

# MANAGEMENT OF CORNEAL INJURIES IN CHINESE PUGS

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During the period, 2005-2010, out of 241 dogs presented with corneal affections, 218 dogs (90.5%) belonged to the breed Chinese Pug. All the pugs presented with corneal affections were having buphthalmia and elevated intraocular pressure (IOP) above 40 mm of Hg. Management technique included use of antiglaucoma therapy and ocular lubricants to avoid xerophthalmia. Those cases with keratitis and ulcerative keratitis were treated with ocular anti-inflammatory drugs also. Dogs with descemetocele and staphyloma were treated with collagen eye shields along with topical/systemic antibiotics in addition to antiglaucoma and anti-inflammatory therapies. Results of treatment varied from excellent to satisfactory, depending on the severity of the condition.

**Key words:** Dogs, Chinese Pug, Corneal Ulcer, Glaucoma, Staphyloma, Descemetocele

## Introduction

With the increasing popularity of the Chinese Pugs among pet lovers, more numbers of pugs are being presented to the veterinary hospitals, common reason being eye diseases. Among ocular affections, bulging eyeball and corneal injuries are more frequently met with. Corneal injuries vary from corneal oedema to corneal perforation and staphyloma. Startup (1984) observed that Chinese Pugs are more prone for corneal injuries and subsequent infection because of their prominent eyeball and large cornea.

## Materials and Methods

During the period, 2005-2010, 241 dogs were presented to the Surgery Unit of Veterinary College Hospital, Mannuthy, Thrissur, Kerala State, with affections of the cornea. Out of those dogs, 218 dogs (90.5%) belonged to the breed, Chinese Pug. Irrespective of their age and sex, all the cases belonging to the breed, Chinese Pug were included in the current study.

All the dogs were subjected to detailed anamnesis and clinical examination followed by ophthalmological examination. Those animals having pyrexia were subjected to haematological examination to rule out presence of blood parasites. The possibility for any systemic disease causing ophthalmic symptoms also was considered. Eye and

adnexa were thoroughly examined under bright light for any deviation from normalcy. All the abnormalities were photographed for detailed study and future references. Ophthalmoscopic examination also was conducted in all cases with clear cornea to rule out the affections of internal structures. All the dogs having mild corneal injury and unilateral corneal affection were subjected to indentation tonometry using Schiøtz tonometer along with digital palpation over the closed eyelids. In the case of bilateral corneal ulcers and keratitis, qualitative assessment of intraocular pressure (IOP) using digital palpation alone was employed in order to avoid further injury to the cornea.

The treatment protocol adopted depended on the nature and severity of the corneal affection. Since all the cases showed increased intraocular pressure (IOP) above 40 mm of Hg, medical treatments were instituted to reduce the IOP. Antiglaucoma drugs like topical carbonic anhydrase enzyme inhibitors (CAI) and  $\beta$ -blockers were used in all the cases to reduce the IOP and to reduce buphthalmos. Reduction in the prominence of the eyeball (buphthalmos) was specifically intended to maintain complete closure of the eye lids over the cornea so that the integrity of the precorneal tear film is maintained (Gelatt, 2000). Topical CAI drugs, dorzolamide eye drops (2% solution)<sup>1</sup> along with 0.5% timolol maleate eye drops<sup>2</sup> ( $\beta$ -blocker) at 30 minutes interval, twice daily were used until satisfactory IOP levels achieved and suitable changes in the schedule was made thereafter.

In the case of buphthalmic eyes, chances of corneal drying (xerophthalmia) were more which may lead to exposure keratosis (Gelatt, 2000). In order to avoid this, frequent lavage of the eye with sterile normal saline was advised. In severe cases of buphthalmia especially in dry weather, use of ocular lubricants like carboxy methyl cellulose eye drops<sup>3</sup> was advised.

1. Dorzox eye drops (2%), Cipla Ltd., Verna, Goa.

2. Glucomol eye drops (0.5%), Allergan India Ltd., Bangalore

3. Lubrex eye drops (0.5%), Microlabs Limited, Bangalore

In the case of dogs presented with corneal oedema and opacity, in addition to antiglaucoma therapy, 6% hypertonic saline eye drops<sup>4</sup> and an ocular nonsteroidal anti-inflammatory (NSAID) drug like flurbiprofen eye drops<sup>5</sup> were advised at 4-6 hourly interval. When the dogs were presented with ocular infection as suggested by mucopurulent ocular discharges, antibiotic eye drops like ciprofloxacin eye drops<sup>6</sup> was also advised at 4-6 hrs interval for 5 to 7 days. When keratitis was not associated with corneal ulceration, instead of using an ocular NSAID drops, a combination of ciprofloxacin-dexamethasone eye drops<sup>7</sup> was used at 4-6 hrs interval depending on the severity of the condition.

