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CASE REPORT

Successful treatment of distichiasis in a cat using transconjunctival electrocautery

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Abstract

A 2-year-old male castrated Domestic Short-haired cat presented to the Ophthalmology Service at the Matthew J. Ryan Veterinary Hospital at the University of Pennsylvania for evaluation of chronic bilateral ocular discharge and blepharospasm. Initial ophthalmic examination revealed severe conjunctivitis and keratitis and the presence of upper eyelid distichiae bilaterally. Initial therapy for suspected feline herpesviral infection provided moderate, but not complete, resolution of the clinical signs. Over the subsequent year, the cat suffered from recurrent, severe, ulcerative keratitis in both eyes despite appropriate medical therapy. Approximately 13 months after the initial presentation, the distichiae were surgically removed using transconjunctival electrocautery, which resulted in complete resolution of the clinical signs. This report documents bilateral distichiasis in a cat, a condition that is considered rare in this species.

Key Words: cat, conjunctivitis, distichiasis, electrocautery, keratitis, ulcer

INTRODUCTION

There are two main forms of ciliary disorders: distichiasis and ectopic cilia. Distichiae are ciliae that arise from the meibomian gland openings. Ectopic ciliae are abnormal ciliae that exit the conjunctival surface, most often in the middle of the upper eyelid.[1] Distichiasis is a very common condition in the dog and is seen frequently in certain breeds, including the Cocker Spaniel, Shih Tzu, and English Bulldog.[1] Clinical signs associated with the presence of distichiae may vary depending upon the characteristics of the hairs. Fine, thin distichiae may float in the tear film without causing any clinical signs. However, firm or stiff distichiae may cause significant corneal injury.[2] Temporary relief may be provided by simple manual epilation of the hairs, although the follicle is likely to regrow a hair.[2,3] Permanent treatment of distichiasis can be achieved with a variety of surgical techniques, including but not limited to electroepilation and electrocautery,[1] lid splitting techniques,[3] partial tarsal plate excision,[4] and cryotherapy.[5]

Ciliary abnormalities, including distichiasis, are considered extremely rare in the cat.[6] A far more common cause of conjunctivitis and keratitis in cats is feline herpesvirus-1 (FHV-1). A thorough review of FHV-1 is available in the literature documenting the widespread nature of this virus. Infection is extremely common, and with up to 97% of adult cats being seropositive for FHV-1, it is considered to be the most common cause of ocular disease in cats.[6,7] This case report describes a cat with bilateral distichiasis that suffered from recurrent conjunctivitis and severe ulcerative keratitis. The exact role of FHV-1 in the case presented here is unclear; however, surgical removal of the distichiae led to resolution of the clinical signs.

CASE REPORT

History and initial ophthalmic examination

A 2-year-old, 5.5-kg male castrated Domestic Short-haired cat presented to the Ophthalmology Service at the Matthew J. Ryan Veterinary Hospital at the University of Pennsylvania for evaluation of chronic ocular discharge and squinting. The owners reported that the cat had always held his eyes somewhat closed, and the ocular discharge had been presented for approximately 6 months. The cat had been treated by the referring veterinarian with oral amoxicillin trihydrate/clavulanate potassium (Clavamox®; Pfizer, New York, NY, USA) 11 mg/kg PO q12 h and a triple antibiotic ointment (neomycin and polymyxin B and bacitracin ophthalmic ointment; Bausch and Lomb, Rochester, NY, USA) OU q12 h for 14 days with no improvement noted. On presentation, the cat was docile and alert, and all vital parameters were within normal limits. Physical examination was unremarkable aside from mild chin acne. Pupillary light reflex, menace response, and palpebral reflexes were intact

