Thermal cautery of the canine third eyelid for treatment of cartilage eversion

Rachel A. Allbaugh  
*Iowa State University, allbaugh@iastate.edu*

Charles M. Stuhr  
*Animal Eye Clinic*

Follow this and additional works at: http://lib.dr.iastate.edu/vcs_pubs

Part of the [Small or Companion Animal Medicine Commons](http://lib.dr.iastate.edu/vcs_pubs), and the [Veterinary Anatomy Commons](http://lib.dr.iastate.edu/vcs_pubs).

The complete bibliographic information for this item can be found at http://lib.dr.iastate.edu/vcs_pubs/2. For information on how to cite this item, please visit http://lib.dr.iastate.edu/howtocite.html.
Thermal cautery of the canine third eyelid for treatment of cartilage eversion

Abstract

Objective To present a novel, minimally invasive technique for everted third eyelid cartilage correction in dogs that employs the use of low-energy cautery to remodel the cartilage. Procedures Twelve eyes of ten dogs had cautery performed under general anesthesia to correct everted third eyelid cartilage. The tip of a handheld cautery unit or an electrocautery handpiece was applied to the bulbar conjunctival surface of the third eyelid at the central location of cartilage convexity and treated to effect. This resulted in gradual conjunctival contraction and cartilage softening that remodeled the third eyelid to return to a more normal, physiologic position. When the tips of the cartilage bar were also curled, cautery was briefly applied to the convex surface to straighten the cartilage in a similar manner.

Results Blanching of the conjunctiva at the site of treatment occurred. Char was sometimes present and was gently removed with a scalpel blade to improve postoperative patient comfort. Mild conjunctival hyperemia was noted in a few patients for 1-2 days after surgery but there were no signs of discomfort or eyelid swelling. All dogs had good results in terms of cartilage correction with no recurrence; however, one of the Great Danes that had concurrent third eyelid gland prolapse required gland replacement surgery.

Conclusions Thermal cautery is a simple, inexpensive means of correcting third eyelid cartilage eversion in dogs with a high rate of success that preserves normal tissue while restoring function.

Keywords
dog, third eyelid, membrana nictitans, cartilage, cautery, surgery

Disciplines
Small or Companion Animal Medicine | Veterinary Anatomy

Comments
This is the accepted version of the following article: Allbaugh RA, Stuhr CM. Thermal cautery of the canine third eyelid for treatment of cartilage eversion. Veterinary Ophthalmology 2013; 16, 392–395, which has been published in final form at http://dx.doi.org/10.1111/vop.12012.
Thermal cautery of the canine third eyelid for treatment of cartilage eversion

Rachel A. Allbaugh* and Charles M. Stuhr‡

*Iowa State University College of Veterinary Medicine, Department of Veterinary Clinical Sciences, 1526 Lloyd Veterinary Medical Center, 1600 S. 16th St, Ames, IA 50011, USA; ‡Animal Eye Clinic, 783 Danbury Road, Wilton, CT 06897, USA

Address communications to:
Rachel A. Allbaugh, Iowa State University, College of Veterinary Medicine, 1526 Lloyd Veterinary Medical Center, 1600 S. 16th St., Ames, IA 50011-1250, USA
Tel: (515) 294-4900, Fax: (515) 294-7520, e-mail: rachelallbaugh@yahoo.com

Abstract

Objective To present a novel, minimally invasive technique for everted third eyelid cartilage correction in dogs that employs the use of low-energy cautery to remodel the cartilage. Procedures Twelve eyes of ten dogs had cautery performed under general anesthesia to correct everted third eyelid cartilage. The tip of a handheld cautery unit or an electrocautery handpiece was applied to the bulbar conjunctival surface of the third eyelid at the central location of cartilage convexity and treated to effect. This resulted in gradual conjunctival contraction and cartilage softening that remodeled the third eyelid to return to a more normal, physiologic position. When the tips of the cartilage bar were also curled, cautery was briefly applied to the convex surface to straighten the cartilage in a similar manner.

