B-4948
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RESEARCH ARTICLE Indian Journal of Animal Research

A Clinical Study on the Surgical Management of Third Eyelid Gland Prolapse in Dogs

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10.18805/IJAR.B-4948

ABSTRACT

Background: The current study was undertaken to evaluate the clinical efficacy of two different surgical methods for management of third eyelid gland prolapse in dogs.

Methods: The study was conducted on 14 eyes of 11 dogs presented with third eyelid gland prolapse for surgical treatment. Two groups dogs were subjected to clinical and ophthalmic examination based on the surgical technique used *i.e.*, Group I (n=8) in which modified Morgan's pocket technique, Group II (n=6) in which modified orbital rim anchorage technique was used. Among the breeds brachycephalic dogs (54.54%, n=6) followed by mesocephalic dogs (45.45%, n=5). The modified Morgan's pocket technique was adopted in 8 eyes of 7 dogs (1bilateral, 6 unilateral) and the modified orbital rim anchorage technique was performed in 6 eyes of 4 dogs (2 bilateral, 2 unilateral). In Group I, the mean pre-operative Schirmer tear test value was 16.87±0.72mm/min and in Group II, it was 17.33±0.67 mm/min, both values increased on 30th Post-operative day. Statistical analysis revealed that there was no significant difference between the two groups ($p>0.05$), but there were significant differences within each group ($p<0.05$). The fluorescein dye test was repeated on 1st,7th,14th, 30th days post-operatively and found positive in the left eye of one dog with the reduced bilateral cherry eye on 7th post-operative day in group I. Third eyelid mobility was normal post-operatively in all the cases of group I. Whereas in group II, it is restricted in all the cases. Three cases regained normal contour by the 10th post-operative day whereas 5 cases by the 14th postoperative day in group I. In group II, 3 cases regained normal contour by 12th post-operative day and 3 cases regained by 14th post-operative day. One case in the group I tested positive for superficial corneal ulcer on the 7thpost-operative day. One dog in group I had a recurrence after 45 days of repositioning. One dog in group II with reduced bilateral cherry eye had a recurrence in the left eye 30 days after surgery.

Result: Present study, Modified Morgan's pocket technique was considered superior over the modified orbital rim anchorage technique in view of technical feasibility and unrestricted third eyelid mobility.

Key words: Canines, Cherry eye, Dogs, Modified orbital rim anchorage technique, Morgan's pocket technique, Third eye lid gland prolapsed.

INTRODUCTION

Prolapse of the gland of the third eyelid also referred as 'cherry eye' is seen commonly in dogs (Hendrix, 2007). The third eyelid gland protrusion is more common in young animals, up to two years of age and it may be unilateral or bilateral (Gellat, 1991 and Plummer *et al.,* 2008). Breeds such as Neapolitan Mastiff, American and English Cocker Spaniel, Boston Terrier, Pekingese, English Bulldog, Beagle, Basset Hound, Lhasa Apso and Shih Tzu were believed to be predisposed to this condition. The condition was found to be more common in male dogs. The disorder can be unilateral, but may be bilateral or would become so if the second gland prolapses later (Mazzucchelli *et al.,* 2012).

With respect to therapy, many surgical procedures were proposed such as the burial or the anchorage of the gland or its surgical excision (Farias *et al.,* 2001). Because this gland was thought to be responsible for 30-57% of tear production, gland replacement was favoured over partial or whole gland removal (Moore *et al.,* 1996).

The third eyelid gland contributes a large percentage of the tear fluid essential for lubricating and protecting the globe, it was suggested that prolapsed glands should be surgically replaced (Helper *et al.,* 1982 and Saito *et al.,* 2001). Gland removal certainly hasten keratoconjunctivitis sicca (KCS) and its onset and severity in animals (Saito *et al.,* 2001). Dogs treated by repositioning the prolapsed gland have a lower incidence of KCS later in life than dogs that were left untreated or when the gland was excised (Morgan *et al.,* 1993).

