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Evaluation of phacoemulsification and implantation of canine specific intraocular lens for cataract in dogs

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Abstract

The present study was carried out among the dogs presented to Veterinary College Hospital, KVAFSU, Hebbal, Bangalore from July 2024 to June 2025. A total of 9,962 dog cases were presented of which the number of dogs with cataract were 64 (0.64%). The highest breed-wise occurrence of 37.5% of cataract was seen in Labrador Retriever (24 out of 64) followed by 25% in Pomeranian (16 out of 64), 9.37% in Cocker Spaniel (6 out of 64), 6.25% in German Shepherd, Shih Tzu and Non Descriptive (4 out of 64), 3.12% each among Siberian Husky, St. Bernard, and Mudhol Hound. The highest occurrence of 37.5% of cataract was seen in >7-9 years of age group (24 out of 64) and high in Female dogs (62%). Pre and post-surgical evaluation of physiological, hematobiochemical parameters, visual function tests and clinical examination of eye were done. Accordingly, six dogs were randomly selected for phacoemulsification followed with implantation of Canine specific intra ocular lens. The present study showed that there were no significant changes in physiological, haematological and biochemical parameters before and after the surgery. The techniques followed were found to be adequate for restoring the vision. There was a lesser post-operative complications, better vision improvement. In conclusion, the phacoemulsification followed with implantation of Canine specific intra ocular lens was adequate in restoring vision.

Keywords: Phacoemulsification, 41D canine specific lens, cataract

Introduction

Vision is essential for environmental interaction, communication, and overall quality of life in dogs. Among canine ocular disorders, cataract is one of the leading causes of reversible blindness, particularly in ageing animals, and may result in significant visual impairment and discomfort if left untreated. Delayed management of mature or hypermature cataracts can lead to serious complications such as lens-induced uveitis and glaucoma, thereby reducing the success of surgical intervention. Advances in veterinary ophthalmology have established phacoemulsification with intraocular lens (IOL) implantation as the gold standard treatment for canine cataracts. Early surgical intervention is now recommended to restore vision and minimise postoperative complications. Recent developments in IOL design and biomaterials have further improved surgical outcomes, biocompatibility, and postoperative visual rehabilitation in dogs. Canine eyes generally require higher dioptric power lenses (40-43 D) than humans, emphasising the importance of species-specific considerations in veterinary cataract surgery.

Materials and Methods

The study was conducted in six clinical cases of tom cats presented to the Department of Veterinary Surgery and Radiology, Veterinary College, Bengaluru. Six cases of dogs with cataract were selected for the study regardless of age and breed.

