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Therapeutic Management of Superficial Corneal Ulcer in Canines

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ABSTRACT

Corneal ulceration also known as ulcerative keratitis is a break in the corneal epithelium that exposes the underlying corneal stroma. It is one of the commonest causes of blindness in dogs, but in most cases, it is treatable. The present study was aimed to document the characteristics of and therapeutic management of superficial corneal ulcer in twelve pug dogs. All the twelve pugs were randomly divided into two groups (six each). Pugs of one of the groups were treated with topical antibiotic, NSAIDs, cycloplegics and autologus serum while of the other group with topical antibiotic, NSAIDs, cycloplegics and autologus serum along with cyclosporine (50 mg). The defect in superficial ulcer was healed within 10 to 14 days in both the groups. In cases of superficial ulcers, there was no deposition of pigment treated with cyclosporine and serum as compared with cases treated with serum alone.

Keywords: Corneal ulcer, Autologous serum, Cyclosporine, Pigmentation

INTRODUCTION

Corneal ulceration or ulcerative keratitis is not only one of the most common eye disease in domestic dogs but also a common reason for an eye to be painful [1]. A corneal ulcer is an inflammatory condition of the cornea involving loss of its outer layer. Causes include trauma, including self-inflicted and that due to eye lid abnormalities, thermal and chemical burns, immune mediated injury, facial paralysis and forms of exposure keratitis and absence of the protective tear film or the inability to blink also infection with bacteria, viruses and fungal elements [2,3].

Corneal ulcers are a common and painful eye problem in domestic dogs that can lead to scarring and/or perforation of the cornea, potentially causing blindness [4]. In addition, breed predispositions with highest incidence in Pug, Spitz, Boxer and Labrador due to craniofacial and eyelid conformation has been implicated as risk factors for corneal ulcers [5].

The anterior cornea is well supplied with sensory nerve endings and therefore, superficial ulcers may actually be more painful than deeper more serious ulcers. The pain from ulcers is usually manifested as blepharospasm and increased lacrimation [2] clinically characterised by varying degrees of lacrimation, blepharospasm, photophobia, conjunctival hyperemia, corneal oedema, and possibly miosis and aqueous flare and was determined by the retention of topically applied fluorescein dye by the corneal stroma. Most superficial corneal ulcers heal rapidly without complication, only medical therapy using topical antibiotics, mydriatics/cycloplegic agents and artificial tears are enough to prevent or eliminate infection, alleviate discomfort and facilitate healing [6]. There are few reports on use of cyclosporine as an adjunct therapy along with autologous serum for medical management of corneal ulcers in dogs, hence this report is presented.

MATERIALS & METHODS

The present clinical study involved twelve (n=12 eyes) pugs irrespective of sex were diagnosed with unilateral superficial corneal ulcers. All the animals underwent detailed ophthalmic examination which include complete history pertaining to visual abnormality and clinical assessment of visual functions by reflexes, different tests like fluorescein staining (to confirm the corneal defect), Schirmer's tear test, complete ophthalmic examination with hand-held slit-lamp biomicroscope and B-mode ultrasonographic examination in appropriate cases [2].

The fluorescein sodium ophthalmic strip was moistened with

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sterile distilled water and then placed in the palpebral fissure *cul–de–sac*. The strip was removed and the excess stain was irrigated using sterile distilled water and examination was done using slit lamp biomicroscope following standard procedure [7] (**Figure 1 & 2**).

(a) (b)

Figure 1. Ophthalmic examination (a) Superficial epithelial (b) Superficial stromal.

Figure 2. Fluorescein strip test – Positive.

The first step in treating all corneal ulcers involved identifying and removing the inciting cause, which include eyelid abnormalities (e.g., masses, lagophthalmos, distichiasis, ectopic cilia), foreign bodies, trauma and keratoconjunctivitis sicca.

All the eyes were treated therapeutically using topical administration of broad spectrum antibiotic to counteract the secondary bacterial infection and topical anti–inflammatory drugs for pain management four times daily. In addition, 1% atropine was administered 2–3 times daily to control ciliary muscle spasm and associated ocular discomfort.

Further, the twelve dogs of present study were randomly grouped into two groups (Group A, n=6 and Group B, n=6). Collagenase and protease inhibitor i.e., plain autologous serum to inhibit bacterial growth was instilled eight times-a-day topical in group A dogs. While the group B dogs were received autologous serum along with cyclosporine (50mg) eight times-a-day. Healing time and outcomes were noted for all the dogs.

RESULTS & DISCUSSION

In the present study, fluorescein dye test was performed with sterile 1% fluorescein dye for differentiation between corneal ulcer, corneal opacity, superficial keratitis and corneal melanosis. Scientists [8] explained hydrophilic affinity of fluorescein dye and intact cornea being lipophilic restricts the uptake of stain. Fluorescein staining gave positive results in all the cases in the present study.

Highest incidence of ulcer was noticed in age group of 1–5 years (6 eyes) followed by <1 year age (5 eyes) and >5 year age (1 eyes). Incidence was more in males (n=8, 63.63%) than females (n=4, 36.36%). Ulcers were observed more in the right eye (7 eyes) than left (5 eyes).

