EVALUATION OF EXTRACAPSULAR CATARACT SURGERY IN CANINES

श्वानों में मोतियाबिन्द की बाह्य खोल निष्कर्षण शल्य चिकित्सा का मूल्यांकन

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B.V.Sc. and A.H.

THESIS

MASTER OF VETERINARY SCIENCE

(Veterinary Surgery and Radiology)

।पशुधनं नित्यं सर्वलोकोपकारकम्।

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Department of Veterinary Surgery and Radiology
College of Veterinary and Animal Science, Bikaner
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Date. 15.02.2016

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CONTENTS

LIST OF TABLES

LIST OF CHARTS

LIST OF FIGURES

Figure No.	Title
2.5	A dog with cataract showing positive obstacle course test
3 (a)	Operating microscope (LABOMED, ENT)
3 (b)	Ophthalmic set used for Extracapsular cataract extraction (ECCE) surgery
4	Instillation of eye drop tropicamide in catractous eye
5	Viscomate, trypan blue dye and 8/0 vicryl suture material used in extracapsular cataract surgery
6 (a)	Position of the patient on operating table
6 (b)	Position of the eye under operating microscope
6 (c)	Retrobulbar nerve block anaesthesia
6 (d)	Application of the self adjustable eye speculum
6 (e)	Incision on cornea with Keratotome
6 (f)	Staining of anterior lens capsule by trypan blue dye
6 (g)	Injection of viscoelastic material into the anterior chamber
6 (h)	Capsulotomy of stained anterior capsule by Double bended needle
6 (i)	Removal of broken anterior lens capsule
6 (j)	Enlargement of corneal incision with corneal scissors
6 (k)	Removal of hypermature cataractous lens
6 (l)	Removal of remaining lens and cortical material

Figure No.	Title
6 (m)	Irrigation of anterior chamber of eye
6 (n)	Suturing of cornea with 8/0 absorbable suture material
6 (o)	Immediate post-operative view of eye
6 (p)	Tarsorrhaphy of operated eye
6 (q)	Post-operative bandaging of operated eye
6 (r)	Recovered cataractous lenses
7 (a)	Clinical cases of immature cataract in dogs
7 (b)	Clinical cases of mature cataract in dogs
7 (c)	Clinical case of hypermature cataract with complete resorption of lens in dog
7 (d)	Clinical case of hypermature cataract with cracks on lens in dog
7 (e)	Clinical case of hypermature cataract with glaucoma in dog
8 (a)	Haemorrhage
8 (b)	Miosis
9 (a)	Posterior capsule opacity
9 (b)	Suture breakage
10 (a)	Postoperative follow up images of operated cases at 1^{st}, 2^{nd} and 4^{th} week
10 (b)	Postoperative follow up images of operated cases at 1^{st} and 4^{th} week

ABBREVIATIONS

Abbreviated forms	Extended forms
ECCE	Extracapsular Cataract Extraction
Fig	Figure
ICCE	Intracapsular Cataract Extraction
ICG	Indocyanine Green
IOL	Intraocular Lens
IOP	Intraocular Pressure
LEC	Lens Epithelial Cells
MIC	Minimal Inhibitory Concentration
PCO	Posterior Capsular Opacification
PLR	Pupillary Light Reflex
PUH	Postoperative Ocular Hypertension
@	At the rate of
%	Percentage

INTRODUCTION

INTRODUCTION

Eye is one of the most important sense organ associated with vision. The lens is a unique structure and has a protein concentration of 33% of its total weight; and most of these proteins are transparent and water-soluble (Hart, 1992 and Shahzad *et al.*, 2012). In its normal form the lens is transparent, avascular biconvex structure, derived solely from epithelial cells. It is immunologically foreign to the body. The sole function of lens is to refract rays of light on to a small area of retina to produce sharp visual image.

Cataract, the opacity of crystalline lens is regarded as major cause of blindness in dogs (Magrane, 1961) affecting thousands of dogs annually (Davidson and Keil, 2001) and also different species of animals (Shafiuzama *et al.*, 1998). Cataract literally means, "**to break down**" and "**a waterfall**" (Peifer and Peterson-Jones, 2001). This "breakdown" refers to the disruption of the normal lamellar architectural arrangement of lens fibers or its capsule, resulting in the loss of transparency of the crystalline lens. Many different processes can cause cataract and they may progress at a variable rate. Loss of vision due to cataract may be accompanied by secondary conditions such as uveitis and glaucoma (Gelatt, 1981).

The basic mechanism of cataract formation is thought to be disturbances in the lens nutrition, energy metabolism, protein metabolism and osmotic balance. Once these disturbances occur, they will cause irreversible changes in lens protein contents, metabolic pumps, ionic concentrations and antioxidant activity. The proportion of nonsoluble (albuminoid) proteins in the lens increases at the expense of the soluble (crystalline) protein fraction. At the same time, proteolytic enzyme activity

increases in the lens, causing breakdown of cell membranes and degradation of lens protein. All of these events amplify and cascade as the cataract progresses, causing visible changes in the lens. The end result is loss of transparency due to lens fibers rupture, cell death, and water-cleft formation (Slatter, 2008).

The age of onset is variable, usually from 5-8 years of age. In some breeds, cataracts appear at higher frequency than the general population. Commonly affected breeds of dog include the American cocker spaniel, Poodle, Boston terrier, Miniature schnauzer, Bichon frise, and Labrador retriever (Cook, 2008).

The causes of cataracts are numerous. Common aetiologies are categorised 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) (Patil *et al.,* 2014). Cataract appears in many different forms and as a result, classification of these lens changes forms the basis of qualifying these opacifications. No single classification accommodates all these variables.

Cataracts are classified by a variety of methods, but the most common method are by age at onset, stage of maturity, location in the lens, and percentage of lens involvement (Birchard and Sherding, 1994). The stages of development are termed as incipient, immature, mature and hypermature (Keil and Davidson, 2001). If a cataract is present at birth, it is considered as congenital and if a cataract develops after eight weeks, it is called as developmental cataract.

Senile cataracts are observed in aged dogs. Many purebred dogs and their crosses are predisposed to juvenile and senile cataracts (Glover and Constantinescu, 1997; Özgencil, 2005). According to localisation within the lens cataracts are classified as nuclear, anterior or posterior cortical, subcapsular, equatorial or capsular.

Diagnosis of cataract involves systemic and ophthalmic examinations such as assessment of vision (menace test and obstacle course test), reflex test (pupillary light reflex and corneal reflex) and ultrasonographical examination of eye (Mustafa *et al.*, 2014). The cataracts can be most easily diagnosed by retro-illumination through a dilated pupil. The lens opacity will be present as a dark and more or less opaque area against the brighter fundus reflex. More thorough examination requires slit lamp biomicroscope.

Treatment of cataract in dogs can be either medical or surgical. One limiting factor in the medical treatment of dogs is that only limited pharmacological agents are available that are effectively capable of exerting any significant influence in its development or regression. Surgery, therefore is regarded as the most promising treatment for cataract in dogs (Startup, 1967 and Whiltely *et al.*, 1993).

Earlier, it was thought appropriate to wait until a cataract 'matures' (resulting in blindness) to perform the surgery. With recent advances in techniques for cataract removal, it has become advantageous to perform the surgery earlier, thus avoiding complications associated with lens-induced uveitis and secondary glaucoma. Uveitis is developed due to breakage of lens protein that are detected as foreign proteins and work as an antigen that ellicite the immune system and results into inflammation and secondary

glaucoma develop due luxation of lens that blocks the natural drainage of the eye leading to pain and permanent blindness. Now surgery is more often performed unilaterally without waiting for both lenses to become completely opaque. In any case, it is always best to perform an initial examination early enough to visualise the fundus to be certain that there is no evidence of concurrent retinal degeneration (Patil *et al.,* 2014).

Contrary to human, dogs does not need the vision to pursue an occupation which requires reasonably good vision. It is important only that this restored vision should enable the animal to live out a normal life free from dangers and insecurity associated with bumping on furniture, being struck by a car or stumbling down the stairs.

