Suture anchor placement technique around the insertion of the ventral rectus muscle for the replacement of the prolapsed gland of the third eyelid in dogs: 100 dogs

John S. Sapienza,* Aloma Mayordomo† and Anne M. Beyer*

*Department of Ophthalmology, Long Island Veterinary Specialists, Plainview, NY, 11803, USA; and †Department of Animal Medicine and Surgery, Cardenal Herrera-CEU University, Calle Tirant lo Blanch, Alfarara del Patriarca, C.P:46115, Spain

Address communications to:
Dr. J. S. Sapienza
Tel.: 516-501-1700
Fax: 516-501-1169
e-mail: jsapeye@aol.com

Abstract

Objective To evaluate a rapid and efficacious procedure to anchor the prolapsed gland of the third eyelid in dogs.

Methods This is a retrospective study of 100 affected dogs (122 eyes) with third eyelid gland prolapse that were surgically anchored with a nonabsorbable suture around the insertion of the ventral rectus muscle.

Results Hundred dogs (122 eyes) were included in this study. Twenty-three pure-bred and several mixed-breed dogs were represented with the right eye affected in 60 cases and the left eye in 62 cases. Thirty-four eyes (27.9%) were previously operated on at another facility prior to referral. The average age of the patients was 2.2 years (57 days to 11 years). No recurrences of gland prolapse were observed over the course of study. Minor intraoperative conjunctival perforations were observed and easily repaired at the time of surgery in 21 cases (17.2%). Five cases demonstrated preexistent keratoconjunctivitis sicca (KCS), and all had improved Schirmer tear test following surgical correction and medical therapy.

Conclusions The suture anchor placement technique provides a cosmetic, rapid, and successful replacement of the prolapsed gland of the third eyelid in dogs. No recurrences were noted. Complications were easily addressed.

Key Words: cherry eye, dogs, KCS, keratoconjunctivitis sicca, prolapsed gland, suture anchor placement, third eyelid, ventral rectus muscle

INTRODUCTION

Prolapse of the gland of the third eyelid, colloquially known as ‘cherry eye,’ is the most common primary disorder of the third eyelid.1 The prolapsed gland protrudes from behind the third eyelid, and this is believed to be due to a defect in the retinaculum which adheres the gland to the periosteum.2 Because this gland is estimated to provide 30–57% of the tear production, gland replacement is preferred to partial or total gland excision.3,5 Analysis of long term follow-up has demonstrated that dogs with surgical gland replacement had a lower incidence of keratoconjunctivitis sicca (KCS) later in life compared with dogs not treated or with excised glands.6

Prolapse of the gland of the third eyelid is common in many breeds, especially the American Cocker Spaniel, Beagle, Bulldog, Pekingese, and Lhasa Apso.1 At least 10 techniques for the surgical replacement of the prolapsed gland of the third eyelid have been reported in the English-speaking veterinary literature. Two general techniques have been developed to replace the prolapsed gland, namely, to anchor the gland or to create a pocket for the gland. Excision, partial or total, was commonplace in the past, and unfortunately, is still performed by many general practitioners. With the realization that surgical removal of the prolapsed third eyelid gland decreases tear production significantly, newer surgical replacement procedures have been described.1,5 The prolapsed gland has been reported to be anchored to the episcleral tissue,7 to the inferior sclera,8 to the ventral oblique muscle,9 to the periosteum,10,11 and to the nictitans cartilage itself (intratietits).12 The gland can be placed in an anterior or posterior pocket.6,13,14 In addition, an imbrication or modified purse-string technique that involves abrasion and suturing the posterior surface of the third eyelid can also be performed.15 The choice of surgical replacement is one
of surgeon’s preference and experience. Cyst formation has been noted with the pocket technique if the incisions are inadvertently sutured to enclose the entire gland, and anchoring techniques, except for the intranictitans tack, may result in immobility of the third eyelid. One previous report has stated a significantly lower incidence of gland re-prolapse specifically using the pocket technique compared with an anchoring technique, while other authors have described a re-prolapse rate of 0–6% using anchoring techniques.

The purpose of this retrospective study is to present a rapid and efficacious procedure to replace and to anchor the prolapsed gland of the third eyelid with a nonabsorbable suture that is placed around the insertion of the ventral rectus muscle.

