (STT). To perform an STT, a folder Schirmer tear strip is placed in the lower conjunctival fornix of an unsedated horse for 60 seconds. The STT is useful for diagnosing deficiencies of tear production, but is not particularly helpful for diagnosing excessive tear production. The function of the nasolacrimal drainage system can be assessed several ways, most importantly by performing a complete ophthalmic examination on the patient to identify any cause for excessive tearing.

The function and patency of the nasolacrimal system is assessed by the Jones test, whereas patency alone can be assessed by lavage of the nasolacrimal duct. It is important to distinguish the clinical implications of the results of these two tests: lavage of the nasolacrimal system only confirms patency, not function. The Jones test is performed by instilling a small amount (0.3–0.5 mL) of fluorescein solution onto the ocular surface and observing fluorescein at the nasal puncta within 5 to 20 minutes (Fig. 3). Sedation may facilitate rapid passage of fluorescein by lowering the horse’s head. A negative Jones test is one in which no fluorescein is observed at the nares.

Nasolacrimal duct lavage can be performed as retrograde (through the nasal puncta) or normograde (through the ocular puncta). Retrograde lavage is easier to perform because it does not require topical anesthesia or magnification to identify the puncta. When retrograde lavage is unsuccessful, normograde lavage should be performed. A suitable cannula should be used, which may include a 4F to 6F polyethylene urinary catheter, an open-ended tomcat catheter (best for normograde lavage), or a 16-gauge intravenous (IV) catheter with the stylet removed (best for retrograde lavage). To perform retrograde lavage, the patient should be...
sedated and the cannula gently fed several centimeters into the nasal puncta (Fig. 4). The cannula should be retracted if resistance is encountered because some horses may have a blind-ended pouch in their distal nasolacrimal duct that can be inadvertently cannulated, making lavage more difficult.

Intravenous extension tubing can be attached to the cannula to allow the practitioner more freedom to attach a syringe with less risk of dislodging the cannula. Sterile saline (10–12 mL) may then be slowly injected through the cannula and observed to drain from the eye. No more resistance should be encountered during injection than is expected with an IV injection. Gentle pulsing pressure may be useful for dislodging obstructions. Normograde lavage is performed similarly, with the exception that a topical anesthetic should be applied to the ocular surface before cannulation of the ocular puncta.

Advanced imaging techniques have been described for the nasolacrimal duct. Dacrystocystorhinography refers to the technique of imaging the nasolacrimal drainage system through the use of radiopaque contrast agents and can be performed by means of radiography or computed tomography. Endoscopy of the nasolacrimal duct has also been reported. These techniques are not widely used in clinical practice but are useful for localization in cases of nasolacrimal duct obstruction.

4. Diseases of the Nasolacrimal System: Excessive Production

The most common cause of excessive tearing in horses is excessive production of tears secondary to an irritating stimulus. A complete ophthalmic examination, including fluorescein staining, tonometry, and funduscopy, should be performed on every horse presented with a complaint of tearing. Excessive tear production is frequently accompanied by blepharospasm, another indicator of ocular pain. Sign of ocular pain is an important observation for differentiating ocular discharge associated with excessive production of tears from that associated with decreased drainage of tears. Decreased drainage of tears is not associated with ocular pain and should not be associated with blepharospasm. When blepharospasm and excessive tearing are observed concurrently, a painful ocular condition is the most likely cause of the excessive tearing.

Possible causes of ocular pain are extensive and diverse (Table 1). The astute practitioner will thoroughly examine the patient for subtle clinical signs of ocular disease. Careful attention should be paid to the intraocular exam. Miosis accompanying blepharospasm is a sign of intraocular disease and should prompt further examination. The application of topical anesthetic to the ocular surface may be a useful diagnostic test. If blepharospasm resolves with the application of topical anesthetic, an ocular surface disease is the most likely cause of the excessive tearing and blepharospasm. If blepharospasm does not resolve, intraocular disease is the most likely cause.