Aphakic vision is much better in dogs in comparison to humans because of some major anatomical differences. In the canine eye, the light rays converged on the retina are influenced mainly by the refractive power of the cornea. The refractive and accommodative power of canine lens is of limited value. Thus the loss of a lens causes loss of only finer details, which are not of great importance in pet dogs (Startup, 1967). So animal can see a blurred, erect image of object after the cataract surgery.

In the early days, the success rate for the cataract operations were relatively low (Startup, 1967) but more recently the surgery has been accomplished successfully in over 95 % cases of cataract (Davidson *et al,.* 1992), but in 5% cases complications may prevent recovery of vision. In cataract surgery common long-term complications include posterior capsular fibrosis, elevated intraocular pressure, excessive prolonged inflammation, retinal detachment, and persistent corneal edema. Thorough preoperative evaluations and the regular post surgery follow up prevent and minimize these complications and helps in the

restoration of vision. In uncomplicated cases, vision begin to improve within a few days and corneal wound healing usually complete in six weeks after cataract surgery (Dziezyc, 1990 and Wilkie *et al.*, 2006).

Selection of patient for cataract surgery plays an important role in the outcome of surgery. Assessment of the patient for cataract surgery starts with the medical and visual history; including a physical examination and laboratory diagnostics to rule out systemic diseases, such as diabetes mellitus, that may contribute to cataract formation. Neurologic evaluation and behaviour assessment are essential in ruling out age-related changes in mentation, activity level or cognitive dysfunction that may be misinterpreted as a decline in vision. Aggressive or unruly patients may not be candidates for surgery due to the inability to consistently provide medical therapy that will be needed both pre-operatively-and postoperatively. The history is important to determine the progression of visual deficit; e.g. nyctalopia (night blindness) is often a sign of retinal degeneration (Burwell, 2004).

Extracapsular cataract extraction is still regarded as an effective and most economical procedure of lens extraction and is preferred worldwide by many ophthalmic surgeons (Williams *et al.*, 2004) and regarded as method of choice by veterinary ophthalmologists (Gelatt, 1981). In 1745 Daviel performed the first extracapsular cataract extraction (ECCE) surgery. Lens extraction is considered to be a basic step in treatment of cataract (Pesudovs and David, 2001).

Extracapsular cataract extraction can be done by using magnifying loupe, table mounted microscope and with advancement it can be more safely done by using operating microscope. It involves a 180-degree incision in the peripheral cornea with removal of the

anterior lens capsule, manual extraction of the lens cortex and nucleus and leaving the posterior lens capsule intact (Glover and Constantinescu, 1997). This technique is necessary in the removal of very dense cataracts.

Cataract has been treated routinely with high success rates in developed countries, but in India it is still in the developing stage because many of the small animal practitioners are not aware of basic steps for eye examination and diagnostic procedures for cataract. So the admitted cases of cataract are mostly mature and hyper mature which can be operated best using Extracapsular cataract extraction (ECCE) method. Now a day, the demand from the pet owners for cataract surgery is increasing, hence it was envisaged to gain step by step technical skill and evaluate the technique of extracapsular cataract extraction in clinical cases in dogs.

In view of this the present investigation was undertaken with the following objectives:

1. Clinical evaluation of cataract cases in dogs.
2. To perform extracapsular cataract surgery using operating microscope.
3. To carry out a follow up of operated cases till four weeks.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Knite (1962) performed 318 lens removal surgeries in the span of four years and stated that lens extraction surgeries were used to remove dislocated as well as cataractous lenses to restore some vision in completely blind dogs. The results of the extracapsular method were proved much less satisfactory than the intracapsular method mainly due to iris adhesion and loss of pupil.

Startup (1967) stated that, if all other parts of the eye were normal, there would be better chances of recovery of vision to the extent that animal could distinguished the light from darkness and could visualised large objects, after the lens extraction surgery. He suggested that enzymatic zonulolysis technique was not useful in canine cataract surgery because zonules in canine eye were tougher than that of human eye. Thus higher concentration of enzyme was needed to break the zonule which caused complications like adhesions and glaucoma. He analysed a total of 252 intracapsular operations performed over a period of 17 years of which good result was recorded in 22% cases, fair in 28% cases and failure in 50% cases. He mentioned that vitreous loss was observed invariably during lens extraction surgery.

Gelatt and Rubin (1969) observed postoperative intercalary staphylomas in 4 dogs within 3 months to 2 years after the lens extraction surgery. They put forth the reasons for this abnormality as secondary to improper wound closure, scleral thinning intraocular inflammation or combination of these factors.

Magrane (1969) reported the success rate of 80% with extracapsular technique where as it was 40% in cases of

intracapsular method. He also suggested that the chances of success could be increased with the use of steroids pre and post-operatively.

Szymanski *et al.* (1973) advised the use of subconjuctival injection of a combination of 10% Phenylephrine and 2% homatropine as the most effective midriatic agent which produced maximum pupillary dilation in 7-12 minutes. Only complication recorded was chemosis however it disappeared 4-18 hrs after the surgery.

Barnett (1980) recorded hereditary cataract due to a simple recessive gene in Welsh springer spaniel. This was later proved by close inbreeding of the affected littermates. Modified extracapsular extraction operation proved successful in restoring vision in these dogs.

Gwin *et al.* (1983) studied the effects of phacoemulsification and extracapsular lens removal on corneal endothelium and corneal thickness in twenty-one dogs. Specular microscopy revealed preoperative cell morphology and cell densities similar to man. After surgery endothelial cell counts significantly decreased 22% (central) and 13% (periphery) with phacoemulsification and 34% (central) and 31% (periphery) with extracapsular lens removal. Corneal thickness was increased with both procedures. Endothelial cell pathology included cellular enlargement, increased pleomorphism, and focal cellular degeneration. Corneal endothelium of dog responds to surgical trauma in a manner similar to man and maintained a functional monolayer via cellular enlargement and migration.

Rooks *et al.* (1985) performed a total of 240 extracapsular cataract extractions on 214 dogs at the University of Illinois from 1968 to 1980. Overall success rate of the surgery as restoration of functional

vision was 49% at least 6 weeks after surgery. There was a significant difference in success rates between surgery on congenital and juvenile cataracts as compared with surgery on diabetic and senile cataracts.

Barnett (1986) studied the cataract development in German shepherd dogs and founded that the bilateral progressive cataract development was not associated with any other ocular abnormality. He also reported that cataract development occurred due to an autosomal recessive gene.

Nasisse *et al.* (1986) evaluated the response of the canine corneal endothelium to intraocular irrigation with saline solution, balance salt solution and balanced salt solution with glutathione. He did not find any significant difference between the three solutions. Except that the corneal thickness was increased slightly by 0.9% saline solution which returned to normal by one week after the irrigation.

Paulsen *et al.* (1986) found that the success rate in lens extraction surgery was 95 % in eyes without lens induced uveitis and it was just 52 % in eyes with lens induced uveitis after 6 months of surgery.

Boldy (1988) reported that success rate in the short and long term period for cataract extraction in dog was substantially increased from 50 % to 95 % in past 35 years.

Whitley (1988) did a survey on canine ocular disorders and its breed predisposition and enlisted breeds like Afghan hound, Australian shepherd, Beagle, Boston terrier, German shepherd, Cocker spaniel, Doberman, Golden retriever, Grey hound, Labrador retriever, Lhasa apso, Pointer, Poodle, Schnauzer, Siberian husky, Silky terrier and Bull terrier were more susceptible to cataract formation.

Davidson *et al.* (1990) compared the postoperative results of 113 unilateral and 77 bilateral extracapsular cataract extractions (ECCE) in dogs. Restoration or improvement of functional vision was achieved in 79.6% cases with unilateral extraction and 85.7% cases with bilateral extractions following 4 to 6 weeks post-operatively. However, complications occurring 6 weeks to 9 months after lens extraction reduced the surgical success rate in both groups. Twenty-six percent of the dogs suffered from complications and resulted in the surgical failure in one eye. When using the criterion that one or both treated eyes had functional vision, a short-term success rate of 98.7% was found for bilateral extractions.