Instrumentation

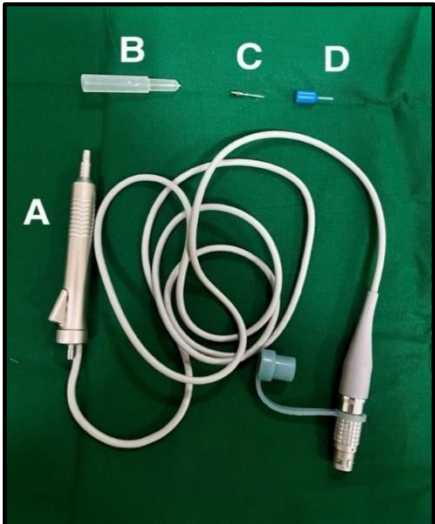


Fig 1: A-Phaco handpiece, B-Test chamber, C-Titanium needle D-Silicone sleeve



Fig 2: Phacoemulsification tubings

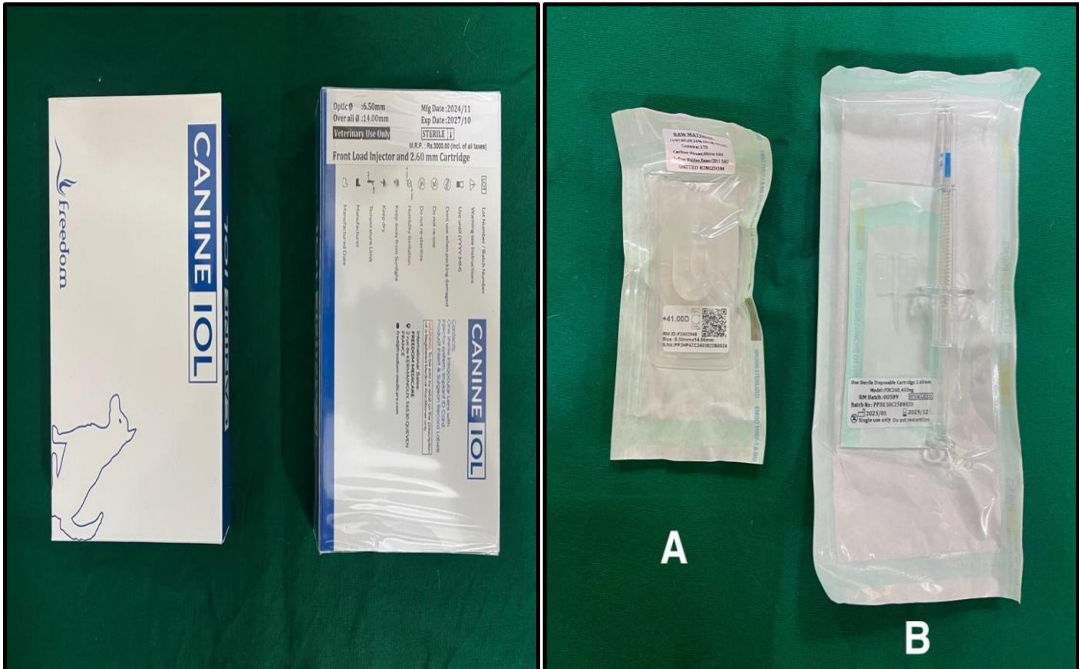


Fig 3: Canine IOL A. CANINE LENS (+ 41 D Hydrophobic, Acrylic) Injecting Assembly (Cartridge and Injector)

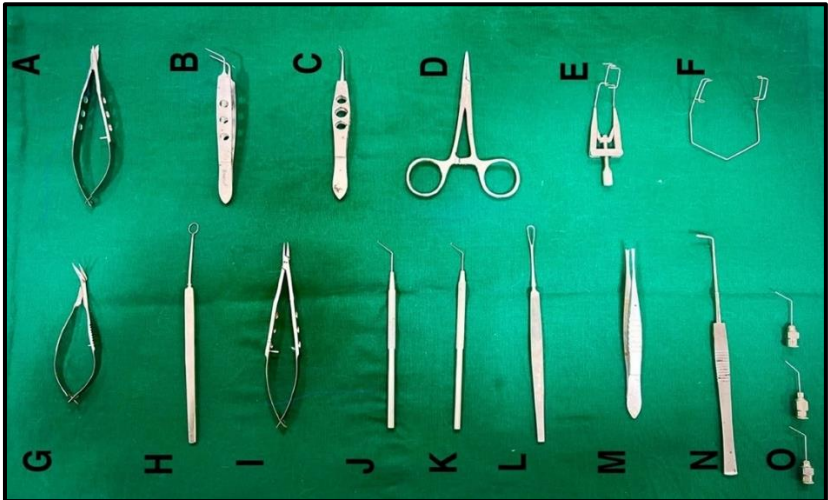


Fig 4: Ophthalmological instruments

Table 1: The details of the dogs selected for the study

Case No.	Sex	Age (Years)	Breed	Etiology	Eye Affected	Duration of illness	Stage of cataract
1	M	5	Labrador	Unknown cause	Bilateral	4 months	Mature
2	M	6	Shih tzu	Trauma	Left	3 months	Mature
3	F	8	Labrador	Senile	Bilateral	7 months	Mature
4	M	11	Cocker Spaniel	Senile	Bilateral	9 months	Hypermaturation
5	M	8	Labrador	Senile	Bilateral	7 months	Mature
6	F	8.5	Pomeranian	Senile	Bilateral	6 months	Mature

Table 2: Pre-operative evaluation of the selected patients

Case no.	Eye examined	Menace Response	PLR	Palpebral Reflex	Cotton Ball Test	Obstacle Test	STT	FDT	Tonometry (mmHg)
1	Left	--	++	++	--	--	20 mm/min	Negative	16
	Right	--	++	++			19 mm/min	Negative	18
2	Left	--	++	++	+	+	18 mm/min	Negative	26
	Right	++	++	++			21 mm/min	Negative	17
3	Left	--	++	++	--	--	18 mm/min	Negative	21
	Right	--	++	++			21 mm/min	Negative	24
4	Left	--	++	++	--	--	19 mm/min	Negative	22
	Right	--	++	++			17 mm/min	Negative	24
5	Left	--	++	++	--	--	22 mm/min	Negative	21
	Right	--	++	++			21 mm/min	Negative	18
6	Left	--	++	++	--	--	20 mm/min	Negative	15
	Right	--	++	++			19 mm/min	Negative	18

Pre-operative preparation of the patient

Selected dogs were fasted for 12 hours for food and 6 hours for water before surgery. The dogs will be administered with preanesthetic medication, Inj. Atropine Sulphate at 0.04 mg/kg body weight and Inj. Butorphanol at 0.2 mg/kg body weight intramuscularly followed by Inj. Diazepam at a dose rate of 0.5mg/kg body weight intravenously. After 10 minutes, the anaesthesia will be induced with Propofol at a dose rate of 6 mg/kg body weight intravenously and maintained with Propofol to effect.

Surgical Procedure

The animals were positioned in dorsal recumbency with the eye facing the operating microscope. A 2.8 mm limbal corneal incision was made at the 12 o'clock position to access the anterior chamber. Intracameral adrenaline was administered to achieve mydriasis, followed by trypan blue staining of the anterior capsule. After irrigation with lactated Ringer's solution, a viscoelastic agent was injected to maintain anterior chamber stability and protect the corneal endothelium. Capsulorhexis was performed using a customised 26-gauge needle and Utrata forceps, followed by creation of a side-port incision and hydrodissection of the

lens. Phacoemulsification was performed using a phaco handpiece to sculpt, fragment, and aspirate the cataractous lens material while preserving the posterior capsule. Residual cortical material was removed using an irrigation-aspiration handpiece. A canine-specific hydrophobic foldable acrylic intraocular lens (+ 41 D) was implanted into the capsular bag through the main incision using an injector system. Following removal of the viscoelastic material, the limbal incision was closed using 5-0 absorbable Vicryl sutures.