Major cause of formation of corneal ulcer was trauma (n=10 eyes), mostly due to self–inflicted nail injury, where the location of the ulcer was axial or central; while secondary reason was presence of ectopic cilia (n=2 eyes) where the location of the ulcer was paraxial or superior nasal. Nasal fold trichiasis and distichiasis was present in 7 eyes and 10 eyes, respectively. Scleral show was present in 8 eyes. However, distichiasis, nasal fold trichiasis and scleral show had no significant correlation with ulcer formation in this study as against the findings of [4].

Clinical signs seen in corneal ulcers were similar to other findings [9]. Superficial ulcer (n=12 eyes) showed epiphora,

episcleral congestion, stippled appearance of cornea, whereas superficial vascularization was evident in chronic cases.

In superficial ulcers, medical management was initiated using topical instillation of antibiotic (moxifloxacin), NSAIDs (flubriprofen) and cycloplegics (atropine). Most superficial corneal ulcers healed rapidly without complication, only medical therapy using topical antibiotics, mydriatics/cycloplegic agents and artificial tears were enough to prevent or eliminate infection, alleviate discomfort and facilitate healing [6]. Success rates and time to healing varied between studies. The defect in superficial ulcer were healed within 10 to 14 days in both the groups. While the time of healing as reported earlier varied from 20% in 14 days to 84% in an average of 23 days [10-12].

Two treatment groups were made, each group comprising of six pugs with superficial corneal ulcers. Use of plain autologous serum in group A promoted healing with significant corneal pigmentation following healing, as serum contains alpha–2 macroglobulin with anti-collagenase activity that helps in healing of ulcers [13]. However, specifically in the pug breeds, there was quick development of corneal pigment after ulcer formation. Significant improvement, was seen in group B in terms of non-pigmentation after healing of ulcer. Cyclosporine is an immunomodulatory that blocks normal production of interleukin–2, which inhibits proliferation of T–helper and cytotoxic T cells in the lacrimal gland and allows normal lacrimation [14]. It also acts as an anti–inflammatory, decreases pigmentation, and normalizes goblet cell mucin secretion [15] and directly stimulates lacrimation [16]. It was observed in the present study that incorporation of cyclosporine helped in restricting the spread of corneal pigment during the healing process (**Figure 3 & 4**).

However, the superficial ulcers in all the eyes healed uneventfully in 10-14 days. Opacity of cornea and pigmentation noted in dogs of group A was medically managed using topical corticosteroid after repeating the fluorescein dye test (if found negative) and topical cyclosporine, 2-3 times a day and once a day, respectively which resolved over a period of 8-10 days.