Sato *et al.* (1991) studied the effect of feeding of 30% galactose diet, with or without the aldose reductase inhibitors sorbinil on cataract formation in young beagle dogs and monitored by the indirect ophthalmoscope and hand-held slit-lamp microscopy and documented by retro illumination photography. The study resulted that the first sign of cataract development was an accentuation of the anterior and posterior lens sutures (1 month after feeding), then the appearance of cortical vacuoles (3 months after feeding), and finally, the formation of predominantly equatorial cortical opacities toward the posterior cortices (4-6 months after feeding).

Van der Woerdt and Davidson (1993) screened several canine patients presented for cataract surgery with ultrasonography and discovered vitreous degeneration and retinal detachment in eyes with hypermature cataract, while it was uncommon in eyes with immature cataract. They concluded that, ultrasonographic examination could detect abnormalities of the posterior segment when opacity of the anterior segment required the complete ophthalmologic examinations. They

suggested that ultrasonography was a quick and easy procedure for screening dogs for retinal detachment prior to cataract surgery.

Whitley *et al.* (1993) stated that cataract surgery in the dog could be highly successful and rewarding technique for restoring vision to the cataract patient. Coexisting ocular conditions such as kerato conjunctivitis sicca, uveitis, glaucoma, lens subluxation, and retinal disease were considered as contraindicate to cataract surgery. They further stated that phacofragmentation was the most successful technique in the dogs however postoperative complications such as uveitis, hyphema, glaucoma, capsular opacities, corneal endothelial damage, and retinal detachments were recorded following the surgery.

Basher and Roberts (1995) studied the cataract development in diabetic dogs and warned about the importance of recognition and maintenance of lens-induced uveitis in presurgical preparation of diabetic dogs. They suggested phacoemulsification as the current treatment of choice for diabetic cataracts in dogs, which could be performed at an earlier stage than traditional extracapsular lens extraction for better success rate.

Smith *et al.* (1996) documented the incidence of postoperative ocular hypertension following cataract surgery in 88 dogs and advised the use of antiglaucoma medications in the first 12 hours after the surgery.

Ori *et al.* (1996) performed the diagnosis of cataract by B-mode two-dimensional ultrasonography that revealed the prevalent hyper echoic changes in the anterior and posterior cortices and nuclear pole in all 26 cataractous eyes. He suggested the B-mode two-dimensional ultrasonography as the effective diagnostic tool for cataract diagnosis.

Williams *et al.* (1996) described the extracapsular lens extraction method. They opined that good visualisation of operating field with loupe or operating microscope was necessary in the cataract surgery. The eye should be in the anterior gaze position so that surgeon can see the lens tissue outlined against retinal reflection. Under surgical anaesthesia the eye rotates ventrally and it must be fixed in the desired position. This could be done with stay sutures, clamps or retrobulbar anaesthesia. Retrobulbar anaesthesia should be preferred over other two methods because it provided better fixation of the eye globe.

Devareddy *et al.* (1998) induced the cataract in one eye of dog after dilation of pupil with 1% atropine sulphate drops. After anaesthetising the animal a 24 gauge needle with its tip bent was passed through corneal limbus and dilated pupil to make series of radial laceration on the anterior capsule of lens to induce cataract which appeared on 5^{th} to 7^{th} days after the procedure.

Shafiuzama *et al.* (1998) described the extracapsular cryo-extraction method of cataract surgery in dogs with satisfactory results and did not report any post-operative complication.

Nasisse and Davidson (1999) reported the corneal edema that might be resulted from the damage to the corneal endothelium by excessive fluid irrigation, postoperative inflammation, cavitations by ultrasound energy or contact with surgical instruments, IOL or lens fragments. He also stated that inadequate apposition of the surgical wound might be associated with improper suturing techniques and post-operative self-mutilation, lead to the surgical wound leakage.

Bernays and Peiffer (2000) correlated the severity of plaques with stage of cataract development and suggested the earlier surgical

removal of cataracts to avoid complications associated with plaque formation.

Biros *et al.* (2000) studied 220 cases of cataract for 6 months to examine factors responsible for the development of glaucoma post operatively. They found that mix breed dogs as well as dogs with intra ocular lens implant were at significantly lower risk than pure breed dogs. Further, they recorded significantly higher risk of development of glaucoma postoperatively in the eye with hypermature cataract.

Davidson *et al.* (2000) compared the effect of different cataract extraction surgical techniques on residual lens epithelial cells (LEC) density and cell regrowth rates and found that phacoemulsification with and without anterior and equatorial capsular vacuuming led to the less initial LEC density in the capsular bag than the extra capsular cataract extraction.

Lannek and Miller (2001) stated that recent improvements in the surgical instrumentation and technique had substantially refined the art of the cataract surgery in dogs and had also increased the success rate of returning vision. However, they reported the fact that postoperative development of glaucoma months to years after extraction remained a common problem after surgery.

Leasure *et al.* (2001) determined the distribution of intraocular pressure in dogs with cataracts and compared the tonometric results to the different stages of cataract formation (incipient, immature, mature, and hypermature) and recorded significant tonometric differences between the immature and hypermature cataract groups.

Collinson and Peiffer (2002) compared the pathological complications arising from methods of canine cataract surgery; manual extracapsular cataract extraction and the more automated phacoemulsification and aspiration surgery. They reported that the failures of manual extracapsular surgical procedures were more commonly associated with post-operative synechia and glaucoma, compared with the failures of phacoemulsification which were more commonly associated with infection and haematogenous retinal detachments.

Laus *et* a/. (2002) evaluated the advantages and complications in the intraoperative and early postoperative periods of phacoemulsification and extracapsular techniques for lens extraction in dogs. The study was conducted on 12 mongrel dogs of 6-8 years old. The follow up period ranged from 1-2 months. The mean operating time was significantly lower for phacoemulsification than the extracapsular lens extraction techniques. Complications in the eye were found in only two cases of phacoemulsification such as corneal edema but this was observed also in all cases in extracapsular surgical technique. They concluded that although phacoemulsification technique exhibits higher cost, it shows shorter surgical time and fewer complications than extracapsular lens extraction surgery.

Sharma (2002) studied the technique of cataract extraction on eight dogs of age between 8-12 years. Extracapsular lens extraction was performed on all these cases. She reported that extracapsular lens extraction was a simple technique which can be performed in clinical cases with high degree of success and minimal complications.

Chahory *et al.* (2003) studied the development of intraocular pressure (IOP) after cataract surgery in 50 dogs and suggested the follow-up of measurement of IOP in the first 12 hours after cataract surgery to avoid complications of the retina and optic nerve as well as for timely management of the conditions.

Tyagi *et al.* (2003) performed cataract surgery by extra capsular lens extraction method in a bullock. They reported that the bullock had navigation vision after 15 days of surgery.

Adkins and Hendrix (2005) studied two hundred and forty-four dogs for cataracts at the University of Tennessee from January 2001 to December 2002 and recorded it's incidence in 54 canine breeds. Incidence of cataract was significantly higher in six pure breeds including the Cocker spaniel, Miniature schnauzer, Toy poodle, Boston terrier, Miniature poodle, and Bichon frise as compared to mixed-breed dogs. One hundred fifty-nine dogs were not operated for cataract surgery due to retinal degeneration.

Ameerjan (2005a) explained the extracapsular lens extraction method as standard and popular method of lens extraction in dogs in India. He left behind the posterior lens capsule which was essential for placing the intraocular lens in the capsular bag. He opined that clear corneal incision 1-2 mm anterior to limbal border should be preferred. According to him, pupil should be well dilated for the surgery. After taking corneal incision, anterior capsulotomy was performed. He advised to remove cataractous lens with the help of vectis. He recommended that closure of anterior chamber could be done with absorbable suture material polyglactin 910 and polyglycolic acid or non-absorbable suture like nylon and prolene 10/0.

Ameerjan (2005b) discussed the different methods of cataract extraction and stated that extracapsular cataract extraction though had been the most popular method but newer technique like phacoemulsification and intraocular lens (41 D) implantation had been proved as much better technique. He also suggested the use of viscoelastic material in the anterior chamber for increasing the success rate.