Out of all the ocular cases in pugs, 197 dogs (90.4%) were having varying degrees of keratitis, corneal oedema and ulceration of cornea, resulting in photophobia, lacrimation, pain and associated symptoms. Those dogs with superficial corneal ulcers were treated in the same pattern as in the case of simple corneal oedema and opacity. Those dogs which were having excessively bulging eyes were subjected to temporary tarsorrhaphy in order to avoid drying of cornea. Among those dogs having ulcerative keratitis, 18 dogs (9.1%) were having descemetocoele and 34 dogs

(17.3%) were having staphyloma. In the case of staphyloma, attempts were made to reduce the protruding iris and sutured the corneal injury, whenever possible, after debridement. When the corneal ulcer is deep and extensive, the ulcerated surface was covered with processed collagen shields (used for the casing of sausages in meat plant) after debridement. Such collagen shields were retained *in situ* with the help of temporary tarsorrhaphy. These collagen shields got absorbed by third day and hence reapplied them at three days interval until the healing was complete. In the case of nine dogs (4.6%) having staphyloma, there was severe infection and suppuration along with systemic disturbances. There were necrosis and pus accumulation in the eyeball. Thorough debridement and lavage with normal saline and antibiotic solutions (gentamycin solution) were made to clear the pus from the eyeball. They were treated with systemic antibiotics (oral cephalixin<sup>8</sup> @ 20 mg/kg twice daily x 7 days) along with the treatment for staphyloma.

1. Hypersol eye drops (6%)
2. Flur (0.03%), Nicholas Piramal, Dhar, Madha Pradesh.
3. Ciplox eye drops (0.3%), Cipla Ltd., Verna, Goa.
4. Ciplox-D eye drops, Cipla Ltd., Verna, Goa.
5. Sporidex DS (250 mg tablets), Ranboxy Laboratories Ltd., A.P.

### Uncomplicated Corneal Ulcer – Stages of Healing



Corneal ulcer on the day of presentation



Scarification of the ulcer



On 3<sup>rd</sup> day



On 30<sup>th</sup> day

## Complicated Ulcer – Stages of Healing



On the day of presentation



After debridement



On 7<sup>th</sup> day



On 45<sup>th</sup> day, contracted, small eye.

Note the pigmented cornea

### **Results and Discussion**

Among the dogs presented with corneal affections, 79.8% dogs (174 numbers) were below one year of age and 26 puppies (14.9%) were below six months of age. According to Gelatt (1981), the effects of elevated IOP in dogs varied with age of the animal and young animals rapidly developed buphthalmia.

On clinical examination, physiological parameters (rate of respiration, pulse rate and rectal temperature) were within the normal range, except for those nine dogs having infected eyeball with systemic disturbances. They showed elevated figures for these three parameters. All the animals presented were having 'good' score for general condition. Varying degrees of epiphora, blepharospasm, episcleral congestion, mydriasis and corneal edema were noticed in all dogs. These findings were in accordance with Priya (2009).

On ophthalmological examination, menace reflex was found to be sluggish, whereas corneal and palpebral reflexes were found to be normal, ruling out the possibility of neurogenic keratitis (Gelatt, 2000). In those animals haematological parameters were tested, they remained normal during the period of treatment. These findings also were in agreement with Priya (2009).

On performing indentation tonometry, the average value of intraocular pressure (IOP) was  $47 \pm 2.32$  at the time of presentation and all of them were buphthalmic. This value got

reduced to an average value of  $29.33 \pm 0.76$  after treatment. Helper (1989) reported that buphthalmic eyes will have dilated pupil and Gelatt (1997) reported that dogs with IOP of 40 mm of Hg or more will result in buphthalmos. IOP values were in agreement with Priya (2009). On reduction of IOP towards 30 mm of Hg, both buphthalmia and mydriasis also got resolved. This was in agreement with Gelatt (1981) who reported that the effects of elevated IOP in dogs varied with age of the animal, duration and levels of IOP. He also found that in young dogs which developed buphthalmia rapidly, the changes in the eyes were reversible.