'Anchoring' and 'pocket' techniques are the two types of surgical procedures documented (Maggs, 2008). Then anchorage to the nictitans cartilage itself (Plummer *et al.,* 2008) or around the ventral rectus muscle insertion

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How to cite this article: Sowmya, D.S., Reddy, K.J.M. and Latha, C. (2022). A Clinical Study on the Surgical Management of Third Eyelid Gland Prolapse in Dogs. Indian Journal of Animal Research. DOI: 10.18805/IJAR.B-4948.

Submitted: 04-06-2022 **Accepted:** 12-10-2022 **Online:** 28-10-2022

(Sapienza *et al.,* 2014) were performed. In pocketing technique, the gland can be placed either in the anterior pocket or in the posterior pocket (Morgan *et al.,* 1993). An imbrication technique involving suturing the posterior surface of the third eyelid was also performed (Moore, 1990).

The surgical excision of the third eyelid gland reduced Schirmer tear test values by 29-57% (Helper *et al.,* 1974) and the third eyelid gland was found to be crucial in maintaining normal tear production (Saito *et al.,* 2001).

MATERIALS AND METHODS

Anamnesis

A total of 14 eyes in 11 dogs that were presented suggestive of third eyelid gland prolapse, considered suitable for surgery were selected for the study. In three dogs it was bilateral. Cases were randomly divided into two groups.

Details of history, age, breed, skull type, sex and weight, side of eye affected, duration of condition of each dog are shown in Table 1.

Pre-operative observations

Dogs showed clinical signs like presence of cherry-like hypertrophied mass protruding from medial canthi of the affected eyes, conjunctivitis, epiphora and ocular discharge (Fig 1).

Pre-operative assessment

Neuro-ophthalmic Examination or Tests for Visual Acuity the following tests as per the standard procedures were

Table 1: Details of age, breed, skull type, sex, weight, side of eye affected, duration of condition and pre-op STT of each dog.

Case no.	Breed	Skull type	Sex (M/F)	Age at presentation (months)	Body weight (kgs)	Side of eye affected	Duration of the condition (days)	Pre-operative STT (mm/min.)
				Group I				
1	Shih Tzu	Brachycephalic	F	4	5.6	Right	1	20
2	French Bulldog	Brachycephalic	F	5	7.6	Right	30	15
3	Shih Tzu	Brachycephalic	F	7	6.5	Left	60	14
4	Golden Retriever	Meso-cephalic	M	3.5	17	Left	5	19
5	Shih Tzu	Brachycephalic	F	7	7	Left	60	16
6 and 7	Rottweiler	Meso-cephalic	F	6	18	Bilateral	30	18/17
8	Beagle	Meso-cephalic	F	3	4.5	Right	15	16
				Group II				
1 and 2	Mixed Breed	Brachycephalic	M	6	5	Bilateral	30	18/19
3 and 4	Spitz	Meso-cephalic	F	5	6	Bilateral	45	19/17
5	Golden Retriever	Meso-cephalic	M	5.5	20	Right	2	15
6	Lhasa Apso	Brachycephalic	M	7	8.35	Left	20	16
Mean±SE				5.36±0.45	9.60±1.82		27±6.73	

Fig 1: clinical signs of cherry eye in dogs.

performed to ascertain visual acuity (Maggs, 2013). Palpebral reflex, Pupillary Light Reflex, Menace reflex and Dazzle reflex were recorded.

Schirmer tear test

Schirmer tear test strip to estimate the tear production and to diagnose KCS. Normal values in dogs for STT was reported to be 15- 25mm/min.STT was repeated on the 1st, 7th,14th,30th days after surgery (Fig 2) tabulated in Table 2.

Fluorescein dye test

Fluorescein dye impregnated sterile paper strips (Fig 3) was performed in the dogs to detect corneal ulcers in the eye.

Table 2: Pre-operative and Post-operative schirmer tear test values (mm/min).