in both eyes (OU). Schirmer tear test 1 values (STT; Merck and Company, Inc., Whitehouse Station, NJ, USA) were within normal limits with 12 mm of wetting/min in the right eye (OD), and 14 mm of wetting/min in the left eye (OS).[8] The cornea was fluorescein negative OU (FUL-GLO® Fluorescein Sodium Strips. USP; Akorn Inc., Lake Forest, IL, USA). Intraocular pressure as measured by applanation tonometry (Tono-Pen® VET; Reichert Technologies, Depew, NY, USA) was normal OU. The adnexa and anterior segment were examined OU with diffuse and focal illumination using a portable hand-held slit lamp (SL-15; Kowa Optimed, Inc., Torrance, CA, USA). There was a black, pasty discharge on the upper and lower eyelids OU accompanied with severe blepharospasm and conjunctival hyperemia OU. The upper and lower eyelids OU were swollen, and multiple distichiae were present in the upper eyelid OU. The distichiae were dark and firm, but no mechanical irritation to the cornea was observed. The cornea, iris, and lens were normal OU. Fundus examination was performed with a portable binocular indirect ophthalmoscope (Keeler Instruments Inc., Broomall, PA, USA) and a condensing lens (Volk Optical, Inc., Mentor, OH, USA) and was normal OU. A diagnosis of blepharitis, conjunctivitis, and distichiasis OU was made. Based upon the examination findings and chronicity of the clinical signs, infection with feline herpesvirus-1 (FHV-1) was suspected as a cause for the conjunctivitis, although not specifically investigated. Lesser consideration was given to other infectious causes of conjunctivitis, including *Mycoplasma* sp., *Chlamydophila felis*, and calicivirus.[6] The blepharitis was suspected to be caused by a *Staphylococcus* sp. infection, as this cat was also affected with chin pyoderma caused by *Staphylococcus intermedius*, although no specific diagnostics was performed. Treatment was initiated with famciclovir (22.7 mg/kg PO q12 h for 3 weeks; Teva Pharmaceuticals, North Wales, PA, USA) and topical fusidic acid ointment (Fucithalmic® Vet; Dechra Pharmaceuticals, Overland Park, KS, USA) applied to the eyelid margins OU q12 h.[9] Two weeks later, a recheck examination revealed decreased ocular discharge OU, although moderate blepharospasm and conjunctival hyperemia persisted OU. Fluorescein stain revealed a superficial ulcer in the central part of the cornea OU. The remainder of the ophthalmic examination was unchanged from the previous visit. The distichiae were manually epilated from the upper eyelid OU using Castroviejo needle holders. Additional treatment with cidofovir 0.5% ophthalmic solution (Wedgewood Pharmacy, Swedesboro, NJ, USA) OU q12 h and L-lysine (Viralys® powder; Vetoquinol, France) 500 mg PO q12 h was instituted. Four months later, the cat presented for evaluation of increased blepharospasm OU. The owners reported a moderate improvement in the ocular discharge and squinting OU since the previous examination; however, there had not been a complete resolution of clinical signs. Examination revealed bilateral periocular crusting, brown discharge, and conjunctival hyperemia. The distichiae had grown back OU; however, the corneal ulcers were healed OU. The remainder of the ophthalmic examination was normal. Treatment with erythromycin ophthalmic ointment (Fera Pharmaceuticals, Locust Valley, NY, USA) OU q8 h was instituted. Surgical removal of the distichiae was recommended if recurrent corneal ulceration or irritation occurred. A recheck examination after 14 days revealed less blepharospasm, but persistent ocular discharge OU. The owners opted to continue treatment with erythromycin ointment and oral L-lysine. Six months later, the cat presented for evaluation of the right eye. The owners reported that the cat had not opened the eye in approximately 2 weeks. On examination, the cat was severely blepharospastic OU, and there was excessive bilateral, mucopurulent ocular discharge. Fluorescein staining revealed a superficial ulcer in the lateral paraxial cornea OS and a very deep (~90% loss of corneal thickness) stromal ulcer in the central cornea OD. There was marked corneal edema and perilimbal neovascularization OD. Distichiae were present dorsally OU and were again manually epilated. Corneal cytology and culture, as well as surgical repair of the deep ulceration OD, were declined by the owners. Aggressive medical therapy was instituted with ciprofloxacin 0.3% ophthalmic solution (Alcon, Fort Worth, TX, USA) OU q6 h, erythromycin ophthalmic ointment OU q12 h, idoxuridine 0.1% ophthalmic solution (Wedgewood Pharmacy, Swedesboro, NJ, USA) OU Q6 h, and famciclovir 22.7 mg/kg PO q12 h. One week later, a recheck examination demonstrated less blepharospasm and decreased ocular discharge OU. There was no fluorescein stain uptake OS. The OD ulcer was much improved, with approximately 20% stromal loss and a small central area of fluorescein stain uptake. There was a drastic clearing of the corneal edema and thinning of the corneal vessels. Multiple, firm distichiae were noted to now be present in the lower eyelid OU, along with regrowth of the upper distichiae OU. The ciprofloxacin was discontinued, and surgical removal of the distichiae was scheduled for 2 weeks later.