Results Blanching of the conjunctiva at the site of treatment occurred. Char was sometimes present and was gently removed with a scalpel blade to improve postoperative patient comfort. Mild conjunctival hyperemia was noted in a few patients for 1-2 days after surgery but there were no signs of discomfort or eyelid swelling. All dogs had good results in terms of cartilage correction with no recurrence; however, one of the Great Danes that had concurrent third eyelid gland prolapse required gland replacement surgery.

Conclusions Thermal cautery is a simple, inexpensive means of correcting third eyelid cartilage eversion in dogs with a high rate of success that preserves normal tissue while restoring function.

Key Words: dog, third eyelid, membrana nictitans, cartilage, cautery, surgery

INTRODUCTION

The third eyelid, or nictitating membrane, is a fold of conjunctiva located in the rostral, ventromedial orbit of dogs. It is supported by a T-shaped piece of hyaline cartilage that imparts a slight concavity to the third eyelid corresponding with the ocular surface.(1) The slightly crescent-shaped crossbar of the cartilage lies just inside the free margin of the third eyelid, while the base of the cartilage stem is surrounded by the serous third eyelid lacrimal gland. The canine third eyelid passively elevates to cover the ocular surface when the globe is retracted posteriorly in the orbit and serves important functions including production and distribution of tears, removal of ocular debris, and protection of the globe. When diseases or abnormalities affect the third eyelid every effort should be made to preserve the structural integrity to facilitate optimal function.

Everted third eyelid cartilage is a unilateral or bilateral condition most commonly recognized in young, large breed dogs. Saint Bernards, Great Danes, German Shepherds, Weimaraners, Newfoundlands, Irish Setters and
German Shorthaired Pointers are over-represented, with a possible genetic predilection. The third eyelid cartilage stem generally folds near the neck of the “T”, allowing the leading edge of the third eyelid to inappropriately evert outward away from the cornea or, less commonly, inward toward the cornea. This is easily differentiated from a prolapse of the third eyelid lacrimal gland by the glistening cartilage convexity visible through the conjunctival surface. Though folded cartilage does not typically cause corneal pathology or visual compromise, the inappropriate third eyelid margin position impairs optimal tear film distribution and drainage, may contribute to conjunctivitis and exposure keratopathy, and is unsightly to most pet owners as the third eyelid no longer conforms to the ocular surface.

The cause of third eyelid cartilage eversion is unknown. It was initially reported to be a congenital condition in certain breeds of dogs with cartilage deformed in the shape of a hook causing the edge of the membrane to turn out. Martin and Leach recognized a genetic connection in German Shorthaired Pointers and cited possible unequal growth rates of the bulbar and palpebral cartilage surfaces and/or an unequal growth rate of the adherent conjunctiva as contributing factors. Gelatt noted the conformation predilection in large breed dogs with relative enophthalmia and hypothesized that unequal forces acting on the third eyelid created the malformation. The junction between the crossbar and stem of cartilage appeared to be the weakest site and everted easily. A problem with the cartilage component itself has been ruled out as cartilage appears normal on histopathologic evaluation. A more recent report in a cat suggests that it is tension across the depth of the cartilage that results in scrolling/eversion of the nictitating membrane.

Though isolated instances of spontaneous third eyelid cartilage return have been reported, surgical correction of everted cartilage is typically necessary, with techniques varying over the years. Temporary third eyelid flap placement was initially attempted to avoid surgical excision but was reported to have limited success. Surgical techniques have included excision of the third eyelid margin, cartilage and gland, removal of the entire cartilage and gland, removal of just the bent portion of cartilage, and bent cartilage removal then homotransplantation. Of these techniques removal of the bent cartilage portion is most commonly performed. In general, incision into or excision of the cartilage can negatively affect the stability of the third eyelid leading to a “shearing” effect to the remaining sections of cartilage or creating prolapse of the gland of the third eyelid which necessitates additional repair. Cartilage excision and homotransplantation addresses this instability and was shown to have the best functional results in one study. Currently, surgeons agree that removal of the entire third eyelid, the lacrimal gland, and the free border of conjunctiva at the third eyelid leading edge should not be performed for this condition. The ideal surgical procedure should preserve, or restore, structural integrity and the normal anatomical relationship between the third eyelid and the cornea.