Groups	Caseno.	Pre-operative	Post-operative			
			1st day	7th day	14th day	30th day
Group I	1	20	21	20	22	24
	2	15	17	18	22	23
	3	14	17	20	21	23
	4	19	20	16	15	18
	5	16	18	19	19	21
	6	17	16	17	19	20
	7	18	19	21	23	27
	8	16	15	18	22	23
Mean ± SE		16.87±0.72	17.87±0.72	18.62±0.59	20.37±0.92	22.37±0.96
Group II	1	18	19	20	21	22
	2	19	18	18	20	20
	3	19	20	20	22	24
	4	17	18	19	19	20
	5	15	16	18	21	21
	6	16	17	18	21	21
Mean ± SE		17.33±0.67	18±0.58	18.33±0.40	20.33±0.49	21±0.73

Fig 2: Schirmer tear test kit and STT at 30 sec.

Fig 3: Fluorescein dye test.

The fluorescein dye test was repeated at regular intervals for detecting any of corneal defects present.

Surgical technique

Group I - Modified morgan's pocket technique

The technique was performed in 8 eyes of 7 dogs. In which, one dog had bilateral condition and rest of the six were unilateral. 4-0 or 5-0 vicryl suture material was used depending on the animal. Two stay sutures were applied at the periphery of the free margin using 5-0 prolene for a better grip and exposure. Thereafter, two superficial curvilinear incisions using no. 11 surgical blade one on either side of prolapsed third eyelid gland (dorsal, ventral) were made parallel to the free margin on the bulbar side of the third eyelid.

The suture (vicryl) was anchored to the conjunctiva on the palpebral surface of the third eyelid and then passed through to the bulbar side. The gland was then tucked into the pocket by suturing the outer (free) edges of the conjunctiva created by these incisions in two layers. The first layer, a simple continuous pattern to close the edges of the conjunctiva over the gland and forcing the gland into the pocket. After complete reduction of the prolapsed gland, the suture was passed back through the third eyelid to the palpebral surface and anchored there in a similar manner as that of, at the start of the suture line. Cushing pattern was used. At the end of the Cushing pattern, the suture was drawn through the nictitans to the palpebral surface and the knot was applied to the first anchored suture. The two incisions were not connected at the end and start to avoid the formation of a retention cyst (Fig 4).

Group-II - Modified orbital rim anchorage technique

The technique was performed in 6 eyes of4 dogs. In which two were bilateral and two were unilateral. In this technique, a skin incision was made along the ventro-medial aspect of the orbit (approximately 1.0-1.5 cm) and to the level of the zygomatic periosteum, a 3-0 or 4-0 monofilament suture material was inserted through the skin incision into the periosteum just ventral to the periorbital rim. After anchoring the suture to the periosteum, the suture was passed through the skin incision exiting on the dorsal bulbar surface of the third eyelid and then passed dorsally to the highest point of the prolapsed gland. The skin incision was closed and the conjunctival incision was left unsutured (Fig 5).

RESULTS AND DISCUSSION

Out of 11 dogs, three were Shih Tzus (27.27%), two were Golden Retrievers (18.18%), followed by one Beagle (9.09%), one French Bulldog (9.09%), one Lhasa Apso (9.09%), one mixed breed (9.09%), one Rottweiler (9.09%) and one Spitz (9.09%). Plummer *et al.* (2008) and Sapienza *et al.* (2014) also reported that Shih Tzus are predisposed to third eyelid gland prolapse. The third eyelid gland prolapse was predominantly observed in female dogs accounting for 63.63% of the recorded cases, while males accounted for 36.36% in the present study. This might be due to the more female population than males in the locality. This result was not in concurrence with the studies of Mazzucchelli *et al.* (2012) and Yaygingul *et al.* (2020) who reported higher incidence in males than females in their study.

Fig 4: Group I- Modified Morgan's pocket technique.

