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# CATARACT AND ECCE – AN EVALUATION ON 60 CANINE CASES REGISTERED AT ANAND, GUJARAT (INDIA) REGION

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## ABSTRACT

Canine Ophthalmology is largely neglected field in India a decade ago. Poor understanding and lack of publications on canine cataract surgery demands a statistical view on linked complications. This article has been an effort to add data to the literature available, in the form of bilateral feedback of canine cataracts and associated complications. In the present study, evaluation of cataract surgery using operative microscope (OM-8) was conducted in 28 eyes from 20 out of 36 clinical cases of dogs with history of vision impairment. Manual extracapsular cataract extraction (ECCE) under general anaesthesia along with a retrobulbar nerve block (RBNB) was found effective in the operated cataract cases. The present clinical study on canine cataract resulted in the restoration of ambulatory vision in 75% of operating cases in 3 months follow up(overall) at the Anand veterinary clinic during the period of two years from 2004 to 2006. This indicates that prior dry-wet lab training is needed to avoid iatrogenic injuries and ECCE under OM-8is an economic, ergonomic method providing vision to cataractous canine eyes in 3 months with less complication.

**KEYWORDS**: operative microscope, canine cataract and extracapsular extraction.

## BACKGROUND

Cataract, the opacity of crystalline lens is regarded as major cause of blindness. [1] Affecting thousands of dog annually. [2] and also different species of animals. [3] It is common in dogs compared to cats. Common causes of canine cataract are hereditary and diabetes, others could be systemic drug toxicity, secondary to other eye diseases, traumatic eye and the age. The cause of cataract is difficult to diagnose in all cases, so few new methods have been used e.g. extracted lens was subjected for isolation of lens epithelial cells and cloned cell line is prepared to study the aetiology of cataract. [4] Although, spontaneous resorption of lens can give vision in young dogs (Miniature Schnauzer, Miniature or Toy Poodle, Boston Terrier, American Cocker Spaniel, Afghan Hound) without medical control lens induced uveitis can lead to further complication of glaucoma etc.[5]

The causes of cataracts are numerous. Common aetiologies were categorized as heritable (genetic) disorders, senile (age related) degeneration, congenital (birth defects), traumatic (capsule rupture), toxic reaction in the lens (progressive retinal degeneration, uveitis, glaucoma) geographical location (UV light), nutritional (deficiency of an amino acid – arginine etc.), metabolic diseases (diabetes etc.), electricity (electric shock during bites on wires).

There have been few studies about percentile complication of elective cataract surgeries in dogs e.g. enucleated or eviscerated due to intractable glaucoma following elective cataract surgery which mostly shown inflammatory keratitis, the presence of lymphoplasmacytic uveal infiltrates. [6] Surgery has been chosen as the most promising treatment for cataracts in dogs. [7,8] Cataract has been treated routinely with high success rates in developed countries, but it is still in the infancy stage in many veterinary clinics due to lack of knowledge about the possibilities of complications. This further derails the confidence in technique available. Hence, studied the possibility of effective surgical treatment of cataract using an operative microscope (OM) and presented an overview of occurrences, types and (operative and postoperative) complications (in percentage amount) for ECCE surgery.

## MATERIALS AND METHODS

Prior to canine cataract surgeries, training on dry, wet lab models was obtained and procedures were performed under the expert supervision of the trained ophthalmic surgeon.

To test the efficacy of prior training, different types of suturing. [9] on gloves (dry lab model)was performed by user (A, B, C) at surgery department. User ABC and three fresh users (D, E, F) without prior practice on dry model were allowed to perform cataract surgery on the cadaveric goat eye(9)for which time was recorded at each attempt (n=10). Operative time and learning curve for user DEF was higher than ABC, shows the vital step in deciding the surgical outcome.

In the present study, evaluation of ECCE using OM was conducted in 28 eyes from 20 out of 36 clinical cases of dogs with history of vision abnormalities admitted to veterinary clinic Anand, from 2004-2006.Rest dogs were unfit for operation with variable clinical presentation (Graph1).