Chung *et al.* (2005) evaluated the safety of trypan blue 1% and indocyanine green (ICG) 0.5% in 46 eyes in assisting visualisation of anterior lens capsule during phacoemulsification in mature cataract and found that both trypan blue 1% and ICG 0.5% were safe for assisting in the visualisation of anterior lens capsule during phacoemuisification of mature cataract.

Manish Kumar *et al.* (2005) compared the clear corneal incision with the limbal incision for extracapsular cataract extraction and noticed that haemorrhage, iris prolapse, difficulty in aspirating the residual mass from the anterior chamber, poor access to the lens were common complications in case of limbal incision technique; while corneal edema, scarring of cornea at the site of incision were common complications that were noticed in corneal incision technique. On the basis of his experience, he opined that the limbal incision would be superior to corneal incision in closing the incision site.

Özgencil (2005) performed the phacofragmentation and aspiration surgery on 32 eyes of 20 dogs (ECCE was performed on 4 eyes and ICCE was performed on 5 eyes of 5 dogs) of different breeds, sexes and ages. Vision restoration and complications were evaluated postoperatively in the short term (4 weeks) period. Mean age of the 20 dogs was 7.3 years.

Stages of cataracts were classified as mature (n: 17), immature (n: 8) and intumescent (n: 7). He reported the most important intraoperatative complications (anterior capsular fibrosis, radial tear of anterior capsule and posterior capsular rupture-vitreous prolapse) in the mature and aged dogs. The most important postoperative complications (uveitis and corneal thermal injury) were observed in mature and aged dogs. Vision was restored in eyes with immature and intumescent cataracts more successfully than in eyes with mature cataracts by phacofragmentation surgery.

Pillai (2005) studied the cataract extraction in dogs, by both intracapsular and extracapsular extraction methods. She also studied the intraocular lens implant by putting 30+ diopter lens after removal of cataractous lens. Twelve dogs suffering with cataract were selected and were divided randomly in two groups. In group I, 6 dogs were operated for cataract by either intracapsular or extracapsular lens extraction without putting intraocular lens implant. In group II, 6 dogs were operated for cataract by intracapsular / extracapsular lens extraction with intraocular lens implant with 30+ diopter lens. Vision was observed in both the groups but good success rate was reported in group II.

Yu-Speight (2005) studied prophylactic use of preoperative topical administration of ciprofloxacin or ofloxacin and reported higher aqueous humour drug concentrations than the minimal inhibitory concentration (MIC) in dogs undergoing cataract surgery. Ofloxacin had higher corneal penetration and ability than ciprofloxacin and proved to be a more appropriate prophylactic drug of choice for canine cataract patients.

Patil (2006) performed the cataract surgeries in 20 canine clinical cases for standardisation of manual extracapsular cataract extraction

(MECCE) with different instruments set up. He found that the result of MECCE was better in mature and hypermature cases with 90% vision recovery for 2 months follow up and 70% vision recovery in one year follow up.

Wilkie *et al.* (2006) examined the surgical outcome of diabetic canine patients with cataract and preoperative spontaneous lens capsule rupture in 20 dogs (40 eyes). Surgery was performed in 38/40 eyes by phacoemulsification method with or without IOL placement. All eyes that had cataract surgery with or without IOL placement were sighted at the time of the last follow-up. Out of the 40 eyes affected with cataracts, 30 had a spontaneous rupture of the lens capsule prior to surgery and the location of the capsular rupture was equatorial in 29/30 and posterior in 1/30 eyes.

Honsho *et al.* (2007) recorded the clinical events and variations in the intraocular pressure (IOP) that occurred in endocapsular phacoemulsification technique and were compared to the modified extracapsular extraction technique during the intraoperative and immediate postoperative periods. Phacoemulsification technique caused the less corneal edema, less ocular discomfort and fewer postoperative complications than the modified extracapsular extraction technique. They observed the increase postoperative IOP, especially in the case of phacoemulsification.

Beteg *et al.* (2008) performed the extracapsular extraction of the lens (ECE) by mini-nuc method adapted from human ophthalmology in four dogs. First day after the surgery they reported the inflammation and slight cloudiness of cornea with blue shadows in all the cases. Transparency of the cornea and clarity of the anterior chamber's liquid

were noticed after 7-10 days of surgery. Vision improvement was noticed 14 days after the surgery.

Kopala (2008) performed phacoemulsification and intraocular lens implantation surgery in a 1.5-year-old spayed female Dachshund dog and noticed that anterior and posterior lens capsule opacities were developed after surgery. He reported that lens epithelial cells shown the metaplasia and generation of fibrous membranes that opacified and increased the capsular wrinkling and obstructed the vision.

Gift *et al.* (2009) evaluated the effect of lens design and biomaterial on formation of posterior capsular opacification (PCO) and refractive correction by bilateral phacoemulsification for mature and diabetic cataracts in sixty dogs. He examined the posterior capsular opacification (PCO) via direct slit-lamp and found significantly lower for the hydrophilic acrylic IOL as compared to the PMMA IOL.

Jhala *et al.* (2009) studied the extracapsular cataract extraction with intraocular polymethyl-methacrylate lens (41 D, 6.5 mm optic and 17 mm haptic) implantation on 14 eyes of 13 dogs with mature cataract, under propofol (5 mg/kg, intravenous) anaesthesia. Cataract surgery was done by using coaxial operating microscope (OM-8, Takagi, Japan). After 3 months of cataract surgery, restoration of ambulatory vision was graded as 'good' in 57% cases followed by 'fair' in 29% cases and 'failure' in 14% cases. Intraoperative complications observed were chemosis (2 cases), iris bulging (2 cases) and haemorrhage (1 case) which were managed during surgery. Post-operative complications included corneal opacity (4 cases), corneal edema (3 cases), posterior capsular opacity (1 case) and uveitis (1 case) which were corrected using topical antibiotic-steroid combinations, NSAIDs and mydriatics.

Acevedo *et al.* (2011) performed the extracapsular cataract surgery with intraocular lens placement in a dog. They reported that patient recovered visual capacity after surgery.

Christine *et al.* (2011) studied the comparison of outcomes for no treatment, topical medical management and phacoemulsification with intraocular lens implantation in 44 dogs (77 eyes). The dogs were divided into 3 groups. Group 1 included dogs that did not receive any medical or surgical treatment for cataracts. Group 2 consisted of dogs that received topical medical treatment only in the form of ophthalmic anti-inflammatory drugs with or without additional mydriatic therapy. Group 3 included dogs that underwent phacoemulsification with intra-ocular lens implantation. The study resulted that the rate of failure of restoration of vision for dogs that received no treatment was 64.5 times higher than in dogs receiving medical treatment and 255 times higher than in dogs receiving surgical treatment and it was 4.0 times higher in the dogs receiving medical treatment alone than for dogs undergoing surgery.

Joy *et al.* (2011) studied the intra and post-operative complications of extracapsular cataract surgery with (34 eyes) or without (28 eyes) IOL in 54 dogs with mature cataract under coaxial operating microscope. They reported the intraoperative complications that were chemosis (06), haemorrhage from canthotomy site (10), miosis (11), iris bulging (05) and vitreous prolapse (26). Post-operatively corneal edema (27) and suture line opacity (57) were frequently observed. Suture dehiscence (21) and subsequent iris prolapse were usually met in dogs with poor owner compliance. Other complications were vaulting of IOL (in roomy eyes) (07), uveitis (11), posterior capsular opacity (09) and retinal detachment (05).

Sale *et al.* (2013) analysed the cataract surgeries (98 cases) using different techniques like ECCE, ICCE and phacoemulsification performed during the years 2008–2013 on the basis of the surgical outcome, complications and its treatment. IOL was implanted in 40 cases. Intra-operative complications were vitreal prolapse (28), pupillary constriction (12), chemosis (10), bleeding from lateral canthotomy (10), iris bleeding (7) and iris bulging (6). Postoperative complications comprised of vaulting of IOL (7), posterior capsule opacification (10), corneal edema (27), corneal ulcer (3), glaucoma (15), synechiae (3) and retinal detachment (4). On the whole, good surgical results were observed in 67.4% (66 out of 98), fair in 21.4% (21) and failure in 11.2% cases (11).