Postoperative care and management

Postoperatively, all dogs were fitted with an Elizabethan collar for three weeks to prevent self-trauma, and owners were advised to minimize excitement and activity to reduce postoperative complications. Doxycycline (5 mg/kg, BID) and oral prednisolone (1 mg/kg) were administered for 7 days. Atropine eye drops were instilled three times daily for the first 3 days to maintain mydriasis and monitor uveitis. Topical moxifloxacin was applied four times daily during the first week, three times daily during the second week, and twice daily for the following 15 days. Flurbiprofen eye drops were administered hourly for 15 days.

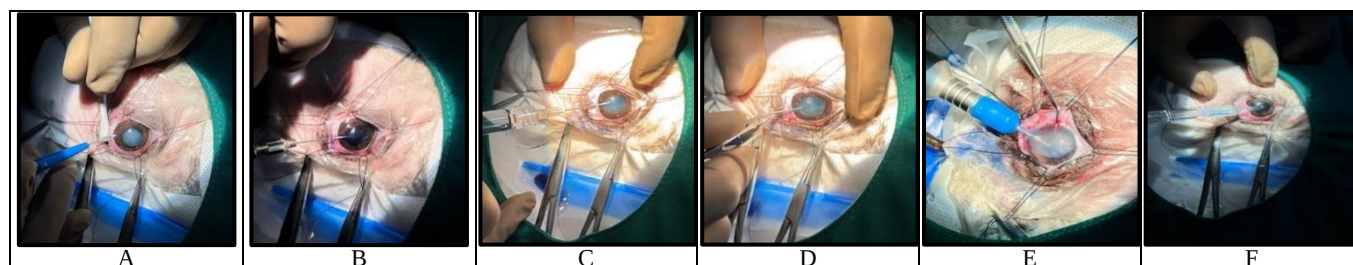


Fig 3: Surgical Procedure. A-12 o clock entry with 2.8mm keratome, B-Trypan blue dye, C-Viscoelastic material, D-Capsulorhexis, E-Phacoemulsification, and F-Canine specific lens implantation.

Results and Discussion

A total of 9,962 canine cases were evaluated, of which 64 dogs (0.64%) were diagnosed with cataract. Among these, Labrador Retrievers showed the highest prevalence (37.5%),

followed by Pomeranians (25%). The highest incidence was recorded in dogs aged 7-9 years (37.5%), with a mean age of 8.05 years. Females (62%) were affected more frequently than males (38%), and the majority of cases were bilateral

(84.37%). Advanced (mature) cataract constituted the predominant stage (76.56%).

Six dogs with cataract were selected for surgical intervention using phacoemulsification followed by implantation of a canine-specific foldable acrylic intraocular lens (+ 41 D). Preoperatively, all animals showed absence of menace response and inability to complete functional vision tests, although pupillary light reflex (PLR) remained intact. Postoperatively, gradual improvement in visual function was observed. Menace response, cotton ball tracking, and obstacle test responses improved progressively, with all animals showing functional vision recovery by the 21st

postoperative day. PLR was restored in most cases by day 14.

Physiological (temperature, heart rate, respiration), haematological (Hb, TEC, TLC), and biochemical parameters (creatinine, ALT, glucose) remained within normal limits throughout the study period, with no statistically significant differences ($p>0.05$). Postoperative complications included mild corneal oedema and hyphema in a few cases, which resolved with medical management. By day 30, outcomes were graded as “good” in five cases and “fair” in one case, indicating successful restoration of vision in the majority of animals.

Table 13: Post operative assessment

Case No	AS ON 30 th Post-Operative Day				Outcome
	Corneal transparency	Fundus	Conjunctival integrity and vascularity	Ocular discharge	
1	Clear cornea	Visible fundus	Normal conjunctival integrity and vascularity	No discharge	Good
2	Slight haze in the cornea	Visible fundus	Normal conjunctival integrity and vascularity	No discharge	Good
3	Clear cornea	Visible fundus	Normal conjunctival integrity and vascularity	No discharge	Good
4	Clear cornea	Visible fundus	Normal conjunctival integrity and vascularity	No discharge	Good
5	Mild haziness around the incision site	Visible fundus	Normal conjunctival integrity and vascularity	No discharge	Good
6	Mild oedema	Visible fundus	Normal conjunctival integrity and vascularity	Mild discharge	Fair



Plate 1: Before Surgery



Plate 2: After surgery

Conclusion

Phacoemulsification combined with canine-specific intraocular lens implantation is a safe and effective technique for the management of cataracts in dogs. The procedure enables successful restoration of vision with minimal postoperative complications when performed with proper case selection, surgical precision, and postoperative care. Overall, this approach significantly improves visual outcomes and quality of life in affected animals.

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