All bilateral immature cataract cases retained remarkable visions hence were not operated until the visual deficit is observed, i.e. after the mature cataract development. Cases presented with anterior lens dislocation were operated without any delay to reduce the chances of permanent blindness due to irreparable damage to the corneal endothelium by the luxated lens. These dogs were observed on day one, one week, three weeks, 8 weeks, three months and then every one-month after the surgery. **Preoperative and operative Procedure:** All animals were operated under general anaesthesia under operative microscope. Procedures were followed as described in an earlier study.[9] Heparin was not added in the irrigation fluid in any case. All cases were followed for a minimum of 3 months postoperatively (Figure A).

**Grading:** In this study, surgical outcome was graded, on the basis of a few parameters. The best surgical outcome was defined as the eye which had a completely clear cornea, normal in shape, minimal incision scar, round pupil with the presence of pupillary light.

1 Graph A. Variation in clinical presentation of eye affections (n=72)

Reflex, minimal adhesions; clear posterior capsule and no residual cortex, vision within 3 months post cataract surgery.

The fair surgical outcome was defined as the eyes, which showed sufficient restoration of vision and presence of independent ambulatory movements. The failure of the surgery was defined as total corneal opacity, secondary glaucoma, severe anterior uveitis or atrophic bulbi following the cataract surgery. Visual outcome was interpreted in the presence or absence of ambulatory vision.

## RESULTS AND DISCUSSION

Irrespective of breeds adopted in a total dog population of Gujarat, majority of cataract cases were aged (graph2) female (graph3) dogs including other clinical presentation of eyes (graph4). Mongrel breed in unilateral (graph5), where as spitz in bilateral (graph6) cataract dominated among other breeds (graph7). In total bilateral cataract was more often admitted to clinic compared to unilateral (graph8). Cataract was identified and classified on the basis of progress in lens opacity viz., incipient, mature, hypermature, immature (graph9) and accordingly surgery was planned. There was not much variation in left or right eye (graph10) for cataract in observed dogs.

Owner compliance was the most important part of the cataract surgery. All the dogs with responsible owners showed excellent results as they strictly followed the postoperative schedule as per the advice. Also, it was noticed that strict regular follow up improves prognosis. Surgery in one isolated case failed due to improper management andirregular postoperative medication (by owner).

### Operative complications

(Figure B): Satisfactory pupillary dilatation was observed in the cases where Tropicamide eye drops were applied bid, for three days prior to surgery. Slight eye movements were observed during general anaesthesia (ketamine), which were reduced after the RBNB. Injection of air instead of lignocaine hydrochloride was tried in order to maintain the protrusion and central position of the eyeball. [10] Where as other ophthalmologist preferred RBNB with 1% procaine hydrochloride.[11] Lignocaine was preferred in RBNB at it also provides postoperative analgesia.

2 Graph B. Variation in age related cataract incidences (n=36)

3 Graph C. Gender variation in cataract operated cases (n=28)

4 Graph D. Gender variation in ocular affection (n=36)

5Graph E. Unilateral cataract in different canine breeds (n=10)

6 Graph F. Bilateral cataract in different canine breeds (n=26)

7 Graph G. Breed-wise distribution of cataract (n=36)

8 Graph H. Occurrence of cataract - Unilateral or Bilateral (n=36)

9 Graph I. Type of cataracts cases observed during 2004-2006 (n=60)

10 Graph J. Types of cataract cases operated during 2004-2006 (n=72)

Lateral recumbency with the affected eye on the upper side was found comfortable with the surgeon during the surgery without any difficulty. The position of the operating surgeon was also satisfactory and most of the surgeries were easily performed in this position. As all the operations were performed in standing, the second half of the surgery was cumbersome and uncomfortable for the surgeon. To obviate this problem surgeon's chair is advisable.

The illumination was highly important during the cataract surgery with focal light source in dark room. [7] Light coloured or white drapes made visualization of the 10-0 non-absorbable monofilament Ethicon suture easier. This suture material being black/blue in colour was seen easily against the white colour drape.

Incision from 10 O'clock to 2 O'clock on the dorsal circumference through the anterior clear cornea was enough large for surgical manoeuvres and lens extraction. Iris prolapse was observed intra-operatively only in one case which was easily repositioned during the surgery. Thickness of the anterior lens capsule in dog increases with age. [12] whereas normal canine anterior capsule is of 49um and posterior is 3.8um. [13] In addition, epithelial cells from lenses with cataracts may undergo metaplasia to form plaques composed of fibrous tissue and ectopic basement membrane produced by epithelial cells. Anterior capsulotomy was slightly difficult due to anterior capsule toughness. In most cases, anterior capsule was removed using utrata forceps, whereas few needed capsular tag scissors in which anterior capsule was exceptionally tough and leathery. Injection of trypan blue dye helped in visualizing the transparent anterior capsule while performing anterior capsulotomy while visco elastic material maintained the anterior chamber space and protected corneal endothelium during the intraocular manipulations. Visco elastic material played an important role in preventing intra-operative injury to corneal epithelial and prevented subsequent corneal oedema and opacity.