A. Eye draping and surgical area exposure using eye speculum, B. Mosquito forceps application to exteriorize the gland, C. Stay sutures application for better exposure and grip, D, E. Superficial curvilinear conjunctival incisions dorsal and ventral to prolapsed gland parallel to free margin were made - creating a pocket, F. Anchorage of suture to the palpebral surface of conjunctiva to avoid corneal abrasion, E.Conjunctival incisions were sutured pushing the prolapsed gland into pocket, G. simple continous first layer, H. Followed by cushing pattern second layer, I. Immediately after reduction of prolapsed gland.

Among the 11 dogs, the third eyelid gland prolapse cases were found to be in the age range of 3-7 months, indicating more predisposition in dogs below one year of age. This was in agreement with Kavitha *et al.* (2010), Kurup (2017) and Yaygingul *et al.* (2020), the condition was unilateral in 72.72%, while the rest 27.27% were bilateral.This was in accordance with Kavitha *et al.* (2010) and Kurup (2017). On the contrary, Plummer *et al.* (2008), Sapienza *et al.* (2014) and Joy (2009) reported more bilateral cases than unilateral. Among the unilateral cases, the left eye and the right eye affected cases were equally distributed which was not in accordance with Hendrix (2007), Mazzucchelli *et al.* (2012) and Yaygingul *et al.* (2020) who reported more right-sided cases over the left-sided ones. In the present study, brachycephalicdogs (54.54%) followed by mesocephalic dogs (45.45%) and no dolichocephalic breeds were reported . This was in congruence with Hendrix (2007) and Mazzucchelli *et al.* (2012). On the contrary, Kurup (2017) reported higher incidence in mesocephalic breeds over the brachycephalic and dolichocephalic ones. Dehghan *et al.* (2012) stated that the susceptibility could be related to the anatomical conformation of the head and orbit of brachycephalic dogs.

The third eyelid gland prolapse was found to be in between three and seven months of age. This was in agreement with Singh *et al.* (2017) and Yaygingul *et al.* (2020). Maggs (2012) opined that antigen-stimulated gland enlargement was thought to be one of the predisposing risk factors for gland prolapse.

In this study, dogs showed signs like presence of cherry-like hypertrophied mass from medial canthi in all of the affected cases, conjunctivitis in two cases, epiphora in four cases. These were found to be correlating with the symptoms described by Mudasir and Andrabi (2017), Yaygingul *et al.* (2020) and Deveci *et al.* (2020). Ocular discharges were seen in five cases. Similar symptoms were observed by Kurup (2017).

The neuro-ophthalmic examination was conducted prior to and after surgery in all the cases. Out of 14 cases (10 dogs) in the present study, Palpebral, menace, dazzle and pupillary light reflexes were found to be positive in all the cases. Similar findings were also observed by Kurup (2017) in dogs with third eyelid gland prolapse. Post-operatively, all these reflexes were found to be positive in all 14 cases in the present study.

Schirmer tear test values were with a mean of 16.87±0.72 mm/min. in group I and 17.33±0.67 mm/min. in group II. All the pre-operative Schirmer tear test values were within normal limits, which matched the findings of Cabral *et al.* (2008). Tear production did not differ with age, sex and time while, Hartley *et al.* (2006) reported a 0.4 mm decline in tear production with each year in dogs. Herring *et al.* (2000) stated that age had no significant influence on Schirmer tear test values.

Statistical analysis revealed no significant difference between the two groups, but found significant differences within each group. On the 1st, 7th, 14th and 30th post-operative days, the Schirmer tear test value increased gradually in both groups compared to pre-operative days. This was in accordance with Premont *et al.* (2012) and Kurup (2017).