Mustafa *et al.* (2014) studied the effect of intraocular pressure (IOP) in extracapsular extraction (ECCE) and phacoemulsification (PHACO) methods with or without intraocular lens (IOL) on dogs with cataract for a 28-day period. He reported the lowest level of intraocular pressure 14 days after the operation in the ECCE without IOL implanted group. The IOL implanted group showed irregular levels of intraocular pressure. It was lowest on the 21st day in without IOL implanted group in phacoemulsification. However, all values remained within the reference values at the end of a 28-day period postoperatively.

Patil *et al.* (2014) evaluated the cataract surgery using operative microscope (OM-8) in 28 eyes from 20 dogs 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 study 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 and also indicated

that prior dry-wet lab training was needed to avoid iatrogenic injuries. The study also concluded that ECCE under OM-8 was an economic method providing vision to cataractous canine eyes in 3 months with fewer complications.

Kibar *et al.* (2014) reported a new cause of cataract namely snake bite induced cataract in a dog that was bitten by a snake nearly 4 months ago. Pupillary light reflexes and the menace response were decreased in both the eyes. Transocular ultrasonography diagnosed that both the eyes were affected with mature cataract with hyperechogenicity in the lens capsule. The affected lens was removed with the help of extracapsular lens extraction technique with implantation of a 40 dioptre acrylic lens. The animal showed the return of ambulatory vision after the surgery.

MATERIALS AND METHODS

MATERIALS AND METHODS

The present clinical study entitled "Evaluation of Extracapsular Cataract Surgery in Canines" was carried out at the clinics of Department of Veterinary Surgery and Radiology, Bikaner (Rajasthan) during the period from June 2015 to November 2015. Dogs of both the sexes were examined for vision abnormalities.

In the present study, evaluation of cataract surgery using operating microscope was conducted in 9 eyes from 7 dogs out of 12 clinical cases of dogs presented to Department of Veterinary Surgery and Radiology, Bikaner with history of vision abnormalities.

A) History of Patient

History of vision changes, age, any injury, time elapsed since occurrence of opacity, use of recent medications and presence of diabetes was obtained from the dog owner.

B) Gross Examinations

The affected eyes were checked for clarity of cornea, opacity of lens, type of cataract, conjunctival appearance, conjunctival vascularity and discharge if any.

C) Detailed Ophthalmic Examinations

In total, twelve dogs having cataract were examined for ophthalmic status with the help of following reflex tests and ultrasonography to check the vision abnormality.

1. **Menace test: -** It was performed by making a menacing gesture with the hand toward the eye, taking care not to touch the vibrissae. If the animal can see, it should blink or move its head away from the stimulus.

2. **Corneal reflex test: -** It was done by touching the cornea gently with a thin wisp of cotton while holding the eyelids open. Cotton wisp was touched to the periphery to avoid a menace response; the normal corneal reflex was retraction of the globe, with protraction of the nictitating membrane.

3. **Light induced pupillary reflexes (direct/consensual): -** Also called as pupillary light reflex (PLR) - The penlight or torch was moved back and forth between both pupils (swinging flashlight test) to create dynamic contraction (anisocoria), the pupil under the direct light stimulation was slightly smaller than the opposite consensual pupil size. This was considered as normal or satisfactory pupillary reflex.

4. **Ultrasonographical examination: -** Ophthalmic ultrasonography was done by using high frequency sound waves to get measurement and produce detailed images of eye. The examination was generally performed with the dogs awake. Sterile, water soluble lubricating acoustic gel approved for the eye was used. The patient's eyelids were manually held open by the restrainer while the head was secured. In ultrasonographic examination cataractous lens looks hyperechoic.

5. **Obstacle course test: -** The animal was evaluated for its movements in normal and dim light. The animals with significant

visual deficits that failed in the obstacles test, demonstrated an altered or accentuated gait, or simply refuse to move.

Considering the history about the vision obtained from the owner and the observations made during the detailed ophthalmic examinations of the patient, 9 eyes from 7 dogs were selected for the extracapsular cataract surgery.

D) Instrumentation

For extracapsular cataract extraction of lens, instruments used were from human ophthalmic set. Instrument set consisted of Bard Parker (B.P) blade no.15, Corneal scissors, Lens scooper, Muscle hook, Eye speculum, Keratotome, Manual lid Retractor, Double bended 24 G needle, Vicryl 8/0 absorbable suture material, Silk 2/0 thread, 2/3 Traumatic curved needle, Troutman needle holder, two curved mosquito artery forceps, Bard Parker (B. P.) handle No. 3, Curved Mayo Scissors, Utrata Capsule forceps, Adson tissue forceps, Silicone irrigating bulb and anterior chamber needle, bulb and cannula and simcoe.

For operative area inbuilt light source from operating microscope was used and for other procedures handy torch was used. Operating Microscope (OM-8) has 20 times zooming quality which made better visualisation. Single holed white cotton drape covered with disposable adhesive plastic drape was used. The table height was increased to make it convenient for surgeon. Animal was secured in lateral recumbency and folded apron was used to elevate the head.

E) Operative Procedure

a) Preoperative Medications

The owner was advised to instill ciprofloxacin[1] eye drops for 7 days for proper sterilisation of cornea, tropicamide[2] eye drop for 4 days for proper dilation of pupil and Flubriprofen[3] eye drops t.i.d. prior to the date of surgery. Tropicamide was used as mydriatic agent and was instilled 30 minutes before operation at the rate of two drops per operative eye per 5 minutes. Septidine[4] drops were instilled on cornea prior to surgery.

b) Anaesthesia

All the animals were premedicated with Inj. atropine sulphate[5] @ 0.04 mg/kg along with a combination of Xylazine[6] @ 1 mg/kg body weight and inj. Ketamine[7] @ 10 mg/kg body weight for induction of general anaesthesia intramuscularly which was maintained by inj. Ketamine intravenously till affect.

Retrobulbar nerve block was achieved by the palpation of ventral orbital rim and depositing 3 ml of 2% lignocaine[8] behind the globe at orbital stalk.

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[1] Ciprofloxacin – Cipro eye onintment, Cipla.
[2] Tropicamide – Tropicacyl, SUNWAYS (INDIA) PVT. LTD.
[3] Flur: Flubriprofen Eye Drops, FDC Ltd., Mumbai.

[4] Septidine eye drops, Wockhardt Pvt Ltd, Bandra, Mumbai, India.
[5] Atropine sulphate, MORVEL Laboratories (P) Ltd., Mehsana, India.

[6] Xylazine, BRILLIANT, BIO PHARMA LIMITED, Medak, A.P.
[7] Ketamine Inj. KETAMAX®50, Troikaa pharmaceutical Ltd., Dehradun, UK, India.
[8] Lignocaine – Inj. Xylocaine 2%, Astra Zeneca pharma India Ltd.

c) Positioning and Draping of the patient

The dog was placed in lateral recumbency facing the affected eye on the uppermost side and nose was elevated by placing soft padding under the snout. The eye was draped with a sterile light coloured eye drape with a hole about 5cm in diameter in the center. Rest of the body of the dog was draped using sterile drapes to avoid contamination. Surgery was performed in standing position.

d) Surgical procedure

Eyeball was covered with sterilised eye drape. Head was elevated and focus was adjusted on eye. A stab incision was made with the help of Keratotome knife on cornea at 2 O' clock position. After incision of cornea 0.2 ml Trypan blue[9] dye was injected into the anterior chamber that stained the anterior lens capsule. After 30 seconds dye was washed with the normal saline solution and Viscomet[10] was filled in the anterior chamber to prevent the collapse of anterior chamber of the eye. The anterior capsulotomy was done by "can opener" method using 24 G double bended hypodermic needle. Incision was extended to 1 and 3 O'clock position using corneal scissors by full thickness cut circumferentially. Capsule was torn with double bended 24 G needle, which was passed horizontally and then twisted to 90°. Slowly capsulorrhexis and or capsulectomy were done with to and fro as well as circumferential movement of double bended 24 G needle. In this procedure, the capsule was torn at weaker equatorial region of lens. After capsulorrhexis the lens was rotated with the help of nuclear rotator to break down any attachment, if present.