It was observed that iris constricted slightly after entering the anterior chamber and more during the anterior capulotomy. Iris bleeding was commonly seen in operated cases (graph11), especially intraumatic cataract. Suturing the incision site with 10-0 Ethiconis possible without any magnification, however; magnification used during surgery helped to increase accuracy and reduce operative duration. Sutures (Ethicon 10/0) for the closure of corneal wound were comparatively thinner and non-irritant than nylon 8-0. [14] Hence, never removed in any case.

11 Graph K. Iris bleeding during procedure (n=28)

**Postoperative complications**

(Figure C): Most of the poor outcomes were due to some of postoperative complications, but not to the extent of total blindness.

Healing of the incision was uneventful in most of the cases. Unhealed wound shown gaps in the line of incision and complete corneal opacity until postoperative day-7. Although incision was on the cornea, the corneal opacity caused by suture material did not hinder vision in any case. Wound healing was faster (two-week) for corneal suture line (graph12) in most of the cases. Postoperative complications observed were posterior synechiae, posterior capsular opacity, iris bombae, corneal oedema, fibropupillary membranes, pannus and hyphema. Postoperative day 1, removal of tarsorraphy suture presented swollen eyelids, blood tinged mucoid ocular discharge in two cases, which gradually disappeared. The generalized corneal haze was observed in 5 cases, which cleared out within 3 days.

A small air bubble was present in the anterior chamber in two cases seen on postoperative day 1 but it got absorbed within a day or two. True aqueous formation is a continuous process, thus it replaces the air bubble in 8-24 hours depending on the rate of aqueous formation in an individual dog in 38% cases, the anterior chamber was completely clear without any signs of anterior uveitis or fibropupillary membrane. One case had developed fibrinous band like stricture at the bottom of the anterior chamber, while another had a blood clot and a fibropupillary membrane in the anterior chamber, which held the iris in a fixed position, thus nullifying the effect of Tropicamide. The pupil was completely constricted and tapetal glow was not seen in this case. A nice round pupil was observed in other cases and tapetal glow was seen quite clearly. No ocular discharge was not observed in any case, which was an indicative of absence of infection, which was expected, as canines are highly resistant for eye infection. [15] The central cornea was completely clear and apposition of the wound edges had completed in all cases. However, slight corneal opacity developed on the periphery, around the suture line. In one case, few sutures untied on postoperative day 3 without opening of incision lips and anterior chamber found well formed with clear cornea. Re-suturing of the wound was performed and shown further uneventful recovery.

Return of vision was not observed in any case at the end of first week, which is expected due to a variable period of adjustment in vision is required following cataract surgery. [7]

Three 12 Graph L. Variation in surgical wound healing (n=28)

weeks after the surgery, 29% cases shown clear cornea and reduced peripheral corneal opacity, except one, which had a complete opaque cornea, due to mutilation. Postoperatively, a case presented with iris bombae; with some fibrin strands in the anterior chamber. Tablet Acetazolamide (10mg/kg in two divided doses) was started immediately and multiple iridotomies (corrective surgery) was carried out within two days. Iris bombae or ballooning of iris was observed with the posterior synechiae involving a large area of the iris i.e. 12 O' clock to 7 O' clock. If this condition had been left uncorrected, it could have led to secondary glaucoma and loss of vision. Acetazolamide reduced the rate of aqueous formation and hence flattened the ballooned iris. In the remaining 25% cases, the anterior chamber was clear without any signs of fibrin or blood clot. The pupil was dilated and posterior synechiae was not observed in any case. In another case, iris bombae had settled down, but posterior synechiae were still present and the aqueous was flowing into the anterior chamber through 4 mm gap in the iris. The posterior capsulotomy incision had stretched into a diamond shaped hole through which dog had regained its vision.