Fluorescein dye test were negative pre-operatively indicating that there's no defect in corneal epithelium present. Felchle and Urbanz (2001) and Maggs (2013) stated that the dye cannotpenetrate the lipophilic corneal

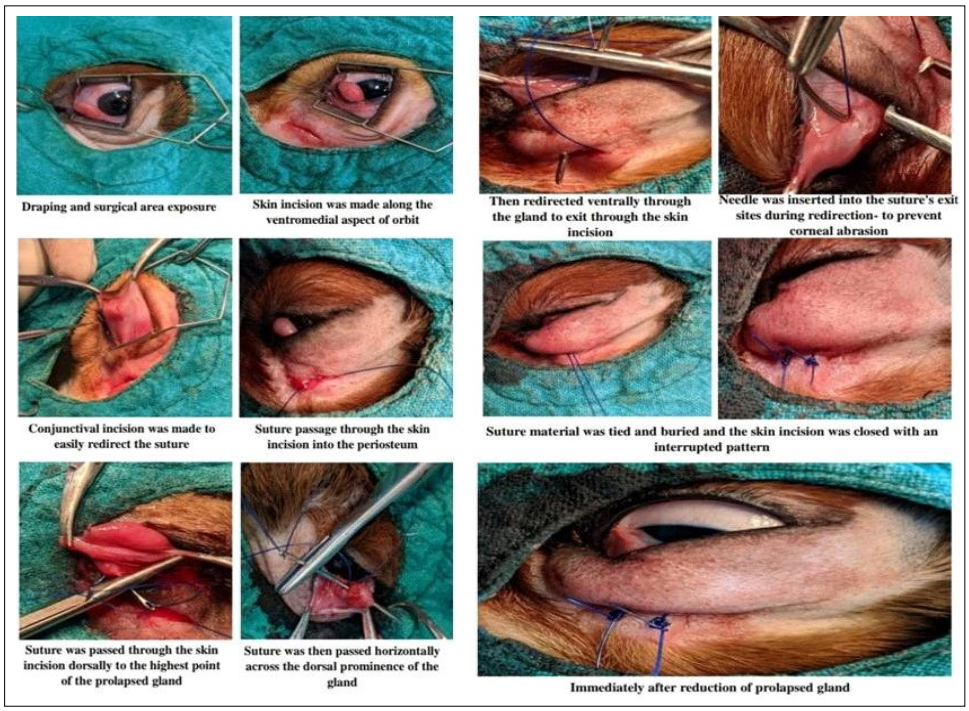

Fig 5: Group II- Modified orbital rim anchorage technique.

epithelium unless and until there were some corneal abnormalities.

In group I, one case tested positive for the fluorescein dye test on the 7th post-operative day. Singh *et al.* (2017) also noticed corneal ulcers development in the pocket technique which later subsided gradually. The animal later tested negative for the fluorescein dye test by the end of the observation period, in our study. In group II, none of the animals developed ulceration in the observation period.

In all the animals of group I in our study, the third eyelid mobility was normal from the very first day. This was similar to the findings of Kurup (2017). On the contrary, Dehghan *et al.* (2012) noticed a reduction in mobility of the third eyelid in some of the dogs in their study. In group II,the third eyelid was fixed and the mobility was restricted in all the cases. This was in agreement with Stanley and Kaswan (1994).

Modified morgan's pocket technique

The double row of suturing the pocket incisions around the gland was found to be more effective for keeping the replaced gland in its normal position within the pocket (Fig 6). A similar method was adopted by Gupta *et al.* (2016).

Modified orbital rim anchorage technique

The modifications made for the original anchorage technique made it easier for the surgeon to get an easy approach (Fig 7). The modified technique used in the study was developed by Stanley and Kaswan (1994).

Time taken to regain normal contour

In cases of group I, the time taken to regain normal contour was between 10-15 days. Whereas, Chaudhary *et al.* (2009) mentioned that the operated eyes became normal in 8 to 10 days in their study. In group II, by the 12th post-operative day three cases achieved normal contour and three cases by 15th post-operative day.

In the present study, one dog had superficial corneal ulceration due to suture material coming in contact with cornea by the 7th post-operative day and later became normal by the end of the observation period in group I. Similarly, Dehghan *et al.* (2012), Premont *et al.* (2012) and Singh *et al.* (2017) observed corneal ulceration in their study period.

