RESEARCH ARTICLE

Complications of Cataract Surgery Following Phacoemulsification and Foldable Intraocular Lens Implantation in Dogs

Darshan J. Chauhan[1*], Shivaji H. Talekar[1], Krina D. Patel[1], Hardik A. Rokad[1], Raghuvir H. Bhatt[2], Jignesh V. Vadalia[2], Vishnudeo Kumar[3]

Abstract

Cataracts are the most common treatable cause of visual impairment and blindness in dogs. Despite tremendous improvements in canine cataract surgery over the years, numerous intra- and post-operative complications persist and decrease the success rate of cataract surgery. The present study was conducted on 12 eyes of 12 distinct dogs presented to Department of Veterinary Surgery and Radiology of the College in Junagadh (Gujarat) to evaluate intra- and post-operative complications after phacoemulsification and intra-ocular lens implantation. Prior to surgery, all dogs were subjected to a detailed ophthalmic examination along with routine clinical, haematological and serum biochemical analysis. In all twelve dogs, phacoemulsification technique was utilised for the surgical removal of the cataractous lens and implantation of intra-ocular lens under premedication with Atropine sulphate, induction with combination of Ketamine-Diazepam and maintenance with Isoflurane. Intra-operative complications recorded were radial tear during continuous curvilinear capsulotomy, miosis, chemosis, hyphema and post-operative complications recorded were corneal opacity, corneal edema, uveitis, ocular hypertension and bullous keratopathy.

Key words: Cataract, Complications, Dogs, Intraocular lens, Phacoemulsification.

Ind J Vet Sci and Biotech (2023): 10.48165/ijvsbt.19.6.08

Introduction

Cataract is one of the biggest causes of blindness in both humans and animals, particularly in old age, and it causes a great deal of suffering (Raghuvanshi and Maiti, 2013). Medical treatment of cataract is restricted owing to non-availability of the pharmacological medicines capable of exerting considerable impact in the development or regression of cataract (Whitley *et al.,* 1993). Thus, surgery is regarded as the most promising and successful approach of treatment for cataract in dogs (Dziezyc, 1990). The indications for cataract surgery include restoration of functional vision and prevention of complications that may occur secondary to cataract surgery (Bras *et al.,* 2006). In the last few decades, advancements in microsurgery and the advent of phacoemulsification have greatly increased the likelihood of a positive outcome for patients undergoing cataract surgery (Dziezyc, 1990). Despite major breakthroughs in cataract surgery, complications continue to exist. Common post-operative complications following cataract surgery include ocular hypertension, capsular opacification, uveitis, intraocular haemorrhage, retinal detachment and glaucoma. These problems may be temporary and medically treatable, or they may be more severe and cause blindness and suffering (Klein *et al.,* 2011). Posterior Capsular Opacification (PCO) is the most common complication following phacoemulsification and implantation of an artificial intraocular lens in canines, with a prevalence of 69-100 % (Gift *et al.,* 2009). The purpose of this study was to evaluate intra- and post-operative complications after phacoemulsification and intra-ocular lens implantation in dogs.

[1]Department of Veterinary Surgery and Radiology, College of Veterinary Science and Animal Husbandry, Kamdhenu University, Junagadh-362 001, Gujarat, India

[2]Veterinary Clinical Complex, College of Veterinary Science and Animal Husbandry, Kamdhenu University, Junagadh-362 001, Gujarat, India

[3]Department of Veterinary Anatomy, College of Veterinary Science and Animal Husbandry, Kamdhenu University, Junagadh-362 001, Gujarat, India.

Corresponding Author: Darshan J. Chauhan, Department of Veterinary Surgery and Radiology, College of Veterinary Science and Animal Husbandry, Kamdhenu University, Junagadh-362001, India, e-mail: djchauhansss@gmail.com

How to cite this article: Chauhan, D. J., Talekar, S. H., Patel, K. D., Rokad, H. A., Bhatt, R. H., Vadalia, J. V., & Kumar, V. (2023). Complications of Cataract Surgery Following Phacoemulsification and Foldable Intraocular Lens Implantation in Dogs. Ind J Vet Sci and Biotech. 19(6), 34-38.