Severe anterior uveitis was not encountered in any of the cases where pre and postoperative steroids were instilled as per the schedule, subsequently increasing post operatively surgical outcome. [1] Two cases developed severe anterior uveitis and subsequently endophthalmitis. The evidence of mild uveitis was observed as posterior synechiae in 4 cases after 2 months in one case whereas after one month in 3 cases.

Severe posterior synechiae leading to iris bombae was observed in one case, while other case shown anterior uveitis 2 days after surgery. This could be attributed to the damage caused due to the constricted pupil during the surgery and lack of steroid eye drop instillation at regular intervals. Other complications encountered were posterior capsular opacity, glaucoma, a remnant of capsule and hyphema (graph13).

Posterior capsular opacity (PCO) obstructed the vision in one case of the dog. In this case, a small slit (2mm) was made in the posterior capsule (posterior capsulotomy) at the time of iridotomies done to correct iris bombae. Two cases had opacity, but not covering the posterior capsule completely shown clear tapetal glow. Posterior capsular opacities might be present during the surgery or can develop after the surgery due to transformation of lens epithelial cells into myofibroblasts, which caused opacification of the posterior capsule. [8]

13 Graph M. Percentile distribution of complication after cataract operation (n=28)

Davidson. [16] Suggested 100% removal of residual lens epithelium to prevent posterior capsular opacities.

In the present study, PCO was observed in senile dogs, whereas in other places, it has been observed as time dependent rather than age, gender, presence of inflammation and cause of cataract. [17]

Similarly, glaucoma was observed in immature traumatic cataract of aged dog whereas few researchers reported that certain breeds have shown increased risk of post cataract glaucoma e.g. Bichon Frise, Boston Terrier, Cocker Spaniel, Jack Russell Terrier, Labrador Retriever, Shih Tzu. [18]

One case developed atrophic bulbi caused difficulty to keep eye open. Whitley.[8] and Devareddy. [14] advised postoperative examination of the patient at three weeks, six weeks and at six-month intervals.

The 8-0 sutures of limbal incision were removed in all the earlier cases (unpublished data-not included in the current study) after 6 weeks, whereas in current study sutures (10-0) on clear corneal incision were not removed. The wound was completely healed in 8 cases with no opacity on the central cornea. Shafiuzama. [3] Observed that corneal opacity around the suture line was decreased remarkably at the end of 40th postoperative day. Anterior chamber did not show any signs of infection but 4 cases had developed posterior synechia at few points. These synechia distorted the shape of the pupil slightly, but did not pose any major problem with the vision. Magrane. [19] suggested that, partial iritic adhesions could be neglected, if the rest of the pupil was mobile.

Tapetal glow was observed in 43 % cases. Five months after the surgery, one of the casesdeveloped a crescent shaped corneal opacity at 6 O'clock to 9 O'clock position. Slight bulge with discoloration of the sclera was observed at 7 O’ clock position on the limbus. Peaking of the iris at the same position was also noticed. Gelatt. [20] had recorded a similar complication in 4 eyes operated for extracapsular cataract extraction after 3 months to 6 months post-surgery. These dogs had developed an enlarging mass on the limbus with distorted pupil. This mass was called as a staphyloma and was caused due to weakening of the ocular supportive structures like sclera leading to bulging of the uveal contents. In another case of cataract, the eccentricity of the pupil indicated inclusion of the iris into the wound

during suturing; which might have weakened the tensile strength of the healing wound. However, vision of the dog was intact. A case operated for mature cataract in left and right eye due to diabetes with cupping of optic disc resulted in no initial vision, but 4 months after the surgery owner reported marked change in its behaviour and the dog easily identifies moving as well as large objects within 5 feet.

At the end of the 3 months, success rate in terms of return of ambulatory vision was recorded in 75% cases in total (graph14) which was okay in comparison with 80%. [14] in IOL implantation of dogs.