The purpose of this paper is to present a novel, minimally invasive technique for everted third eyelid cartilage correction in dogs developed by one of the authors (CMS) that employs the use of low-energy thermal or electrocautery to remodel the cartilage and improve its functional shape. The treatment protocol is detailed, along with clinical case information and postoperative results.

MATERIALS AND METHODS
Twelve eyes of ten dogs had cautery performed to correct everted third eyelid cartilage. Three were Great Danes, with one each of the following breeds: Standard Poodle, Weimaraner, Chow Chow, Bouvier, Akita, Rhodesian Ridgeback mix and a hound mix. Eight dogs had unilateral everted third eyelid cartilage as represented in Figure 1 while the Akita and hound mix were bilaterally affected. One of the Great Danes had a partially prolapsed gland
of the third eyelid concurrently and the Akita had unilateral entropion. Ages ranged from 6 months to 1 year and 7 months old.

**Cautery Technique**
Following premedication and induction of anesthesia each patient was positioned in sternal recumbency for the procedure. The ocular surface and adnexal tissues of the affected eye(s) were surgically prepared. An eyelid speculum was placed to facilitate exposure. The leading margin of the third eyelid was grasped with Bishop-Harmon forceps and extended anteriorly. The tip of an electrocautery handpiece (Sabre 2400 Electrosurgical Unit, ConMed Aspen Labs, Englewood, Colorado) (used by RAA) or a handheld cautery unit (Accu Temp Cautery, Beaver Visitec International Inc., Waltham, Massachusetts) (used by CMS) was applied to the bulbar conjunctival surface of the third eyelid at the central location of cartilage convexity. When using the monopolar electrocautery unit the power was set to the lowest coagulation energy setting (cut always remained at 0) and gradually increased until an effect was seen (typically at coagulation power of 2). The desired effect was gradual conjunctival contraction and cartilage softening that remodeled the third eyelid to a more normal, physiologic position (video). Similarly, the handheld cautery unit tip was placed on or near the conjunctival surface and the number of sites and duration the tip was kept in position was determined by watching its effect. In patients, in whom the tips of the cartilage bar were also curled, cautery was briefly applied to the convex surface to allow similar cartilage straightening (video) and allow for anatomically correct third eyelid apposition with the globe (Fig. 2). Blanching of the bulbar third eyelid conjunctiva at the site of treatment was noted (Fig. 3). Char was sometimes present and was gently removed with a scalpel blade to improve postoperative patient comfort. Care was taken to not over treat the region which could result in reversing the bend of the cartilage too much. A medial temporary tarsorrhaphy suture was placed following treatment by one of the authors (CMS).

**Figure 1.** Image of everted third eyelid cartilage in a 1 year and 7 month old castrated male Great Dane prior to thermocautery treatment.

**Figure 2.** Immediate postoperative appearance of the patient in Figure 1 following everted cartilage correction. The tips of the cartilage bar were also curled in this patient so small areas of cautery treatment are visible near the medial and lateral aspects of the third eyelid margin.

**Figure 3.** Appearance of the bulbar third eyelid conjunctiva at the site of cartilage treatment for the patient in Figure 1, with blanching noted and minimal char present immediately after thermocautery application.

Postoperative management included a topical ophthalmic antibiotic, a systemic nonsteroidal anti-inflammatory drug, or no medications. An Elizabethan collar was typically not necessary unless self-trauma due to irritation from an irregular bulbar surface was observed. Mild conjunctival hyperemia was noted in a few patients for 1-2
days after surgery but there were no signs of discomfort or eyelid swelling. Patients were rechecked 1-2 weeks postoperatively.