Source of support: Nil

Conflict of interest: None

Submitted: 10/09/2023 **Accepted:** 14/09/2023 **Published:** 10/11/2023

Materials and Methods

The present clinical study was conducted on 12 eyes of 12 distinct dogs presented to the Department of Veterinary Surgery and Radiology, College of Veterinary Science and Animal Husbandry, Kamdhenu University, Junagadh, Gujarat (India), during the year 2022-23 with the history and symptoms suggestive of cataract. All the animals were subjected to detailed ophthalmic examination for various neurological reflex tests, maze test, cotton ball test, Schirmer's tear test, fluorescein staining, tonometry, and indirect and direct ophthalmoscopy to confirm the diagnosis and to ascertain the stage of cataract. In addition, routine haematological and biochemical tests were conducted before surgery in each patient to rule out underlying systemic diseases.

Before surgery, two drops of Moxifloxacin (5 mg/mL) twice a day for seven days, two drops of Tropicamide + Phenylephrine twice a day for two days, and one drop of Flurbiprofen thrice a day on the day prior to surgery were administered topically to reduce intra- and post-operative complications. In addition, Tropicamide plus Phenylephrine (1%) was employed as a mydriatic agent and was instilled one hour before the surgery @ two drops every 5 minutes in the eye to be operated.

Phacoemulsification technique was utilised for the surgical removal of the cataractous lens in all twelve eyes. All dogs were premedicated using inj. Atropine sulphate @ 0.04 mg/kg b.wt., intramuscularly. Anaesthesia was induced using combination of inj. Diazepam @ 0.5 mg/kg b.wt. and inj. Ketamine @ 10 mg/kg b.wt., intravenously, and maintained on 1 to 2% Isoflurane. The retrobulbar nerve block was performed using inj. Bupivacaine (0.5%). Phacoemulsification was performed by bimanual technique as suggested by Gelatt and Wilkie (2011). After complete aspiration of cataractous lens, a single-piece multifocal hydrophilic foldable acrylic intraocular lens of +41 D was implanted in all 12 operated eyes. After surgery, a sub-conjunctival injection of a combination of inj. Gentamicin (0.5 ml) and inj. Dexamethasone (0.5 mL) was given in all the dogs and the eyelid was closed by a temporary vertical mattress stay suture using silk thread.

Post-operatively, all dogs were required to wear Elizabethan collars at all times for the first month to prevent self-trauma. The exterior of the operated eye was cleaned daily with warm mineral water for the first week. A broad spectrum systemic antibiotic inj. Amoxicillin + Clavulanic acid @ 12.5 mg/kg b.wt. was administered for 7 days, followed by oral tab. Carprofen @ 2 mg/kg b.wt. for 5 days. Eye drops Moxifloxacin was instilled five times a day for the 1st week, t.i.d. for 2nd and 3rd week, and b.i.d for next 2 weeks. Eye drops Flurbiprofen was instilled for every hour for 15 days. Medications and doses were changed based on intraocular complications. The frequency of eye drops was tapered down and was discontinued after one month.

Complications occurring during the surgical procedure were observed and corrected accordingly. The post-operative complications were recorded on 15th and 30th day after surgery.

Results and Discussion

Intra-Operative Complications

Miosis: Miosis occurred in 16.66% (n=2/12) eyes in the present study (Fig. 1). Intra-operative mydriasis was achieved using intracameral 1:1000 Adrenaline or 0.2 mL of preservative-free intracameral Lignocaine. The irrigation fluid might be infused with Adrenaline or Heparin sodium to avoid miosis during surgery. Pre-operative therapy with systemic corticosteroids 2 hours before surgery in dogs avoids the generation of endogenous prostaglandins that might produce an acute miosis (Tuntivanich and Tuntivanich, 2007). Intracameral Lidocaine 1 % without preservatives exhibits a quick and effective mydriasis and might be used as a safe alternative to topical and intracameral mydriatics during phacoemulsification (Nikeghbali *et al*., 2008).