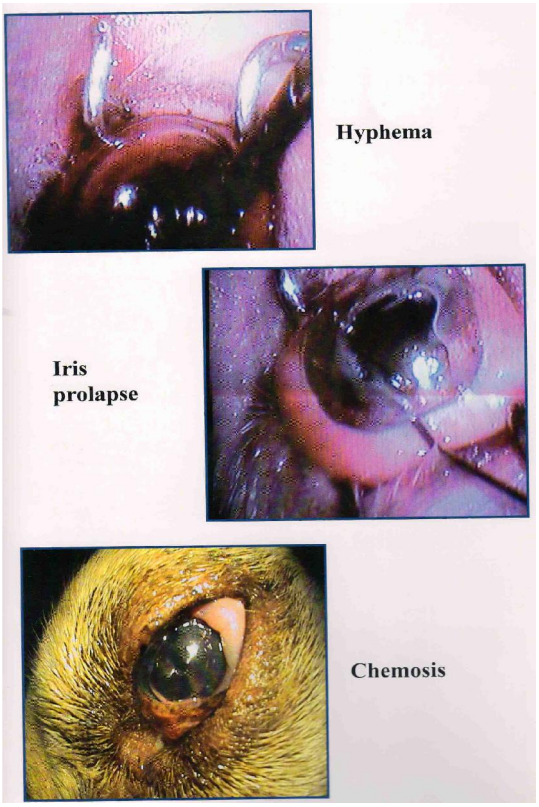
This study had very promising surgical outcome (good - 43.00 %, fair - 28.57 %, and failure - 25.00 %) on comparison with others (good - 22%, fair - 28% and failure - 50%), which were operated intracapsular method (21) whereas satisfactory outcome in 75% (11) and 90% (8) operated with Manual extracapsular cataract extraction (MECCE). Here, one can say that the extracapsular lens extraction method would be a more successful procedure for cataract surgery for animals with tough capsule, big and hard lens and veterinarians with less experience of microsurgery, lack of advanced instruments and owners with less willingness to spend on their cataractous dogs.

**Figure Legends**

A – Post operative follow up

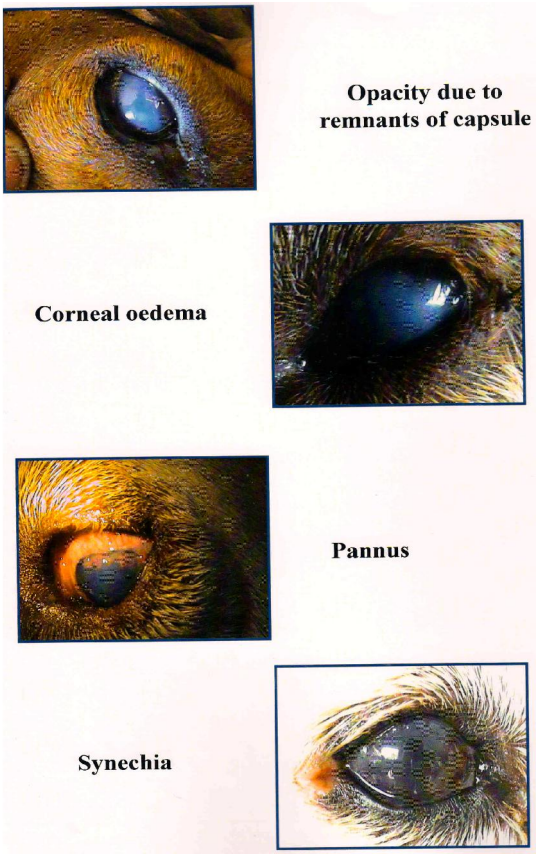

**A**

B – Operative complications




**B**

C – Postoperative complications




**B**

**Graph legends**

Graph A. Variation in clinical presentation of eye affections (n=72)

Graph B. Variation in age related cataract incidences (n=36)

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Graph H. Occurrence of cataract - Unilateral or Bilateral (n=36)

Graph I. Types of cataract cases observed (n=60)

