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The influence of the different cherry eye surgical intervention on tear production in dogs.

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ABSTRACT

A Schirmer's tear test (STT) is a procedure that is used to verify if the dog eyes are producing enough tears to keep the eyes healthy. The goal of this study was to estimate the influence of different techniques of cherry eye management on the tear production in dogs. Cherry eye was diagnosed unilaterally and bilaterally in 17 (62.96%) and 10 (37.04%) cases, respectively. The recorded cases were 19 (10 bilateral and 9 unilateral) in male (70.37%) and 8 (all were unilateral) in female (29.63%). Cherry eye affection mainly managed by surgical excision or pocket techniques. Schirmer's tear test was applied in both healthy and affected animals which were treated by both technique. The pocket technique preserved the morphology and integrity of the duct system of the nictitating gland and also resumes tear production. On the other hand, surgical excision of third eyelid gland eliminated about 40% of the tear production.

1. INTRODUCTION

The adenoma or hyperplasia of third eyelid gland is usually noticed at the free margin of the nictitating membrane and commonly known as cherry eye (Gelatt, 2001; Slatter, 2001). The protrusion of the third eye lid gland is usually diagnosed under one-year aged dogs (Hendrix, 2007; Thamizharasan et al, 2016).

The etiological factor of the hypertrophy of the gland is not obvious. Many factors were mentioned to illustrate the cause which may be inflammation of the third eye, weakness of the connective tissue attaching the gland in situ and or heritable conditions (Plummer et al 2008; Peiffer et al, 2022).

The clinical problems associated with cherry eye are summarized in epiphora, conjunctivitis and red mass at the medial canthus (Martin, 2009). The deficiency in tear production supposes dehydration, malnutrition, conjunctival epithelial damage, corneal ulceration, infection, and the dogs predispose to keratoconjunctivitis sicca (Williams, 2008).

The excision of third eyelid gland leads to deficiency of the production of aqueous portion precorneal tear film. The pocket technique which achieves the preservation of tear production and morphology of third eyelid gland (Dehghan et al., 2011; Thamizharasan et al., 2016).

In spite of the precorneal tear film formed from three portion, the outer phospholipid, the middle aqueous and the inner mucin layer; the middle aqueous portion remains the most important one because it hydrates and nourishes the cornea. The aqueous portion is composed from the secretion of many gland such as lacrimal, nictitating and scattered conjunctival glands (Wolfering and Krause gland). The entire gland produces up to 40% of aqueous portion precorneal tear film (Saito et al, 2001). The precorneal tear film provides

lubrication, protect the ocular surface from damage and supply the cornea with oxygen and nutrient (Braun et al, 2015).

A Schirmer's tear test (STT) is a procedure that is used to examine if the dog eyes are producing enough tears to keep the eyes healthy. Schirmer's tear test still remains the cheapest, fastest, simplest, and most accurate technique that does not need special equipment and reliable technique for measurement both total and reflex tear production (Senchyna and Wax 2008).

The aim of the present study was to evaluate the influence of different techniques of cherry eye management on tear production in dogs assessed by Schirmer's tear test.

2. MATERIAL AND METHODS

The study was conducted after receiving the approval from the institutional animal ethics committee, Faculty of Veterinary Medicine, Benha University (BUVFTM 07-05-23).

Twenty-seven clinical cases were diagnosed as cherry eye (17 unilateral and 10 bilateral). The cases were collected over three years from the Faculty of Veterinary Medicine Teaching Hospital, Benha University, Military Veterinary Hospital, Peoples Sick Animal Hospital, and veterinary clinics .

The recorded cases were 19 (10 bilateral and 9 unilateral) in male and 8 unilateral in female. The most prevalent affected breed was Rottweiler (8 cases) followed by Cane Corso (5 cases) and the least breed recorded was Shih Tzu (one case) . The affected cases were generally anesthetized by administration of IM xylazine Hcl 2.0 mg/ kg (Xylaject®, Adwia, Egypt). Anesthesia was induced with IV propofol

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(Diprivan 1%, Fresenius Kabi USA) and maintained with isoflurane after intubation (Elkasapy et al., 2022).

All cases were subjected to surgical intervention for correcting the prolapse of nictitating gland. The pocket technique was performed in 20 cases while, the other 7 cases were subjected to total surgical excision of the gland.