Surgical report

Brief examination prior to surgery revealed mild blepharospasm and no corneal fluorescein stain uptake OU. Multiple distichiae were present in the upper and lower eyelids OU. (Fig. 1) Complete blood count and blood chemistry were within normal limits. The cat was premedicated with methadone (0.5 mg/kg IV; Bioniche Pharma, Lake Forest, IL, USA) and midazolam (0.3 mg/kg IV; Hospira, Lake Forest, IL, USA) and cefazolin (22 mg/kg IV; Apotex, Weston, FL, USA). Anesthesia was induced with propofol (4 mg/kg IV; APP Pharmaceuticals, Schaumburg, IL, USA) and maintained using isoflurane 1.5% (Abbott Animal Health, North Chicago, IL, USA) in 100% oxygen after endotracheal intubation. The periocular area, eyelids, and ocular surface OD were routinely aseptically prepped with 10% povidone iodine solution. A chalazion clamp was placed on the upper eyelid to provide hemostasis and stability to the eyelid. A sterile electrocautery pen (Pro Advantage® Sterile Cautery;

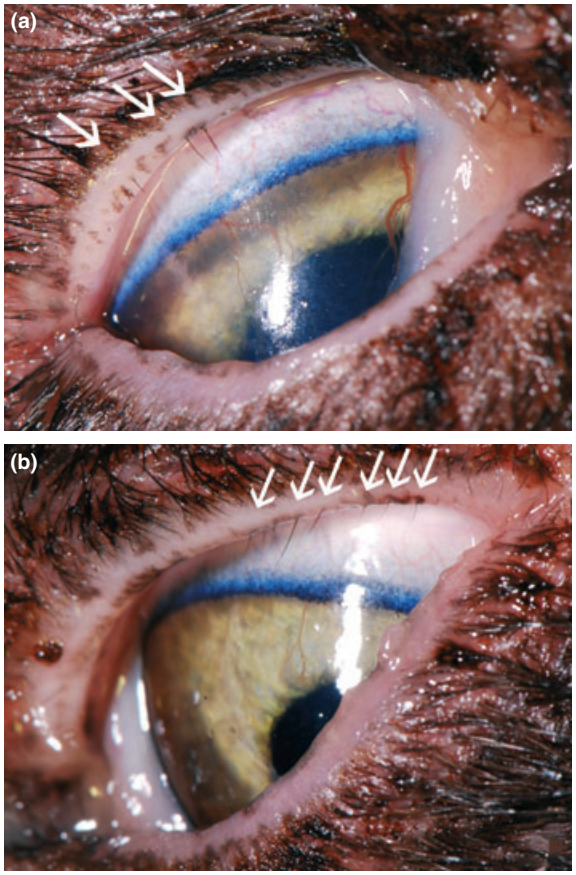

Figure 1. The OD (a) and OS (b) prior to surgical removal of the distichiae (arrows). Note the corneal neovascularization associated with the chronic ulcerative keratitis OU.

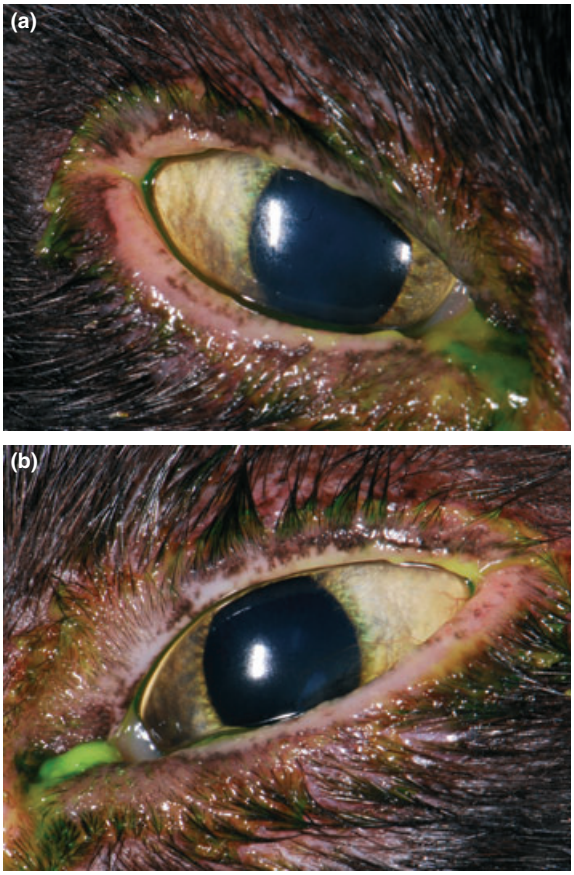

Figure 2. The OD (a) and OS (b) 4 months after surgical removal of the distichiae with electrocautery. Note the complete resolution of corneal fibrosis and neovascularization OD and mild remaining neovascularization OS.