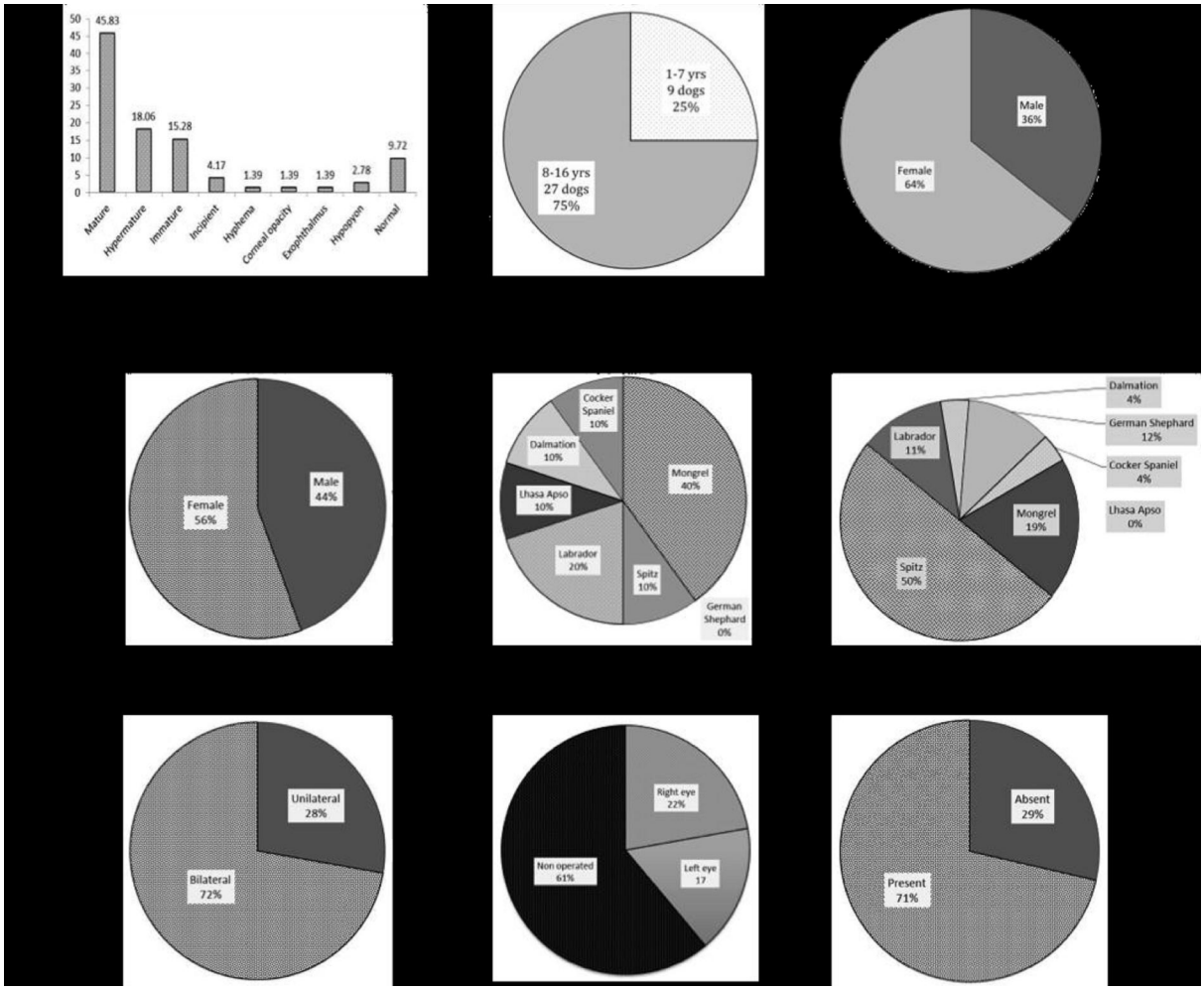
Graph J. Types of cataract cases operated (n=72)