In the present study, in all the dogs of both the groups, post-operative inflammation, epiphora, redness were noticed in the initial days after surgery which subsided bythree to five days in group I and by five to seven days in group II. Post-operative irritation got subsided by seven to ten days in group I and ten to twelve days in group II after surgery. Dehghan *et al.* (2012), Gupta *et al.* (2016) and Kushwaha *et al.* (2016) observed similar complications.

One dog in each group developed recurrence; in group I recurrence was observed after 45 days of repositioning while in group II the dog developed after 30 days of repositioning. Kaswan and Martin (1985) and Stadsvold (1992) have described a re-prolapse rate of 0-6% using anchoring techniques.

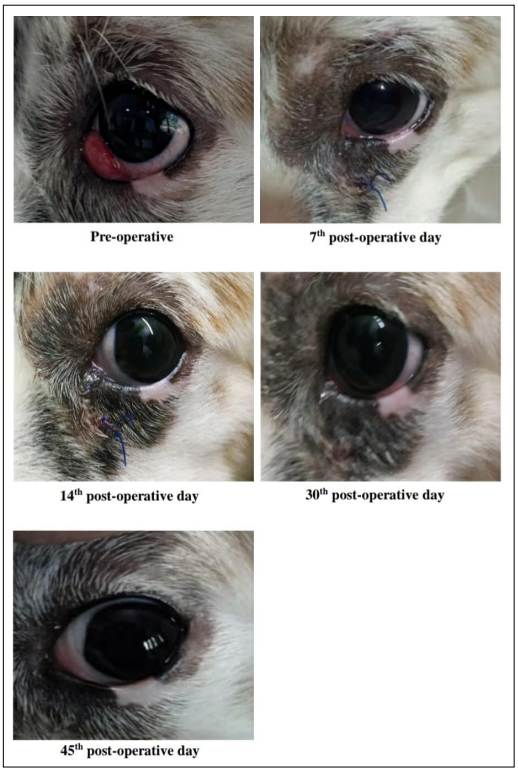

Fig 7: Group II -Case no. 4 - Modified orbital rim anchorage technique. Post-operative appearance in the left eye.

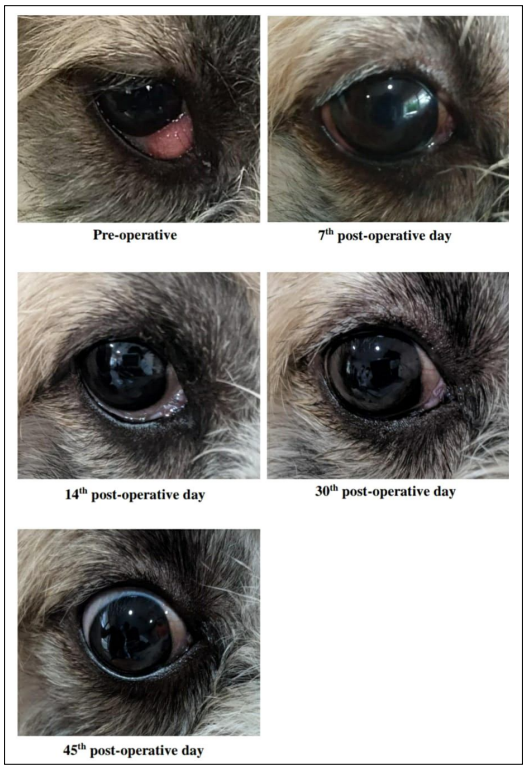

Fig 6: Group I- Case no. 1 - Modified Morgan's pocket technique. Post-operative appearance in the right eye.

CONCLUSION

Based on the present clinical study, both techniques were effective in repositioning the prolapsed gland and in improving tear production. However, in the modified orbital rim anchorage technique restriction of the third eyelid mobility was noticed which may compromise its functions like corneal protection and tear film distribution in the long term. Modified Morgan's pocket technique was considered superior over the modified orbital rim anchorage technique in view of technical feasibility and unrestricted third eyelid mobility.

Conflict of interest: None.

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