National Distribution and Contracting, Inc., Nashville, TN, USA) was inserted into the palpebral conjunctiva approximately 3 mm posterior to the eyelid margin, overlying each distichia follicle, to an approximate 2 mm depth. The distichiae were easily removed through the meibomian gland openings using Castroviejo needle holders. The procedure was repeated for each distichia OU. A soft contact lens (PureVision™; Bausch & Lomb, Rochester, NY, USA) was placed on the cornea OU. Recovery was routine and the cat was discharged later that day with instructions to instill ofloxacin 0.3% ophthalmic solution (Falcon Pharmaceuticals, Fort Worth, TX, USA) OU q8 h.

Follow-up examinations

A recheck examination 1 week postoperatively revealed a drastic reduction in blepharospasm and no ocular discharge OU. There was moderate corneal fibrosis and remaining neovascularization in the areas of previous ulceration OU. The electrocautery sites exhibited minimal inflammation and no evidence of infection. The topical ofloxacin drops were reduced in frequency to once daily OU until recheck examination confirmed complete incisional healing. Subsequent recheck at 1 month postoperatively revealed no discomfort or discharge in either eye. Mild corneal fibrosis and neovascularization remained OU. All topical medications were discontinued, and daily lubrication with an over the counter ophthalmic gel was recommended. Four months postoperatively, the cat remained comfortable OU. The corneal fibrosis was minimal, and there was continued thinning of the vascularization (Fig. 2).

DISCUSSION

Distichiae are ciliae that emerge from the openings of the meibomian glands. Their hair follicles are located approximately 5 mm posterior to the eyelid margin at the base of the meibomian glands. The hairs arise from undifferentiated glandular tissue within the meibomian glands.[1] Distichiasis occurs frequently in the dog and is presumed to be inherited in several breeds, although the mode of inheritance is unknown. Certain breeds are overrepresented, including the American and English Cocker Spaniel, Cavalier King Charles Spaniel, Boxer, English Bulldog, Pekingese, Shih Tzu, and Dachshunds.[1] Distichiae are considered very rare in cats.[6,10,11] A case series published by Wheeler and Severin includes two cats with distichiasis.[5] A 2.5-year-old Siamese

cat was evaluated for a history of ocular discharge. Distichiae were present OU and treated with cryotherapy. This procedure provided resolution of the clinical signs, and no recurrence was noted at 1 year postoperatively. A 1.5–year-old Burmese cat was diagnosed with bilateral distichiasis and blepharitis OS from previous attempts at electroepilation. Cryotherapy was performed in the area of blepharitis OS, and the distichiae were successfully removed. No recurrence was noted at 1 year postoperatively. There is one published report of an ectopic cilium in a Siamese cat that suffered from chronic corneal ulceration and was successfully treated using cryosurgical removal.[8] There are no other published reports of distichiasis in cats.

The diagnosis of distichiasis is made by direct visualization of the abnormally positioned hair, emerging from the meibomian gland opening. The upper lid is more commonly affected than the lower lid.[2] The hairs are generally recognizable without the use of optical magnification, although head loupe or slit-lamp magnification is helpful for thin or nonpigmented hairs.[3] Some distichiae are fine and lay gently in the preocular tear film without causing any clinical signs.[1] However, some are very course and firm, resulting in corneal irritation and the associated clinical signs of excessive lacrimation, eyelid swelling, and conjunctival hyperemia. Direct mechanical trauma to the cornea may result in keratitis, ulceration, and possible perforation.[3]

Treatment of distichiasis involves removal of the hair, with or without the associated follicle. Manual epilation with epilation forceps, mosquito forceps, or Castroviejo needle holders may be appropriate for a small number of distichiae. This technique can be of diagnostic value as it allows the clinician to determine whether the distichiae are the cause of the irritation. Additional advantages of manual epilation include the avoidance of general anesthesia, and repeated epilation can be performed by pet owners at home with a cooperative patient. However, this technique fails to remove the associated follicle, and recurrence is almost guaranteed.[2,3] Early surgical methods developed for removal of the offending follicle include lid splitting techniques and partial tarsal plate excision.