The pocket technique was proceeded by two curvilinear incision on both side of the prolapsed gland at the bulbar aspect of the third eyelid. After replacement of the prolapsed gland the edges of the surgical incisions were co-aptated by 6/0 Vicryl (Dehghan, et al 2011).

Surgical excision of the prolapsed nictitating gland was achieved in long standing cases or those showed wounding and ulceration.

The total schemer tear test:

The schemer tear test (STT) was done at the time of surgical intervention (0 time), 2, 10, 20 and 30 days after operation. Both eyes were examined at the same time even in the case of unilateral cherry eye.

To measure the STT, Schemer tear testing paper (OpStrip, Ophtech, India) was used. The strips were 40 mm length and 5 mm width with a notch 5 mm from its end.

To conduct the basal Schirmer's tear test, the dog eyes were locally anesthetized by instillation of Benoxinate hydrochloride 0.4% eye drops) Benox®, Egyptian Int. Pharmaceutical Industries Co, Egypt, Egypt). The excess of tears and anesthetic solutions were dried after one minute to prevent excess moisture effect on the placed strips. A 5 mm tip of the strip was folded and placed in the lower cull-D-sac at the junction of the lateral and middle third of the lower eyelid. The schemer paper test was left in place for one min and the wetting distance on the strip was measured by mm scale on the paper.

Statistical analysis:

The data of tear production were plotted as mean (\pm SEM) using GraphPad Prism program (ver. 7). Differences between groups were tested by a one-way analysis of variance (ANOVA) with Duncan multiple comparison test using IBM®SPSS (ver. 23). P value was set at 0.05 to define the significant differences between groups.

3. RESULTS

Cherry eye was recorded among different breeds, age, and sex with total 37 eyes. The affected eye showed conjunctivitis, epiphora, sticky yellowish exudation that appeared at the medial canthus in the morning, and red mass of variable size in the medial canthus (Fig. 1).

Pocket technique was carried out in 20 cases. Following up of these cases showed dehiscence of the surgical knot of the nictitating membrane in two cases, these wounds healed by the second intention after routine daily dressing.

Seven cases of cherry eye showed symptoms of wounding and ulceration as a result of scratching and total surgical excision was performed.

One case showed symptoms of chemosis and keratitis after surgical excision of cherry eye due to aggressive temperament of the dog.

The Schirmer's tear test (STT) revealed that the tear production was 19-26 mm normal healthy (Fig. 2A) and 7-11 mm in cherry eye cases (Fig. 2B). The STT of the eyes subjected to pocket technique was close to the normal

secretion at day 20 post-operative and reached its normal value at day 30 (Fig. 3). The measured normal tear production was undulant and revealing no significant change with time post intervention in surgical excised group. A highly significant ($P < 0.001$) decrease in the tear production, ranged from 13 to 15 mm, was observed in seven cases where the surgical excision was performed in comparison with the normal tear value.

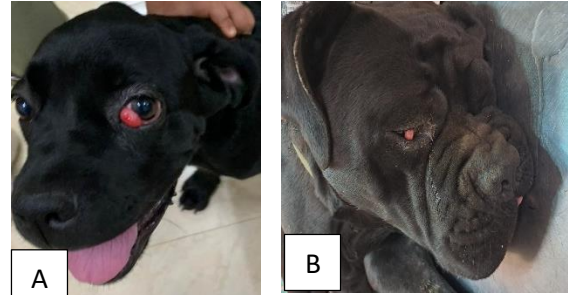


Fig. (1) Unilateral cherry eye (red mass in medial canthus) in young (A) and aged (B) Cane Corso dogs.

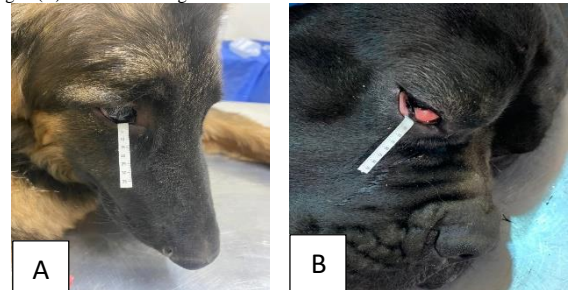


Fig. (2) Schirmer's tear test in both normal (A) and cherry eye (B) dogs after application of single dose of local analgesia.