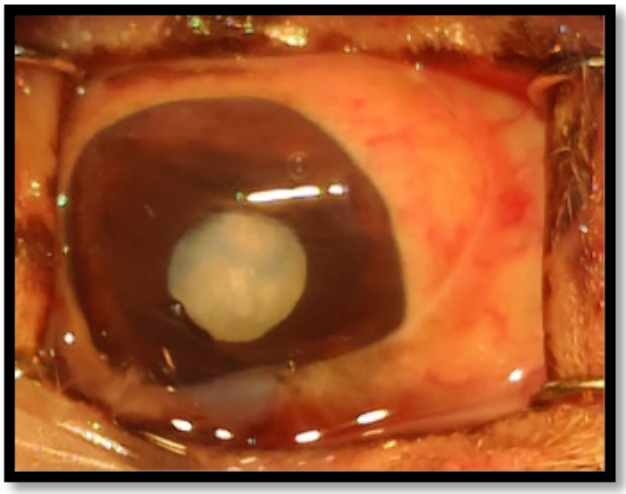

Fig. 1: Intra-operative miosis

Hyphema: In the present study, intra-operative hyphema was observed in 25.00 % (n=3/12) eyes (Fig. 2). This may be the result of unintentional instrument contact with the iris, which might result in limited hyphema. Intra-operatively, 0.05 mL of Triamcinolone acetonide was administered intracameral to control hyphema. Injection of this drug intracameral during phacotrabeculectomy significantly reduced aqueous inflammation and improved visual acuity (Wang *et al.,* 2013). During phacoemulsification, the primary cause of hyphema in patients may be the IOL haptic causing trauma to the iris, uveitis, retinal detachment, extreme hypotony, or patient activity causing trauma to the eye (Klein *et al.,* 2011). The hyphema disappeared within three days of topical corticosteroid treatment. In accordance to present study, Kelawala (2017) also used Triamcinolone acetonide to control intra-operative hyphema in dogs.

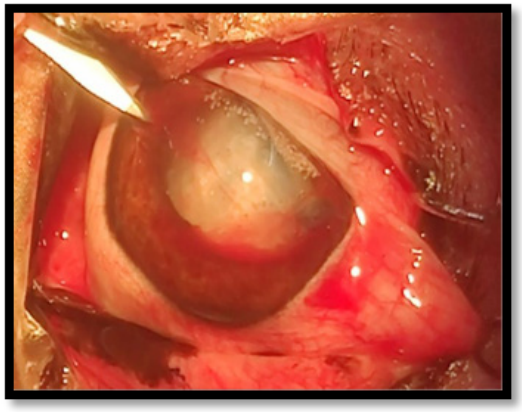

Fig. 2: Intra-operative hyphema

Idiopathic chemosis: Idiopathic chemosis was observed in 16.66% (n=2/12) eyes in present study (Fig. 3). Similar complication was observed by Harshith (2019) and Shukla (2020) also.

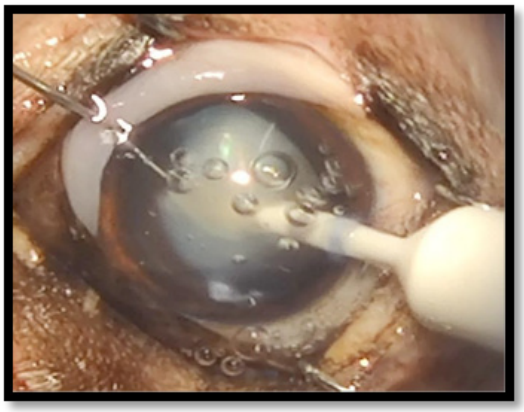

Fig. 3: Intra-operative chemosis

Radial tear during capsulotomy: Radial tear during continuous curvilinear capsulotomy was observed in 8.33 % (n=1/12) eyes (Fig. 4). Shukla (2020) also observed 8.33% complication of radial tear of anterior capsule in his study. Radial tear during capsulotomy leads to unstable capsular bag.