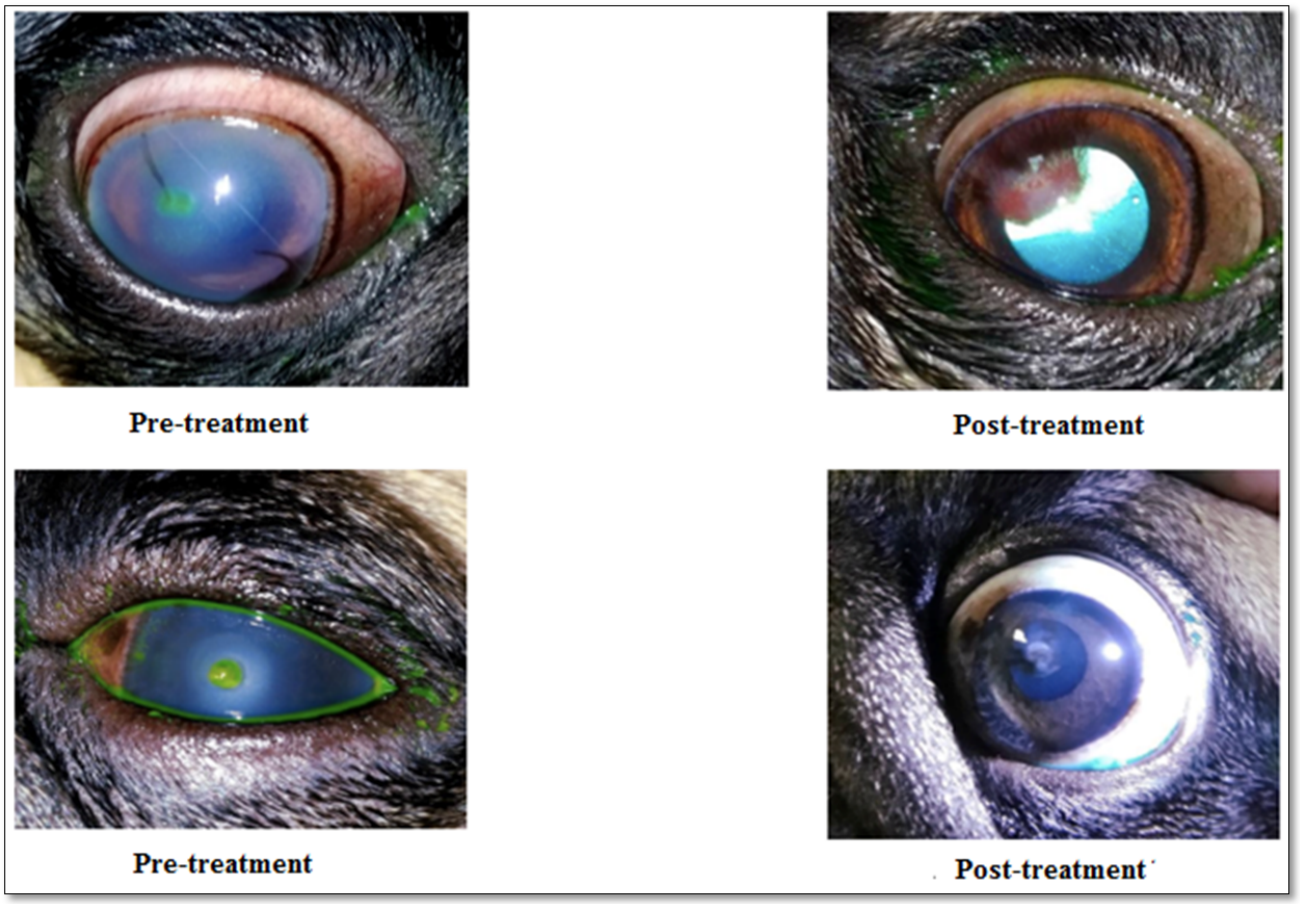

Figure 3. Treatment of ulcer using plain autologous serum (Group A).

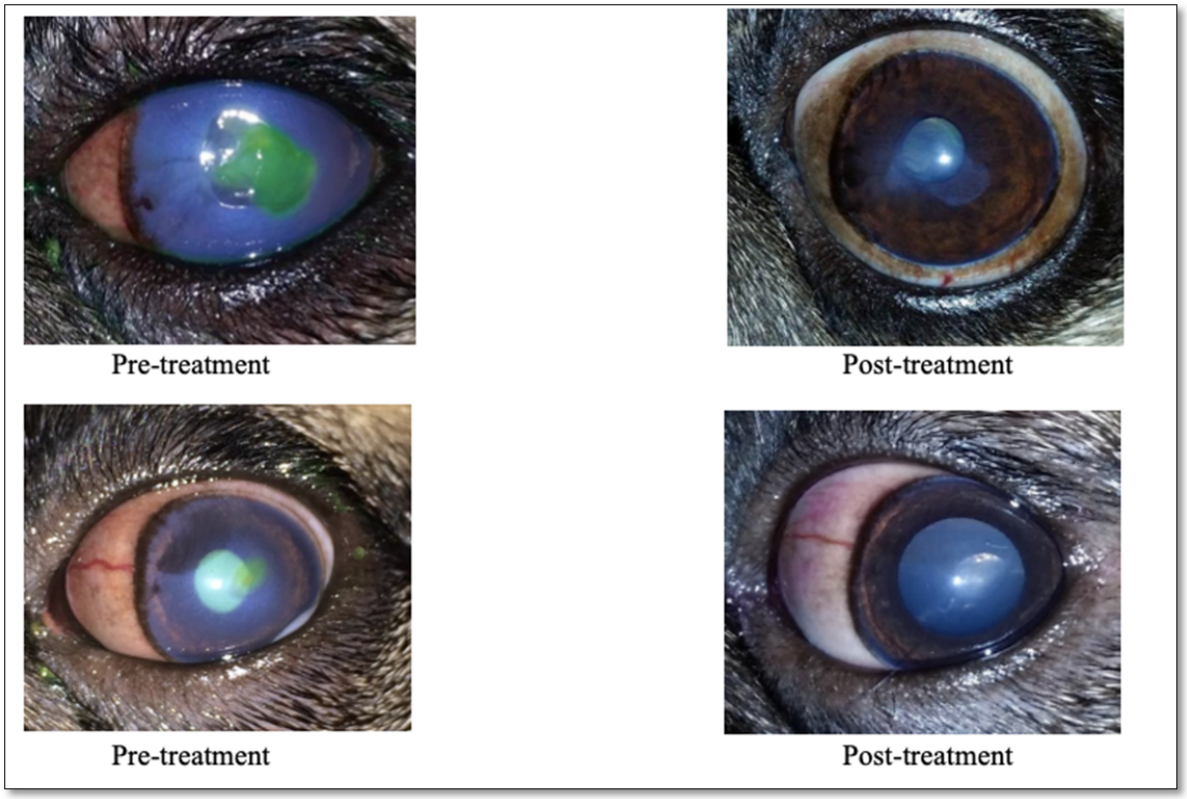

Figure 4. Treatment of ulcer using autologous serum along with cyclosporine (50mg) (Group B).

CONCLUSION

Superficial ulcers were healed on treatment with topical application of antibiotics, NSAIDs, cycloplegics and autologus serum. In cases of superficial ulcers, there was no deposition of pigment when treated with cyclosporine and autologus serum as compared with cases treated with autologus serum alone. Treatment with autologous serum with cyclosporine had a better outcome in superficial ulcers than with autologous serum alone.

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