MATERIAL AND METHODS

The clinical records of all dogs that presented to the primary author’s referral practice between the years 2008 and 2011 for the chief complaint of a prolapsed gland of the third eyelid were reviewed. Surgical reports of 100 dogs with >1 year of follow-up were available for this report. Documentation of the age at the first evaluation, gender, pedigree information, previous gland surgery, initial and postoperative Schirmer Tear Test (STT) values, surgical complications, and recurrences were recorded. All dogs received a complete ophthalmic evaluation with slit-lamp examination (SL-5 or SL-14; Kowa Company, Tokyo, Japan), indirect ophthalmoscopy with a Heine Omega 180 (Herrsching, Germany), Baseline STT values (Tear Flo; HUB Pharmaceuticals, LLC, Rancho Cucamonga, CA, USA), fluorescein staining (Bio Glo; HUB Pharmaceuticals, LLC), and intraocular pressure measurements (Tono-Pen XL; Mentor Ophthalmics, Norwell, MA, USA) were obtained for all patients.

All surgeries were performed by the primary author (JSS), using a novel technique modified from a previous surgical report for an everted third eyelid in cats. Sedation and induction included subcutaneous injections of premedication with acepromazine maleate (0.01 mg/kg; Boehringer Ingelheim Vetmedica, Inc. St. Joseph, MO, USA) as needed for excited or aggressive dogs, butorphanol tartrate (0.2 mg/kg; Torbugesic, Fort Dodge Animal Health, Fort Dodge, IA, USA), atropine sulfate (0.02 mg/kg; Med-Pharmex Incorporated, Pomona, CA, USA), and induction with ketamine HCl (5 mg/kg IV; Boehringer Ingelheim Vetmedica, Inc.) and diazepam (0.25 mg/kg IV; Hospira, Inc., Lake Forest, IL, USA). The patient was maintained on isoflurane inhalant anesthesia (Piramal Healthcare, Bethlehem, PA, USA). The patient was prepared for aseptic surgery and placed in sternal recumbency. After placement of an eyelid speculum, the third eyelid is grasped with Bishop Harmon forceps (Sontec Instruments, Centennial, CO, USA) and exposed with two mosquito forceps placed at both tips of the nictitans.

A linear incision is created through the conjunctiva over the prolapsed gland with a number 15 scalpel blade from the limbus until the most distal (bulbous) aspect of the prolapsed gland (Fig. 1). The conjunctival incision is expanded with the use of Steven tenotomy scissors (Sontec Instruments) (Fig. 2). The cartilage of the third eyelid is exposed by sharp excision with the tenotomy scissors, and a 1–2 mm portion of the exposed cartilage is excised at the base of the gland (Fig. 3). The prolapsed third eyelid gland is more mobile and can be easily tucked into the ventromedial fornix (Fig. 4). The globe is grasped at the limbus with fine forceps and rotated dorsally (Fig. 5). The insertion of the ventral rectus muscle (VRM) is grasped with a Gass muscle hook (item number 12-6910; Sontec Instruments) (Fig. 6). A suture of 5-0 ethilon (Ethicon, Somerville, NJ, USA) is threaded through the eyelet, and the Gass muscle hook and suture are back out around the VRM insertion (Fig. 7). Positioning of the suture around the VRM is assured by lifting the suture upwards and thus rotating the globe dorsally (Fig. 8). The suture is passed through the most bulbous distal part of the gland, and a moistened cotton-tipped applicator is used to push the gland deep into the ventromedial fornix while the ligature is tightened (Figs 9 and 10). The applicator is removed, and the knot is secured with four throws (Fig. 11). The third eyelid should be in a normal position after suture placement, and the gland should not be observed posterior to the nictitans (Fig. 12). A video demonstrating the VRM procedure can be viewed at the following internet link: http://www.youtube.com/watch?v=uBmCpekwpcc

Secondary and tertiary repairs were also included in this series. Scar tissue and retained suture material were removed from previous incisions, and the gland was replaced as described above. In the event that a conjunctival perforation occurred during the step where the third eyelid cartilage was excised, the palpebral conjunctiva in...
Figure 2. The conjunctival incision is expanded with the use of Steven tenotomy scissors.

Figure 3. The cartilage of the third eyelid is exposed by sharp excision with the tenotomy scissors, and a 1–2 mm portion of the cartilage is excised at the base of the gland.

Figure 4. The prolapsed third eyelid gland is more mobile and can be easily tucked into the posterior conjunctival fornix.

Figure 5. The globe is grasped with fine forceps at the limbus and rotated dorsally.

Figure 6. The insertion of the ventral rectus muscle (VRM) is grasped with the Gass muscle hook.

Figure 7. A suture of 5–0 ethilon (nylon) is threaded through the hole, and the Gass muscle hook and suture are backed out around the ventral rectus muscle (VRM) insertion.
the area of the perforation was closed with a simple continuous suture of 5-0 polyglactin 910 (Coated Vicryl; Ethicon) with the knots placed on the anterior aspect of the third eyelid.