Following treatment for increased IOP with dorzolamide eye drops and timolol eye drops, at the rate of one drop twice daily, there was considerable reduction in the IOP during the period of observation. Gelatt (1981) used carbonic anhydrase enzyme inhibitors for both short and long term management of canine glaucoma with twice daily administration. Townsend (2007) pointed out that topical beta blockers administered 8-12 hrs interval decreased production of aqueous humor and thereby IOP also. Hasegawa et al. (2001) opined that lower IOP could be maintained with medical therapy alone for a long period in dogs with open angle glaucoma. Additionally, the affected eyes were advised to be lavaged with normal saline solution in order to avoid corneal drying. Also, during the period of dry weather, such cases were advised to use ocular

lubricant eye drops in order to prevent xerophthalmia effectively. Very successful results obtained in such cases were supported by the observations made by Gelatt (2000).

In the case of dogs presented with corneal edema, keratitis, corneal opacity and punctate and superficial ulcerative keratitis, the treatment included the use of topical flurbiprofen eye drops and topical use of 6% hypertonic saline eye drops along with antiglaucoma therapy. In the case of mucopurulent discharge from the eye indicating infection, ciprofloxacin eye drops were used topically. In cases of keratitis with infection and without ulceration, a combination of ciprofloxacin and dexamethasone eye drops were topically used at 4-6 hrs interval. All these treatments were effective and resulted in satisfactory resolution in 4-6 days duration of treatment itself. These findings are in accordance with Gelatt (2000), Moore (2001), Munro (2001), Raji (2006) and Jose (2010).

In the case of excessively bulging eyes, performing temporary tarsorrhaphy for 3-5 days along with other topical medications provided excellent results. This may be due to the prevention of xerophthalmia very effectively until the IOP is normalized, as suggested by Startup (1984), Raji (2006) and Jose (2010).

In the case of dogs presented with staphyloma, attempts were made to reduce the prolapsed iris back into the anterior chamber, after debridement, and sutures were placed to appose cornea (Startup, 1984). If the prolapsed parts were necrotic, debridement alone was performed (Sansom, 2000). The cleared corneal surface was covered with collagen eye shields made of processed collagen sheet and it was retained *in situ* with the help of temporary tarsorrhaphy. In the case of descemetocoele also, after thorough debridement and placement of collagen eye shields, tarsorrhaphy was performed (Malenda, 2000., Raji, 2006 and Jose, 2010). In both the cases, topical NSAID eye drops and antibiotic eye drops were continued as in the previous cases (Malenda, 2000). In both the cases, the tarsorrhaphy sutures were removed every third day, by which time the collagen sheet was completely absorbed, and the depth of the corneal ulcer was reduced (Jose, 2010). This process was repeated 2-3 times. By 7<sup>th</sup> day itself there was good healing of the ulcer and after that only medical treatment was continued (Raji, 2006 and Jose, 2010).

All the dogs with descemetocoele regained corneal clarity with in a period of 30-45 days time, even though corneal healing was complete with in 7-10 days. These findings were in accordance with Raji (2006) and Jose (2010). Corneal oedema and opacity persisted for 15-30 days depending on extend of the lesion (Samuelson, 1991). Dogs presented with staphyloma also had good recovery and cornea healed completely with in 10-15 days. But the corneal edema and opacity persisted for longer duration and got gradually cleared over a period of three months even after three months, a small sized scar persisted (Jose *et al.*, 2010). In both the cases, where prolonged recovery period was required, excessive corneal vascularization and melanin pigment deposition were the common post operative complication. Startup (1984) observed corneal vascularization as an important part of corneal healing. Corneal vascularity subsided very fast, whereas the corneal pigmentation persisted for longer duration even after treatment with topical dexamethasone eye drops and 6% hypertonic saline eye drops (Slatter and Dietrich, 2003). In some cases, some amount of the pigmentation got retained throughout the period of observation (Jose, 2010).

In the case of severely infected cases of staphyloma, after debridement and lavage of the eyeball with antibiotic solutions or normal saline, routine treatment for staphyloma was adopted. Additionally, systemic antibiotic treatment was given with oral cephalixin tablets. Among these animals, all of them had complete healing of the corneal injury. But, none of the cases regained vision in the affected eye. But a slightly contracted, small, cosmetically acceptable eye could be restored. These findings were in accordance with Raji (2006); Jose (2010) and Anoop *et al.* (2010).

It is therefore concluded that one reason for higher occurrence of corneal lesions in Chinese Pug breed of dogs was on account of buphthalmia which may result in exposure keratosis and xerophthalmia. The treatment protocol should be selected according to the nature and gravity of the lesion and the major goal should be to reduce the IOP, buphthalmia and xerophthalmia.

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