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[9] Trypan blue, SUNWAYS (INDIA) PVT, LTD.
[10] Viscomet, Sun Pharmaceutical Ind. Ltd., Mumbai.

Lens was extracted with manual counter pressure at opposite poles of limbus using muscle hook and lens scooper. The muscle hook was gently pressed against the exterior limbus at 6 O'clock position which pushed the lens in anterior chamber of eye that easily removed by the help of lens scooper. Then irrigation of anterior chamber was done by Simcoe's irrigation aspiration cannula to remove out small pieces of capsule or cortical material.

Simcoe's irrigation- Aspiration cannula was inserted inside the anterior chamber of eye and irrigated with sterilised normal saline solution with Gentamicin[11] 20mg and 0.5ml Adrenaline[12]. The pieces of capsule or cortical material were aspirated by the cannula so that no visible material was remained inside the anterior chamber. Due care was taken for not to damage the posterior capsule and not to damage the corneal endothelium.

Corneal incision was closed with 8/0 absorbable suture material using simple interrupted suture. The sutures were placed one mm apart and knots were rotated on the scleral side. Anterior chamber was reinflated by injecting air into the chamber. After completion of the surgery subconjuctival injection of Gentamicin (0.5 ml) + 0.5 ml Dexamethasone[13] was given using 24 G needle. Eye lids were closed by horizontal mattress suture to protect the eye (Gelatt and Gelatt, 2001).

[11] Gentamicin, MARTIN & BROWN BIO-SCIENCES, Solan, H. P.
[12] Adrenaline, RATHI LABORATORIES (HINDUSTAN) PVT LTD., Patna.
[13] Dexamethasone, Zydus Animal Health, Ahmedabad.

e) Post-operative care

Elizabethan collar was applied for two weeks to protect the eye from self-mutilation. Daily cleansing of the exterior of the operated eye with warm distilled water was done for the first week. Clinical evaluation (heart rate, respiratory rate and temperature) and examination of the patient was done on 0, 2, 4, 6 day followed by every week up to four weeks after the surgery. A broad-spectrum systemic antibiotic was given for 7 days. Acetazolamide[14] 250 mg was given (10 mg/ kg) orally, in two divided doses for 7 days and eye drop pilocarpine[15] (2% solution) instilled b.i.d. for 7 days to avoid postoperative ocular hypertension in few cases.

Tobramycin[16] four times a day for 1st week t.i.d. for 2nd week and b.i.d for next 15 days and Flurbiprofen eye drops were instilled for every hour a day for 15 days and Neosporine eye ointment was applied b.i.d. for first 15 days. After 15 days the frequency was reduced. As per the status of wound and progress of wound healing and vision the frequency and regimen was changed individually. Thus the frequency of eye drops was tapered down and was stopped after 2 months.

Eye lid sutures were removed after 7 days. All these dogs were observed up to four weeks after surgery and then every 15 days for a variable time period. Outcome of the surgery as well as the complications if any were recorded. Results of the cataract surgery were interpreted in two ways namely surgical result and visual result. The surgical result was categorised as, good, fair and failure.

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[14] Acetazolamide, Diamox, 250 mg tablet, Cyanamid.
[15] Pilocarpine (2% solution), Pilocar, Cipla Ltd., India
[16] Tobramycin, Toba, Milamet.

The good surgical result was defined as, eye which had minimal corneal opacity, normal shaped cornea, minimal incisional scar, round pupil with presence of pupillary light reflex, minimal adhesions, almost clear posterior capsule and no residual cortex, four weeks after the cataract surgery.

The fair surgical result was defined as, eye in which good surgical result was hampered by some postoperative complications, sufficient to prevent restoration of good vision but not as great as to necessitate the loss of the eye or to result in total blindness. The failure of the surgery was defined as, total corneal opacity, secondary glaucoma, severe postoperative complications following the cataract surgery. Visual result was interpreted into presence or absence of ambulatory vision.

RESULTS

RESULT

The present study was undertaken to evaluate the incidences of cataract in dogs, to perform cataract surgery by Extracapsular Cataract Extraction (ECCE) method using operating microscope and to carry out a follow up of operated cases till four weeks.

A total of 12 clinical cases of cataract were studied in detail. Their history related to age, sex, breed, eyes affected, stage of cataract, vision deficit and probable etiology were recorded (Table-1). Out of these 12 cases, 7 dogs (9 eyes) were surgically treated for cataract by extracapsular cataract extraction method (Table-2). The owners of remaining cases did not give their consent for surgery.

A) Clinical evaluation of cataract in dogs

Table: 1.The clinical evaluation of cataract cases in relation to breed, age, sex, eyes affected with type of cataract, vision deficit and probable etiology

Case No.	Breed	Age	Sex	Unilateral / Bilateral	Stage of cataract (Right/Left Eye)	Vision	Etiology
01.	Pomeranian	7 yrs	F	Unilateral	Immature	Present	Senile
					Eye lost	Absent	-
02.	Cocker spaniel	4 yrs	F	Bilateral	Mature	Absent	Unknown
					Hypermature	Absent	Unknown
03.	Cocker spaniel	7 yrs	F	Bilateral	Mature	Absent	Senile
					Mature	Absent	Senile
04.	German shepherd	3 yrs	F	Bilateral	Hypermature	Absent	Unknown
					Hypermature	Absent	Unknown
05.	German shepherd	4 month	M	Bilateral	Mature	Absent	Congenital
					Mature	Absent	Congenital

Case No.	Breed	Age	Sex	Unilateral / Bilateral	Stage of cataract (Right/Left Eye)	Vision	Etiology
06.	Pomeranian	12 yrs	F	Bilateral	Immature	Present	Senile
					Immature	Present	Senile
07.	Spitz	11 yrs	M	Bilateral	Mature	Absent	Senile
					Mature	Absent	Senile
08.	Mongrel	7 yrs	M	Unilateral	Mature	Absent	Senile
					Eye lost	Absent	-
09.	Pomeranian	13 yrs	M	Bilateral	Immature	Present	Senile
					Immature	Present	Senile
10.	German shepherd	8 yrs	F	Bilateral	Mature	Absent	Senile
					Immature	Present	Senile
11.	German shepherd	3 month	F	Bilateral	Mature	Absent	Congenital
					Mature	Absent	Congenital
12.	Mongrel	10 yrs	F	Unilateral	Mature	Absent	Senile
					Normal	Present	-

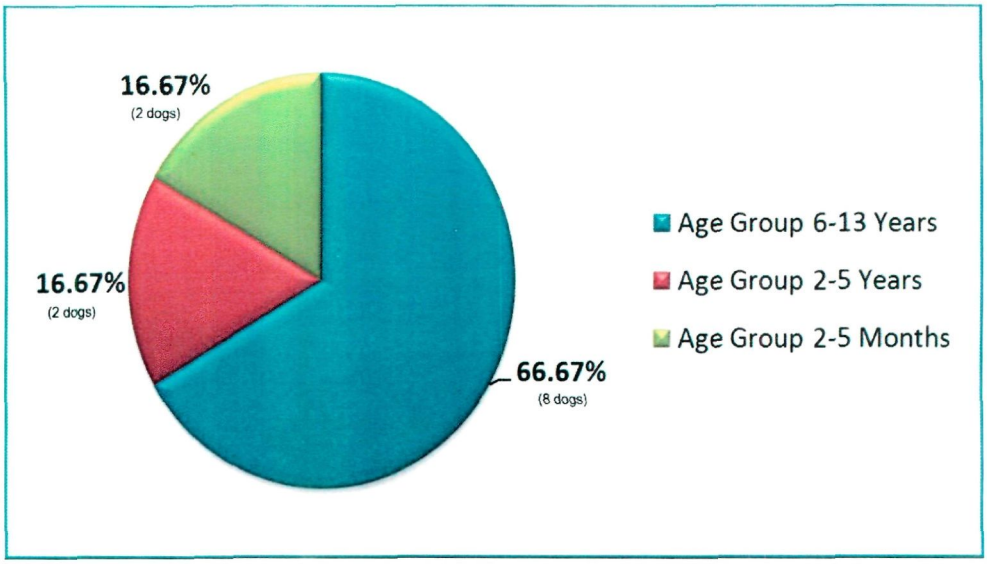


Chart-1. Pie chart showing incidences of cataract in different age groups.