Postoperative care included the use of a topical broad-spectrum triple antibiotic ointment (Neomycin and Polymyxin B Bacitracin Zinc Ophthalmic ointment; Akorn, Lake Forest, IL, USA) for 2 weeks, an oral broad-spectrum antibiotic (Amoxicillin trihydrate/clavulanate potassium; Pfizer Animal Health, NY, USA) and an oral nonsteroidal anti-inflammatory agent (Rimadyl; Pfizer Animal Health) for 1 week. If KCS was present prior to surgery, a lacrimostimulant agent (0.02% tacrolimus; Prescription Center, North Carolina, NC, USA) was added to the therapeutic regime. A protective collar was not placed on any patient. The owners were instructed to return in 3–4 weeks for a reevaluation of the surgery.

Figure 8. Positioning of the suture around the ventral rectus muscle (VRM) is assured by lifting the suture upwards and thus rotating the globe dorsally.

Figures 9. The suture is passed through the most bulbous distal part of the gland.

Figure 10. A moistened cotton-tipped applicator is used to push the gland deep into the ventromedial fornix while the ligature is tightened.

Figure 11. The cotton-tipped applicator is removed, and the knot is secured.

Figure 12. The third eyelid is in a normal position after suture placement, and the previously prolapsed gland is not observed posterior to the nictitans.
RESULTS

One hundred dogs (122 eyes) were included in this surgical review. Twenty-three different pure-bred and several mixed-breed dogs were represented (Table 1). The average age of the patient was 2.2 years with a range of 57 days to 11 years. 60 cases involved the right eye, and 62 cases the left eye. Both eyes were affected in 23 patients (18.9%). Secondary repair of a previously operated prolapsed gland at another facility was performed in 27 cases (22%), and seven cases were evaluated for tertiary repairs (5.7%). There were 34 spayed females, nine intact females, 32 castrated males, and 25 intact males included in this study. The patients were followed for a minimum of 1 year, and the longest duration of follow-up was 5.5 years.

Recurrence of gland prolapse was not observed in any of the postoperative cases with use of the VRM suture anchoring placement technique. Mild conjunctiva hyperemia of the third eyelid was noted for up to 4 weeks after surgery. All cases developing conjunctival perforations healed uneventfully.

Twenty-one patients had a small conjunctival perforation occur at the time of gland dissection (17.2%). Seventeen of these 21 patients occurred in the early phase of this study. Four cases of conjunctival perforation had previous third eyelid gland surgeries prior to referral. Extensive scar tissue and retained suture material were observed in eight cases that were presented for surgical correction of a recurrent prolapsed gland.

The mean duration for completion of this procedure was 8 min and 46 s (range: 3–20 min).

Five cases of preoperative KCS had improved Schirmer tear test values following surgical correction and medical management with lacromimetic agents. After surgical correction of the prolapsed gland with the VRM suture technique and the institution of a lacromimetic agent, 4/5 cases with preoperative KCS had normal postoperative STT values, and 1/5 of the cases had an improved STT value from 2 mm of wetting per minute to 9 mm/min. Keratoconjunctivitis sicca was not newly diagnosed in the postoperative period in any case.

Neither evidence of pupillary changes nor restriction of ocular movement was noted at the time of surgery or in the postoperative course of examinations.

DISCUSSION

The preferred method of surgical replacement of the prolapsed third eyelid gland is one with which the surgeon is most comfortable. The optimal technique for gland replacement is one that is highly reproducible, time efficient, and one with no to minimal complications or recurrences. Removal of the gland is contraindicated in all breeds, and especially in those breeds that are predisposed to the development of KCS. Dry eye syndrome may be precipitated by gland amputation.1,6,10

This reported technique of the VRM suture anchor placement was 100% successful in the replacement of all operated glands. The recurrence rate of 0% is lower than any other reported surgical procedure in the English literature.6–14 In comparison, the Morgan technique had an approximately 6% failure rate and up to a 50% recurrence rate was reported in a scleral suturing anchoring procedure presented in the same report.6 In the intranictitans tacking procedure, 1/15 cases recurred.12 In addition, our VRM technique was able to correctly replace 34 glands that had undergone previous surgeries using other techniques prior to referral. We found that the VRM replacement was particularly effective in large gland prolapses encountered in the Bulldog, Mastiff, and other large breeds. The modification to remove a small piece of third eyelid cartilage facilitated the reposition of the prolapsed gland deep into the ventromedial conjunctival fornix without restricting movement of the third eyelid. This modification to remove a small portion of the third eyelid cartilage seemingly is not used by other surgeons who perform a similar VRM technique (Dr. Jorge Pereira, personal communication. See also video at http://www.youtube.com/watch?v=9rxH3J9nU4). We have found that the small resection of cartilage allowed easy placement into the ventral conjunctival fornix without extensive tension on the sutured gland. The only observed complication in 21 eyes was the creation of a small conjunctival perforation during this cartilage resection step. This wound was easily repaired with a simple continuous suture of an absorbable suture material. Perforation of the conjunctiva was most frequent in the early learning curve of the VRM technique. This minor complication did not have any undesirable effect in the repair, postoperative recurrence rate, or gland positioning. No adverse effects were noted except for the minimally added surgical time to repair the defect.