One important cause of ocular discomfort and excessive tearing is environmental irritants. These may include allergens, particulate matter, wind, ultraviolet light, or extreme temperatures. This is a diagnosis of exclusion after eliminating other causes of excessive tearing. Treatment beyond environmental modification may not be required for such cases. A flymask may be useful in decreasing environmental irritants. Topical antihistamines are rarely indicated but may be useful in some cases.
5. Diseases of the Nasolacrimal System: Decreased Drainage

**Congenital Malformations**

Congenital abnormalities of the nasolacrimal drainage system are most frequently diagnosed in horses <1 year of age. Ocular discharge may be serous or mucopurulent in nature. The nasal puncta is the most common site of atresia, and diagnosis can be confirmed by visual assessment of the nasal floor. The Jones test and nasolacrimal duct lavage will be negative in cases of nasal punctal atresia. The nasolacrimal duct itself may also have atresia, and dacryocystorhinography may be warranted.

Nasal punctal atresia is treated by surgical creation of a nasal puncta. The procedure can be performed under general anesthesia or standing sedation with topical and local anesthetic. The upper or lower ocular puncta are cannulated with the use of 5F plastic tubing (such as a urinary catheter) and advanced distally until the catheter tip can be observed at the ventral nasal floor. A No. 15 scalpel blade is used to make a single full-thickness incision through which the catheter is fed. Hemorrhage associated with this incision may be significant, so a single decisive incision is recommended. The catheter is then sutured at the medial canthal skin and nares with the use of three to five sutures per site for maximum security. After surgery, the patient is treated with a broad-spectrum topical antibiotic solution and systemic nonsteroidal anti-inflammatory drugs. The catheter is left in place for 4 to 6 weeks as a stent while the newly created puncta heals. Patency can be confirmed by the Jones test before removal of the catheter. Premature dislodging of the catheter can be addressed by replacing the catheter as previously described. Dacryocystitis and other complications associated with catheter placement is uncommon.

Other congenital malformations, including anomalous puncta, have been reported in the horse. Surgical repair of such abnormalities require dacryocystorhinography to ensure that the anatomic location is identified and that appropriate surgical repair is selected.

**Functional Obstruction: Dacryocystitis, Foreign Body, and Dacryolith**

The nasolacrimal drainage system may become inflamed or infected (termed dacryocystitis), resulting in functional obstruction to outflow. Intraluminal foreign bodies are suspected as an occasional cause of nasolacrimal drainage system obstruction. Dacryoliths (mineral concretions within the nasolacrimal duct) are rarely reported. External compression from sinusosal disease may also decrease nasolacrimal duct flow.

Clinical signs include serous or mucopurulent discharge. The Jones test is negative, and nasolacrimal duct lavage should be attempted in all cases. If lavage is successful, post-lavage treatment with broad-spectrum systemic antibiotics and anti-inflammatories for 2 to 3 weeks is warranted. A topical antibiotic-corticosteroid solution may also be used, provided that the cornea is fluorescein-negative and free of ulceration. When the obstruction is difficult to dislodge or recurrence occurs, cannulation of the nasolacrimal duct as is described for nasal punctal atresia may be warranted. Any catheter should be left in place for 4 to 6 weeks, and concurrent antibiotic and anti-inflammatory treatment should be implemented. Advanced surgical intervention, including creation of alternate tear flow pathways into the nearby nasal cavity or sinus (canaliculorhinostomy or conjunctivorhinostomy), has been infrequently reported in the horse.

**Malpositioned Globe**

Enophthalmos (caudal displacement of the globe within the orbit as the result of decreased orbital contents) results in poor apposition of the eyelid margin against the globe. This malpositioning of the globe relative to the eyelids results in decreased tear flow into the ocular puncta and canaliculi. Enophthalmos is more common in older horses and horses in poor body condition caused by atrophy of orbital fat. Treatment includes improving body condition where possible and diligent facial hygiene, with special attention to keeping the periorcular skin clean and dry.

**Ocular Punctal Occlusion**

Atresia of the ocular puncta is rare, but chronic conjunctival inflammation may lead to fibrosis and occlusion of the ocular puncta. Treatment is similar to nasal punctal occlusion, although cannulation of the nasolacrimal duct must be performed in a retrograde fashion.

**References and Footnote**


"Opcon A, Bausch & Lomb, Rochester, NY 14604-2701."