In the present study out of 12 dogs presented with cataract, 66.67 % (8 dogs) were from the age group of 6-13 years, 16.67 % (2 dogs) were between 2-5 years of age and 16.67 % (2 dogs) were between 2-5 months of age. The average age of the affected dogs was observed as 6.64 years indicating that dogs above 6 years of age are more prone to development of cataract (Chart-1).

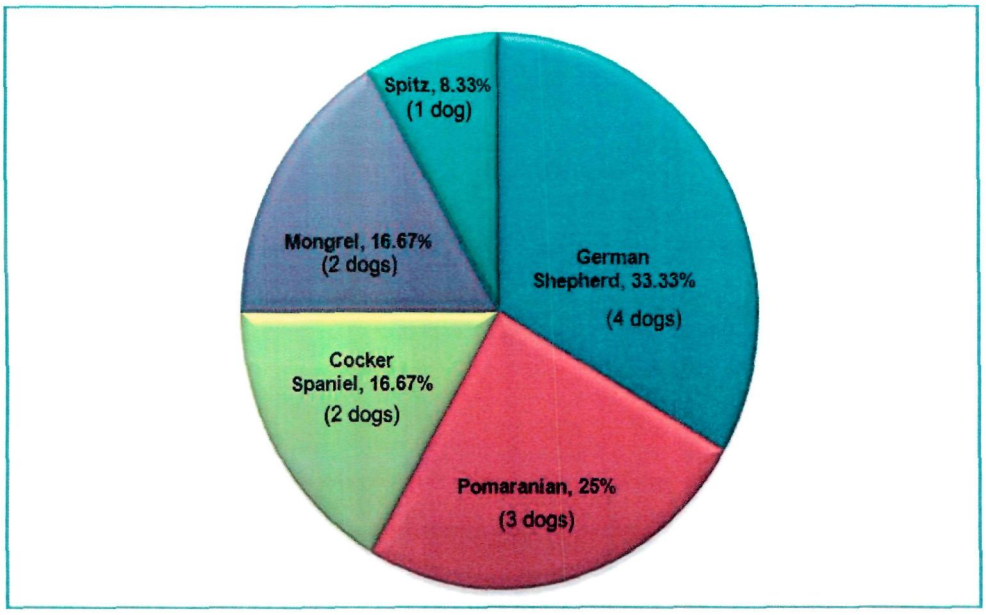


Chart-2. Pie chart showing breed-wise incidences of cataract in dogs.

In the present study German shepherd dogs had higher incidence of cataract (4 dogs, 33.33 %) followed by Pomeranian (3 dogs, 25 %) as compared to the other breeds such as Cocker spaniel (2 dogs, 16.67 %), Mongrel (2 dogs, 16.67 %) and Spitz (1 dog, 8.33 %) of the dogs (Chart-2). Out of 12 cases of dogs, the incidence of cataract was more in the female (66.67 %) than in the male dogs (33.33 %).

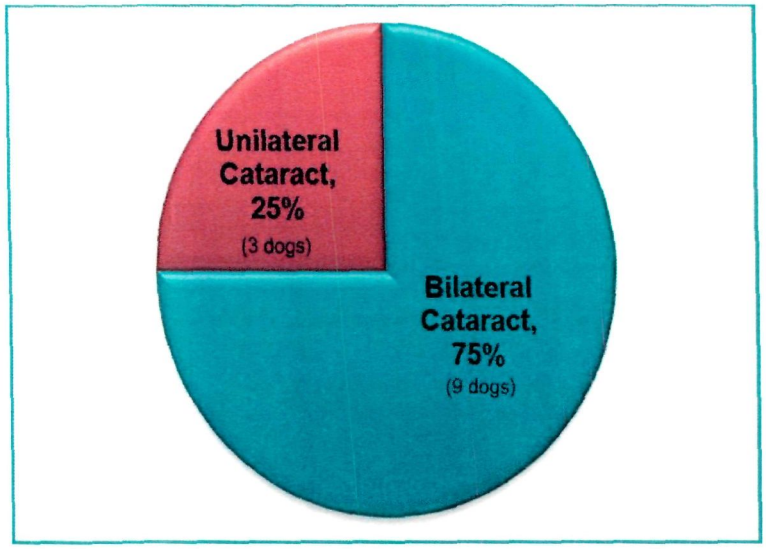


Chart-3. Pie chart showing incidences of cataract on the basis of eye affected

Bilateral cataract was observed in 9 cases (75 %) and unilateral was in 3 cases (25 %) out of 12 cases of cataract in the dogs (Chart-3). In the present study it was observed that most of the times, the stage of cataract was same between the eyes of the same dog.

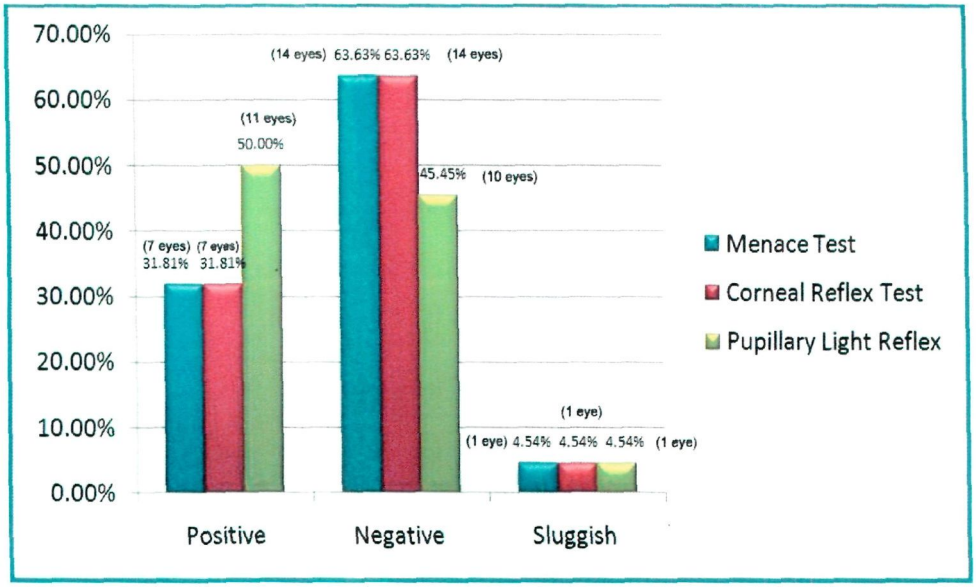


Chart-4. Bar chart showing results of ophthalmic examinations in 22 eyes.

In the ophthalmic examination of 22 eyes; 7 eyes showed positive menace reflex test and corneal reflex test, 14 eyes showed negative menace reflex test and corneal reflex test and 1 eye showed sluggish menace reflex test and corneal reflex test. For pupillary light reflex test 11 eyes showed positive reflex, 10 eyes showed negative reflex and 1 eyes showed sluggish reflex (Chart-4).

In ultrasonographic examinations 21 eyes showed hyperechogenicity of lens because of cataract while one eye that was normal showed the anechogenicity of lens.