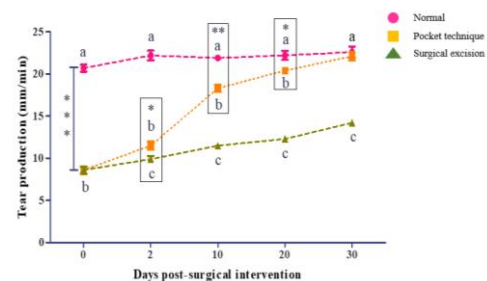


Fig. (3) Schirmer's tear test values in normal eye, pocket technique and surgical excision of cherry eye at 0 (the time of surgical intervention), 2, 10, 20 and 30 days after operation.

4. DISCUSSION

A general rule of thumb, normal STT values should be 15-25 mm/minute. It has been suggested that 11-14 mm/min is suggestive of early KCS, while 6-10 mm/min is moderate KCS, and less than 5 mm/minute is severe KCS. The Schirmer's test is assumed as one of the easy and smooth tests that don't require much preparation or special equipment or tools, and its result appear very quickly within one mints. This result is very close to that recorded by Saito and Kotani (2001) and Hartley et al. (2006). Who mentioned that STT is a good method for determination of KCS.

In the current study, the rate of tear production was measured under the influence of a single dose of Benoxinate hydrochloride 0.4%.The excess of the local analgesic and tear wiped before applying the Schirmer's tear paper. This protocol was documented by Hamor et al. (2000) and Margadant et al. (2003), they concluded that a single dose of

local analgesia not significantly lower tear production rate in dog.

Cherry eye was diagnosed among Rottweiler (8 cases) and Cane Corso (5 cases), this results comes in contrary to that recorded by Dehghan et al. (2011), they stated that the cherry eye is usually recorded within small and medial breeds. Our results may be attributed to the dog population as Egyptian breeders and pet owners prefer the large breeds; this has been reflected in the increase of the number of population of large breed dogs.

The clinical symptoms observed and recorded on the affected animals were summarized as epiphora, conjunctivitis, and yellowish sticky discharge especially in the morning and presence of red mass in the medial canthus. These symptoms are greatly similar to the clinical finding which was reported by Braun et al. (2015). They added that the cornea and conjunctiva keep its integrity, remain healthy and freeform any harmful effect as long as tear secretions remain at the required level .

Our results come in harmony with that reported by Davidson and Kuonen (2004), Giuliano and Moore (2007) and Braun et al. (2015). They stated that the precorneal tear film not only protect the cornea and conjunctiva , but also provides the lubricant, flushing debris, moisture, oxygenation, nourishment, have a certain antimicrobial properties and is considered a line of defense for these important structure in front of many pathogens .

The radical excision of protruded gland (cherry eye) decreases from 38 to 44 % of the aqueous portion of the tear. These results were supported by Margadant et al. (2003) and Broadwater et al. (2010). They mentioned that the aqueous portion of the precorneal tear film is chiefly a combination of both lacrimal and nictitating membrane gland secretions. They also added that the surgical excision of cherry eye deprived the tear from 40 % of its level even with maximum secretion of the lacrimal gland. On the other hand, Hartely et al. (2006) discussed that the central aqueous layer of the precorneal tear film which makes up the bulk of the tear film is essentially and produced by the lacrimal and nictitans gland (70% and 30%, respectively).

The conducted study showed that the secretion rate of tear production regained its near normal level in a short period of time not exceeding 2-3 weeks and return to their normal level after one month of pocket technique intervention. This result is consistent with that mentioned by Saito et al. (2001) and Multari et al. (2015). They reported that the replacement of gland to its normal proper position is preferred method for treatment of cherry eye in dogs because the technique resumes the tear production from nictitating gland also the technique does not alter tear production or damaging the gland duct system .

Our results revealed that there was no significant difference in normal tear production with different time of estimation. This result is completely differed from Hartely et al. (2006), they stated that the tear production is statistically significant by the age, gender, weight, and time of day. They added that the largest difference was between 10 am and 4 pm while the secretion is decreased with age.

5. CONCLUSION

Surgical excision of the third eye lid gland significantly decreased the tear production and the dogs become liable to keratoconjunctivitis sicca later on. The pocket technique is the preferred method for treatment of cherry eye in dogs because it does not alter the morphology and not damage the

gland duct system. The tear production regains its normal production level one month after pocket technique intervention.

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