The lid splitting technique was first described by Halliwell in 1967.[3] The procedure involves the removal of a 2-mm-thick, partial thickness strip of tissue from the posterior surface of the eyelid margin containing the meibomian gland tissue and distichiae. Cicatricial entropion and eyelid distortion were common complications of this procedure.[2,12] Partial tarsal plate excision was described by Bedford in 1973 as a less radical alternative to the lid splitting techniques.[4] The leading edge of the eyelid is exposed, and a 3–5-mm-tall wedge-shaped strip of tissue is removed from the distal tarsal plate. This modification allowed the cilia and associated follicles to be removed while maintaining the integrity of the anterior and posterior eyelid surfaces. This technique was advocated as being quicker and less likely to cause secondary entropion as the posterior eyelid margin is maintained.[4,13]

Electroepilation is advocated in cases of few distichiae, as tedious electrode placement into the offending follicle is required. Generally, an electrical current of 3–5 mA is applied for 15–30 s, and the cilia is manually removed with forceps. Disadvantages of electroepilation include destruction of the meibomian gland tissue or recurrence of the distichiasis because of follicle survival.[1]

Electrocautery destroys the distichia follicle by coagulation. The follicle can be accessed either via the meibomian gland opening, as with the battery-powered needle coagulator, or via the conjunctival surface using an electrocautery pen.[1] The distichia should provide no resistance to epilation once the follicle is destroyed. The benefit of the latter method is that destruction of the follicle is visualized, rather than assumed.

After recognition that permanent eyelash loss was a common sequela in humans following cryotherapy for eyelid tumors, this technique was employed for removal of distichiae in veterinary patients. Cryotherapy may be performed using liquid nitrogen or nitrous oxide.[1] The optimal therapeutic temperature is −25 °C whereas eyelid necrosis can occur at temperatures below −30 °C.[5] The cryoprobe is placed on the palpebral conjunctiva 3 mm caudal to the eyelid margin overlying the offending follicle. Marked swelling of the eyelids is expected immediately postoperatively, but generally resolves within days to a week. Possible complications of cryosurgery include permanent eyelid distortion and transient or permanent eyelid depigmentation.[1,5]

Aside from the two cats included in Wheeler and Severin's case series, this case is the only published report of bilateral distichiasis associated with conjunctivitis and ulcerative keratitis in a cat. A far more common cause of conjunctivitis and keratitis in the cat is feline herpesvirus-1 (FHV-1). Because of the widespread nature of the virus, the authors feel strongly that the clinical signs in our patient were to some degree caused by infection with FHV-1; however, the lack of specific diagnostic tests performed precludes certainty. Infection with FHV-1 is ubiquitous among domestic cats and considered to be the most common cause of ocular disease in the cat.[7,14] Treatment of FHV-1-induced ocular disease is aimed at reducing viral replication; however, there are currently no antiviral drugs approved for the treatment of FHV-1 in cats in the United States. Various topical antiviral therapies have been shown to be effective. Topical application of 0.5% cidofovir was associated with clinical improvement and decreased viral shedding in cats with experimentally induced FHV-1 infection.[15] Thomasey *et al.* have recently demonstrated that oral administration of famciclovir at a dose of 40 mg/kg PO q8 h to cats with experimental FHV-1 infection improves the ocular, systemic, histologic, and viral shedding parameters.[16] Utilizing famciclovir at the aforementioned dose was precluded by financial constraints in our case. Oral administration of L-lysine has been shown to decrease the severity of conjunctivitis because of FHV-1 in experimentally infected cats.[17]

In the case presented here, it is likely that the initial conjunctivitis was caused by infection with FHV-1 and further complicated by the distichiasis. Reactivation of latent virus because of persistent corneal and conjunctival irritation from the disthichiae should be considered. Despite any presumed effect of FHV-1 infection, it is important to note that the corneal ulceration and conjunctivitis resolved rapidly after surgical removal of the distichiae using the transconjunctival electrocautery technique. Although very uncommon, this case highlights the point that the presence of distichiae should be evaluated and considered clinically significant when examining a cat with evidence of conjunctivitis and keratitis. Surgical removal of the distichiae may be necessary to alleviate corneal irritation and ulceration.

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