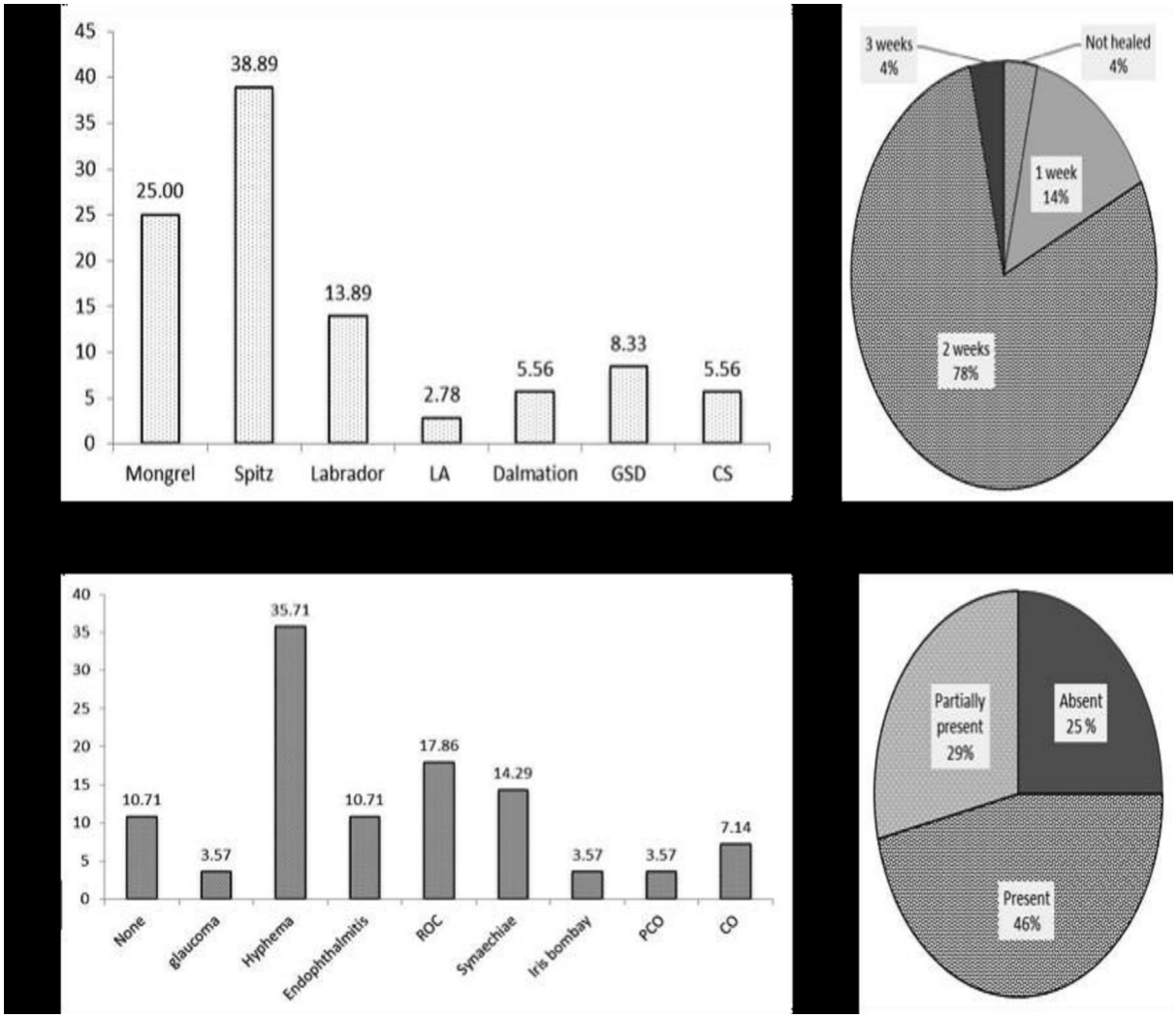
Graph K. Iris bleeding during the ECCE procedure (n=28)

Graph L. Variation in surgical wound healing in ECCE (n=28)

Graph M. Complication after ECCE procedure (n=28)

Graph N. Postoperative visions in dogs (n=28)






## SUMMARY

There was good exposure and visualization of the eyeball by operative microscope, which made surgeon comfortable. Operative microscope facilitated magnified visualization of vital ophthalmic structures. Closure of corneal incision was quite difficult needs patience and skill (practice on dry and wet models). MECCE under general anaesthesia along with a RBNB was found effective and easy to operate. Viscomet usage, gentle handling of eye tissue and proper follow up will enhance the surgical outcome. On the basis of above clinical study, use of the operative microscope provides aid in surgical technique and extracapsular cataract extraction is a promising method for restoring vision in canine cataract cases. Although the number of cases operated is a very small number and overall follow up mentioned was of short period, the authors believe that reporting of the failures and complications will add a valuable piece of information to the field of canine ophthalmology. In the world of advanced techniques, MECCE is still used due to indication in cases, which are problematic for phacoemulsification. MECCE is still a valid technique in dogs due to capsular thickness,

hardness and larger sized cataractous lens. In most of the places, canine lens are not available or affordable, can benefit with such techniques. Further long-term follow up with large case number study is required.