Fig. 4: Radial tear

Post-Operative Complications

Corneal opacity: The post-operative corneal opacity was recorded in 25.00 % (n=3/12) eyes at 15th day post-operative (Fig. 5). However, on 30th day, there was decrease in corneal opacity by the use of topical NSAIDs and only 16.66% (n=2/12) eyes had low grade corneal opacity (Fig. 6). According to Ahmad *et al*. (2017), the most prevalent post-operative complication after phacoemulsification was corneal opacity and uveitis. It was proposed that the trauma to the eyes caused during phacoemulsification could have injured the corneal endothelium, resulting in severe corneal opacity.

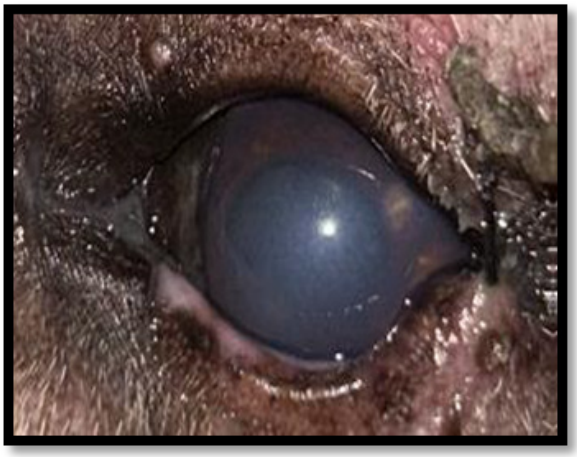

Fig. 5: Corneal opacity

Fig. 6: Low grade corneal opacity

Corneal edema: Corneal edema was noticed in 8.33% (n=1/12) eyes at 15th day post-operative and did not respond to medical treatment till 30th day because of extensive damage to non-regenerative corneal endothelium by the thermal energy produced during phacoemulsification of lens (Fig. 7). Similarly, Harshith (2019) reported persistent corneal edema as post-operative complication at 30th day after surgery.

Fig.7: Corneal edema

Post-operative ocular hypertension: Cataract surgery has been linked to a significant risk of developing ocular hypertension. In the present study, 8.33% (n=1/12) eyes developed post-operative ocular hypertension on 15th post-operative day. It resolved at 30th post-operative day with oral administration of Acetazolamide along with topical application of Dorzolamide & Timolol eye drops. Brikshavana (2007) reported postoperative ocular hypertension in 4/25 (16%) eyes. The low incidence in the present study may be owing to patient selection, a small number of operated cases, and a well-refined endo-phacoemulsification method.

Bullous keratopathy: Bullous keratopathy was observed in 8.33% (n=1/12) eyes at 15th post-operative day and did not respond to medical treatment till 30th day because of irreversible damage to corneal endothelium by the thermal energy produced during phacoemulsification of lens (Fig. 8).

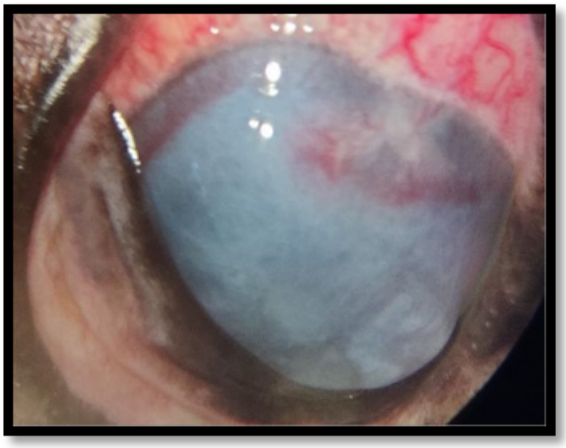

Fig. 8: Bullous keratopathy

Uveitis: Some degree of anterior uveitis was noticed in 50.00 % (n=6/12) eyes on 15th post-operative day. It may be due to surgical trauma and exposure of the eye to lens proteins. Similarly, Kelawala (2017) reported anterior uveitis in 66.66% (n=16/24) cases following phacoemulsification. Tuntivanich and Tuntivanich (2007) hypothesized that phacolytic uveitis is the most frequent complication following phacoemulsification surgery. In the present study, uveitis was resolved in all six eyes on 30th post-operative day with the treatment of topical corticosteroids and antibiotics.