RESULTS

All dogs had good results in terms of cartilage correction (Fig 4) with no recurrence up to four years postoperatively; however, the Great Dane that had concurrent third eyelid gland prolapse required subsequent gland replacement surgery. In this patient the third eyelid gland prolapse appeared to resolve during cartilage cautery treatment so additional gland repair was not initially performed. Immediately following anesthesia recovery the gland was mildly prolapsed and though it could be manually replaced as needed a Morgan pocket technique was performed a few weeks later to allow definitive gland correction.

DISCUSSION

This novel cautery procedure allows simple, rapid, minimally invasive correction of everted third eyelid cartilage in dogs. The technique is easy to learn and use. The key to performing this procedure successfully is to use as low an energy level as possible and/or minimize the number of sites burned to achieve desired results in order to avoid excessive tissue damage, adjacent tissue injury, cartilage exposure, or full-thickness third eyelid perforation. It is also beneficial to keep gentle anterior traction on the third eyelid margin with forceps while the cartilage becomes pliable and the orientation is correcting to ensure sufficient treatment effect.

Though cautery has been used previously for treatment of corneal disease,(11, 12) or as an aid for hemostasis during ocular/periocular surgery, this is the first reported use on the third eyelid. A possible concern of cautery use on the third eyelid is damage to the third eyelid gland and/or its secretory ductules. However, this is easily avoided since the gland encompasses the base of the cartilage deep within the third eyelid(10) and is located proximal to the typical site of cartilage eversion.

All other techniques for everted third eyelid correction require cutting into the third eyelid conjunctiva and cartilage and therefore may cause bleeding that can impair visualization.(4) Excision of the bent portion of cartilage may currently be the most popular method of eversion correction.(4-7, 9) but can also result in complications such as clinical shortening of the third eyelid, overriding of the cartilage edges, and histologic necrosis of the cartilage margin.(10) Though homotransplantation resulted in complete cartilage union and the best morphofunctional outcome in one study,(10) delicate instrumentation is needed for this procedure. In addition there is added time and expense necessary, as well as a longer postoperative healing phase and the possibility of a suture reaction.

Complications associated with this procedure were rare and were typically associated with heat-associated disturbance to the conjunctival surface which created local irritation. This was easily resolved by scraping the bulbar surface with a blade to remove char and minimize the surface irregularity. Overcorrection of the cartilage was uncommon when using visual cues to stop the process. Small changes could be reversed by treating the opposite surface to “pull” the cartilage back. Local irritation after the procedure was expected and palliated with

Figure 4. Postoperative appearance of the patient in Figure 1 showing normal third eyelid position and apposition with the globe following right everted cartilage correction.
topical antibiotic in an ointment form to lubricate the corneal surface and prevent secondary infection. Excessive swelling of the third eyelid due to the heat was not observed.

The one patient that required repeated surgery to address the third eyelid gland prolapse likely had abnormal forces that affected the third eyelid structures from the beginning. Initial gland replacement surgery was not performed at the time of thermal cautery treatment for cartilage eversion due to the intraoperative apparent resolution. In addition, the third eyelid bulbar conjunctiva was cauterized in the usual location for a pocket technique gland replacement incision so concurrent surgery would have been suboptimal. In similar circumstances depending on the degree of cartilage and glandular involvement, a surgeon may try the rapid, simple cautery technique combined with a third eyelid gland replacement surgery that does not require third eyelid bulbar conjunctival incision or may select an alternative cartilage treatment from the beginning (such as cartilage homotransplantation) combined with gland replacement surgery.

In summary, surgical correction of everted third eyelid cartilage using thermal or electrocautery is a fast, simple and highly effective method of treatment. The surgical technique is straight-forward and offers a good outcome with minimal tissue damage and no third eyelid anatomical disruption.

SUPPLEMENTAL MATERIAL
Video. Treatment of everted third eyelid cartilage using thermal cautery. The bulbar surface of the third eyelid is contacted to treat the cartilage stem, while the cartilage tips are treated from the palpebral surface. Blanched and slightly charred conjunctiva is visible at the treatment locations while assessing the cartilage and third eyelid position postoperatively.

REFERENCES