## REFERENCES


1. Magrane WG. The normal eye. Canine ophthalmology. 2 ed. Philadelphia: Lea and Febiger, 1961; 3-5.
2. Keil SM, Davidson, H. J. Canine cataracts: A review of diagnostic and treatment procedures. Vet Med, 2001; 96: 14-38.
3. Shafiuzama M. VMS, Jayadevappa S. M, CRYOEXTRACTION OF CATARACTOUS LENS IN CANINES. Indian Veterinary Journal, 1998; 75(5): 444-5.
4. Kanemaki N, Saito M, Onda K, Maruo T, Ogihara K, Naya Y, et al. Establishment of a lens epithelial cell line from a canine mature cataract. Experimental animals / Japanese Association for Laboratory Animal Science, 2012; 61(1): 41-7. PubMed PMID: 22293671.
5. Gelatt KN. Spontaneous cataract resorption and lens-induced uveitis in the dog. Modern veterinary practice, May 1975; 56(5): 331-5. PubMed PMID: 1169683.
6. Scott EM, Esson DW, Fritz KJ, Dubielzig RR. Major breed distribution of canine patients enucleated or eviscerated due to glaucoma following routine cataract surgery as well as common histopathologic findings within enucleated globes. Veterinary ophthalmology, Feb 2013; 13. PubMed PMID: 23406449.
7. Startup FG. Cataract surgery in the dog. I. History and review of the literature. The Journal of small animal practice, Dec 1967; 8(12): 667-70 passim. PubMed PMID: 4867301.
8. Whitley RDM, S A Whiltley, E. M. et al. Cataract removal in dogs: The surgical techniques. Vet Med, 1993; 88: 859-66.
9. Patil VN, Patil PB, Parikh PV, Talekar SH, Patil DB, Kelawala NH, et al. Extra capsular cataract surgery in canine - a pictorial view. International Journal of Veterinary Science & Research, 2014; 1(1):1-6.
10. Ormrod JN. Two cases of chloroquine-induced retinal damage. British medical journal, Mar 1962; 31: 1(5282): 918-9. PubMed PMID: 14482334. Pubmed Central PMCID: 1957516.

11. Spreull JS, Chawla HB, Crispin SM. Routine lens extraction for the treatment of cataract in the dog. The Journal of small animal practice, Oct 1980; 21(10): 535-54. PubMed PMID: 7464067.
12. Bernays ME, Peiffer RL. Morphologic alterations in the anterior lens capsule of canine eyes with cataracts. American journal of veterinary research, Dec 2000; 61(12): 1517-9. PubMed PMID: 11131591. Epub 2000/12/29. eng.
13. Beale AB, Salmon J, Michau TM, Gilger BC. Effect of ophthalmic Nd: YAG laser energy on intraocular lenses after posterior capsulotomy in normal dog eyes. Veterinary ophthalmology, 2006; 9(5): 335-40. PubMed PMID: 16939462.
14. Devareddy SJ, S. M.; Ranganth, B. N. and Srinivasan, C. L. Intraocular lens implantation in experiemtal dogs. Ind Vet j, 1998; 75: 1000-1.
15. Taylor MM, Kern TJ, Riis RC, McDonough PL, Erb HN. Intraocular bacterial contamination during cataract surgery in dogs. Journal of the American Veterinary Medical Association, 1995; 1, 206(11). 1716-20. PubMed PMID: 7782243.
16. Davidson MG, Morgan DK, McGahan MC. Effect of surgical technique on in vitro posterior capsule opacification. Journal of cataract and refractive surgery, 2000: 26(10): 1550-4. PubMed PMID: 11033406.
17. Bras ID, Colitz CM, Saville WJ, Gemensky-Metzler AJ, Wilkie DA. Posterior capsular opacification in diabetic and nondiabetic canine patients following cataract surgery. Veterinary ophthalmology, 2006; 9(5): 317-27. PubMed PMID: 16939460.
18. Scott EM, Esson DW, Fritz KJ, Dubielzig RR. Major breed distribution of canine patients enucleated or eviscerated due to glaucoma following routine cataract surgery as well as common histopathologic findings within enucleated globes. Veterinary ophthalmology, 2013; 16 Suppl 1:64-72. PubMed PMID: 23406449.
19. Magrane WG. Cataract extraction: a follow up study (429 cases). The Journal of small animal practice, 1969; 10(9): 545-53. PubMed PMID: 5389043.
20. Gelatt KN. Veterinary Opthalmology. Gainesville, Florida, 1991; 429-60.
21. Startup FG. Cataract surgery in the dog. II. Published results. The Journal of small animal practice, 1967; 8(12): 671-4. PubMed PMID: 5625609.