Conclusions

The present study recorded radial tear during continuous curvilinear capsulotomy, miosis, chemosis, hyphema as intra-operative complications, and corneal opacity, corneal edema, uveitis, post-operative ocular hypertension and bullous keratopathy as post-operative complications among 12 unilateral eyes of dogs operated for cataract following phacoemulsification surgery.

Acknowledgemnent

We thank the Principal & Dean of the College of Veterinary Science & AH, Junagadh, and the authorities of Kamdhenu University, Gandhinagar for the infrastructures provided.

References

Ahmad, R., Saini, N.S., Mahajan, S.K., Mohindroo, J., & Singh, S.S. (2017). Comparison of rigid polymethylmethacrylate and foldable square edge acrylic lens replacement for management of cataract after phacoemulsification in 22 eyes of dogs. *Indian Journal of Animal Research*, *51*(1), 146-150.

Bras, I.D., Colitz, C.M.H., Saville, W.J.A., Gemensky-Metzler, A.J., & Wilkie, D.A. (2006). Posterior capsule opacification in diabetic and nondiabetic canine patients following cataract surgery. *Veterinary Ophthalmology, 9*(5), 317-327.

Brikshavana, P. (2007). Success rate and postoperative complications of phacoemulsification in 25 cataractous eyes: A retrospective study in 20 dogs (2003-2005). *The Thai Journal of Veterinary Medicine*, *37*(2), 53-60.

Dziezyc, J. (1990). Cataract surgery: Current approaches. *Veterinary Clinics of North America: Small Animal Practice*, *20*(3), 737-754.

Gelatt, K.N., & Wilkie, D.A. (2011). Surgical procedures of the lens and cataracts. In: K.N. Gelatt and J.P. Gelatt (Eds.), *Veterinary Ophthalmic Surgery,* 1st ed., Elsevier, pp. 304-355.

Gift, B.W., English, R.V., Nadelstein, B., Weigt, A.K., & Gilger, B.C. (2009). Comparison of capsular opacification and refractive status after placement of three different intraocular lens implants following phacoemulsification and aspiration of cataracts in dogs. *Veterinary Ophthalmology*, *12*(1), 13-21.

Harshith, B.H. (2019). Surgical management of cataract by phacoemulsification and intraocular lens implantation in dogs. *Master's Thesis*. Junagadh Agricultural University, Junagadh, Gujarat, India.

Kelawala, D.N. (2017). Studies on phacoemulsification in cataractous dogs. *Ph.D. thesis*. Anand Agricultural University, Anand, Gujarat, India.

Klein, H.E., Krohne, S.G., Moore, G.E., & Stiles, J. (2011). Postoperative complications and visual outcomes of phacoemulsification in 103 dogs (179 eyes): 2006-2008, *Veterinary Ophthalmology*, *14*(2), 114-120.

Nikeghbali, A., Falavarjani, K.G., & Kheirkhah, A. (2008). Pupil dilation with intracameral lidocaine during phacoemulsification: Benefits for the patient and surgeon. *Indian Journal of Ophthalmology*, *56,* 63-64.

Raghuvanshi, P.D.S., & Maiti, S.K. (2013). Canine cataract and its management: An overview. *Journal of Animal Research*, *3*(1), 17-26.

Shukla, H.B. (2020). Comparative evaluation of extracapsular cataract extraction and phacoemulsification of cataractous lens in dogs. *Master's thesis.* Junagadh Agricultural University, Junagadh, Gujarat, India.

Tuntivanich, P., & Tuntivanich, N. (2007). Phacofragmentation and aspiration in canine mature cataract: surgical technique, success rate and complications. *The Thai Veterinary Medicine*, *37*(2), 33-45.

Wang, B., Dong, N., Xu, B., Liu, J., & Xiao, L. (2013). Efficacy and safety of intracameral triamcinolone acetonide to control postoperative inflammation after phacotrabeculectomy. *Journal of Cataract & Refractive Surgery*, *39*(11), 1691-1697.

Whitley, R.D., McLaghlin, S.A., Whitley, E.M., & Gilger, B.C. (1993). Cataract removal in dogs: The surgical techniques. *Veterinary Medicine*, *88*(9), 859-866.