Table 1. Breeds of dogs that were operated by the ventral rectus muscle (VRM) suture anchor placement technique

<table>
<thead>
<tr>
<th>Breed</th>
<th>Number of eyes</th>
</tr>
</thead>
<tbody>
<tr>
<td>English Bulldog</td>
<td>31</td>
</tr>
<tr>
<td>Cocker Spaniel</td>
<td>16</td>
</tr>
<tr>
<td>Beagle</td>
<td>7</td>
</tr>
<tr>
<td>French Bulldog</td>
<td>5</td>
</tr>
<tr>
<td>Shih Tzu</td>
<td>5</td>
</tr>
<tr>
<td>Boston Terrier</td>
<td>3</td>
</tr>
<tr>
<td>Coton de Tuléar</td>
<td>3</td>
</tr>
<tr>
<td>Lhasa Apso</td>
<td>3</td>
</tr>
<tr>
<td>Cockapoo</td>
<td>3</td>
</tr>
<tr>
<td>Yorkshire Terrier</td>
<td>2</td>
</tr>
<tr>
<td>Haveneese</td>
<td>2</td>
</tr>
<tr>
<td>Maltese</td>
<td>2</td>
</tr>
<tr>
<td>Pekingese</td>
<td>2</td>
</tr>
<tr>
<td>Bassett Hound</td>
<td>2</td>
</tr>
<tr>
<td>Mixed Breeds</td>
<td>5</td>
</tr>
<tr>
<td>Shar Pei, Dachshund, Mastiff, Cane Corso, Dog de Bordeaux, Pit Bull, Chihuahua, Welsh Corgi, Pug</td>
<td>1</td>
</tr>
</tbody>
</table>
Whenever there is conjunctival dissection around the prolapsed gland of the third eyelid, concern does exist that there may be a disruption to the ductules of the gland and thus predispose the patient to the development of KCS. The Morgan pocket technique was shown to have an incidence rate of 16.6% operated eyes, whereas eyes that had been treated with excision of the gland accounted for 68.4% of all eyes that developed KCS. Previous reports support the decision to replace the prolapsed glands surgically rather than to amputate the gland. Dogs treated with surgical replacement were less likely to develop KCS than those treated with surgical excision. Data have shown that KCS is a delayed event and may not occur until several years after surgical intervention/amputation (median time of 4.5 years). Moore demonstrated that in the normal third eyelid, multiple ducts were observed histologically to course from the seromucous secretory units to the central posterior surface of the third eyelid. The purse-string or the pocket technique was not associated with an altered tear production, and both were considered not to damage secretory duct system in operated eyes. In our study, there were no cases of postoperative KCS with a minimal follow-up period of 1 year in 100 dogs (122 eyes). In fact, 5/15 eyes demonstrated an increased in STT values after surgery and medical management with taconimus solution.

The VRM technique utilizes suture placement and anchoring around the insertion of the ventral rectus muscle. During the placement of the nylon suture, great care is taken to assure that the suture is placed close to the VRM insertion as possible and not encompassing the belly of the VRM. Impaired motion or function of any extraocular muscle may result in diplopia or double vision. There were no pupillary changes, restriction of ocular motion or globe deviation in any of the operated eyes.

The VRM technique is easily mastered and is facilitated by the addition of one instrument to the standard external eye pack, namely, a Gass muscle hook. This instrument allows a smooth grasp around the insertion of the VRM and easy placement of the nonabsorbable suture through the eyelet of the hook. Instead of using this muscle hook, one can also back the suture needle around the VRM insertion and thus avoid any scleral perforation or damage to the extraocular muscle with the tip of the suture needle.

In conclusion, the replacement of the prolapsed gland of the third eyelid in dogs using the VRM procedure is consistent, rapid technique, and is not associated with the development of either KCS or recurrence of gland prolapse in the 100 reported dogs (122 eyes). This procedure is especially helpful in the repair of particularly large and swollen glands as well as glands that have re-prolapsed after usage of another described surgical replacement techniques. Because the prolapse of the gland of the third eyelid is commonplace in breeds predisposed to KCS, a reliable repositioning surgery, free of major complications with minimal to no recurrence rate, is advised. Replacement of the prolapsed gland will decrease the incidence of future KCS compared with a prolapsed gland that is left alone or one that is surgically amputated. The VRM suture anchor placement proved to be a rapid and very successful gland replacement procedure.

REFERENCES