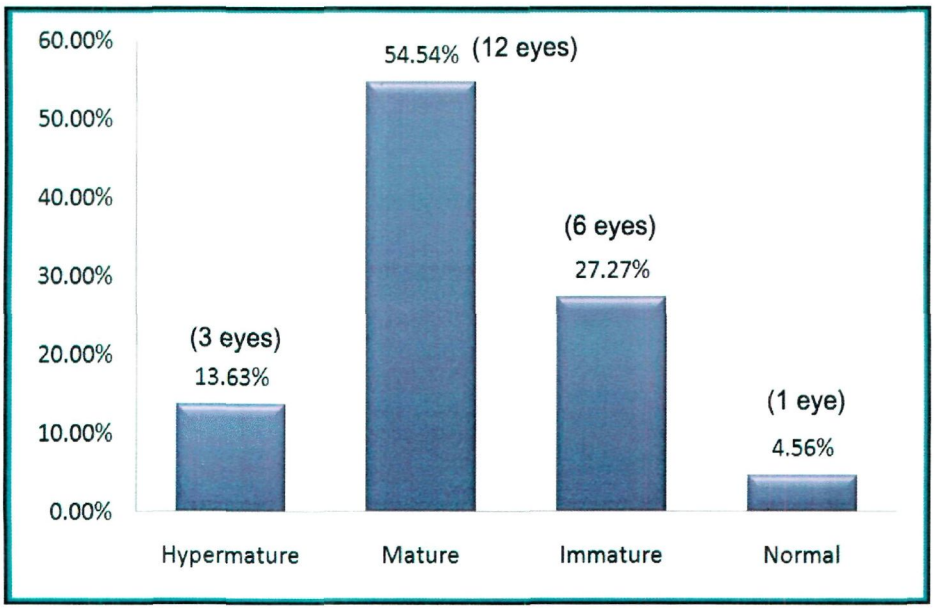


Chart-5. Bar chart showing incidences of different types of cataract.

After detailed ophthalmic examination, complete vision loss in the affected eye was seen only in 12 eyes due to mature cataract and in 3 eyes due to hypermature cataract, while the 6 eyes with immature cataract and one normal eye had satisfactory vision (Chart-5). In two cases of dog, their left eye was already lost when they were presented at the clinics. Out of two dogs presented with hypermature cataract; one dog had

severe glaucomatous condition in both the eyes with rise in the intraocular pressure due to long term exposure to cataract. So this case was treated with antiglaucomatous medications till reduction in the intraocular pressure before extracapsular cataract surgery.

B) Evaluation of Extracapsular Cataract Extraction method

All the dogs selected for cataract surgery, irrespective of age tolerated anaesthetic regimen without any complications during and after surgery. The dogs which showed good pupillary light reflex, regained their vision after the surgery except in right eye of case No. 2. The cause of failure to regain vision was probably the formation of adhesions in the eye after surgery due to haemorrhage during operation.

All the dogs with responsible owners showed excellent results because they strictly followed the postoperative schedule as advised and presented their dogs for regular checkups but stray dogs were not comfortable with the frequent topical medications and did not tolerate Elizabethan collar. Satisfactory pupillary dilatation was achieved by topical instillation of tropicamide eye drops twice daily for four days prior to surgery. Only in case No. 02 and case No. 04 pupillary constriction was observed after incision of cornea during surgery.

Surgery of the affected eyes was performed by keeping affected eye upper side. This found comfortable to the surgeon without any difficulty during the surgery. Position of the operating surgeon was also satisfactory and most of the surgery was easily performed in this position. All the eyes which received premedication with antibiotic eye drops and midriatic agent having well dilated pupil was selected for extracapsular cataract surgery.

In all the cases, after induction of anaesthesia, eyelids drooped and the nictitating membrane protruded and covered half of the cornea during the surgery. A self-retaining adjustable eye speculum successfully held the third eyelid and the eyelids apart and provided easy access to the surgical field. Some eye movements were also observed in the ketamine anaesthesia, which were reduced after the retrobulbar nerve block anaesthesia which completely fixed the eye ball and provided comfortable surgery.

All the animals were premedicated with Inj. atropine sulphate @ 0.04 mg/kg along with a combination of Xylazine @ 1 mg/kg body weight and inj. Ketamine @ 10 mg/kg body weight for induction of general anaesthesia intramuscularly which was maintained by inj. Ketamine intravenously till affect found excellent for undertaking the cataract surgery with uneventful recovery. Recovery in all cases was smooth and it was well tolerated in all the age groups of dog.

Incision from 10 O'clock to 2 O'clock on dorsal circumference through anterior clear corneal was observed as a good incision site. Iris prolapse was observed intra-operatively only in case no.01, which was easily repositioned with the help of iris spatula. In the same case, one day after the surgery due to self mutilation the corneal sutures were broken leading to the prolapse of iris that was again repositioned and corneal wound was sutured.

Trypan blue dye stained the anterior capsule in blue colour and made it easy to visualise blue anterior capsule against white coloured cataract. This helped during anterior capsulectomy. No side effect of Trypan blue was observed postoperatively.

Viscoelastic material successfully maintained the anterior chamber space during intraocular manipulations and protected non-regenerative corneal endothelium by coating it. Anterior capsulotomy was successfully performed in all the cases except in right eye of case no.04. Anterior capsule was removed with the help of 24G cystotome needle and Utrata forceps or capsulorrhexis forceps. It was slightly difficult to tear a circular piece of the tough anterior capsule.

In all cases, delivery of the lens nucleus was smooth, but little big globe rendered longer incision and some amount of cortical material remained in the anterior chamber, which was removed successfully with the Simcoe's irrigation-aspiration cannula. Normal saline solution was used as the irrigation fluid without any damage to the corneal endothelium. Suturing of the incision site with 8-0 absorbable suture material was easy even without any magnification.

Various complications were encountered during surgery in which iris prolapse was observed in right eye of case no. 01, miosis in left eye of case no. 02 and right eye of case no. 04 and hemorrhage in right eye of case no. 02. Iris prolapse and miosis was corrected successfully. Haemorrhage was controlled by instillation of 1:1000 adrenaline but later it causes the formation of adhesions in the eye that was successfully treated with serratiopeptidase and took four weeks for complete dissolution.

On the first day after surgery, blood tinged mucoid ocular discharge was present only in right eye of case no. 02 but other cases did not show any discharge. The eyelid sutures were removed one week after surgery. Return of vision was not observed in most of the case at the end of first week but in case no.03 and case no.11 owners reported

improvement in the activities of dogs. Three weeks after the surgery, 4 cases had clear corneas and the peripheral corneal opacity had reduced considerably while, right eye of case No. 02 had completely opaque cornea, where most of the sutures had given away.

Four weeks after surgery, return of ambulatory vision was observed in 5 cases (6 eyes) out of 7 operated cases (9 eyes) (Table-2). Owners of these dogs reported increased activity by the patient and found that dog did not collide with the objects or walls. In all the six eyes with return of ambulatory vision positive menace reflex test, corneal reflex test and pupillary light reflex test were observed after four weeks. Corneal wound was also completely healed in the four weeks after surgery.

Postoperative complications such as posterior capsular opacity, glaucoma, suture dehiscence, iris prolapse and corneal edema were reported after surgery. Posterior capsule opacity was observed in case no. 01, 02 and 12. Glaucoma developed in case no. 02 four weeks after surgery that was successfully treated with the help of Acetazolamide tablets and eye drop pilocarpine.

Suture dehiscence and iris prolapse were reported in case no. 01 that was again repositioned and resutured. Corneal edema was observed in case no. 01 and 03 that was reduce gradually.

Table-2. Operated eyes, complications at perioperative and postoperative time and outcome of surgery or vision.

Case No.	Breed	Operated eye (Right/Left)	Perioperative Complications	Postoperative Complications	Outcome (Vision)
01.	Pomeranian	Operated	Iris prolapse	Posterior capsule opacity, corneal edema suture breakage	Present
		-	-	-	-
02.	Cocker spaniel	Operated	Hemorrhage	Glaucoma	Absent
		Operated	Miosis	Posterior capsule opacity	Present
03.	Cocker spaniel	Operated	No	Corneal edema	Present
		Operated	No	-	Absent
04.	German shepherd	Operated	Miosis	-	Present
		Not operated	-	-	-
05.	German shepherd	Not operated	-	-	-
		Not operated	-	-	-
06.	Pomeranian	Not operated	-	-	-
		Not operated	-	-	-
07.	Spitz	Not operated	-	-	-
		Not operated	-	-	-
08.	Mongrel	Operated	-	-	Present
		-	-	-	-
09.	Pomeranian	Not operated	-	-	-
		Not operated	-	-	-
10.	German shepherd	Not operated	-	-	-
		Not operated	-	-	-
11.	German shepherd	Not operated	-	-	-
		Operated	-	-	Present
12.	Mongrel	Operated	-	Posterior capsule opacity	Absent
		Not operated	-	-	-

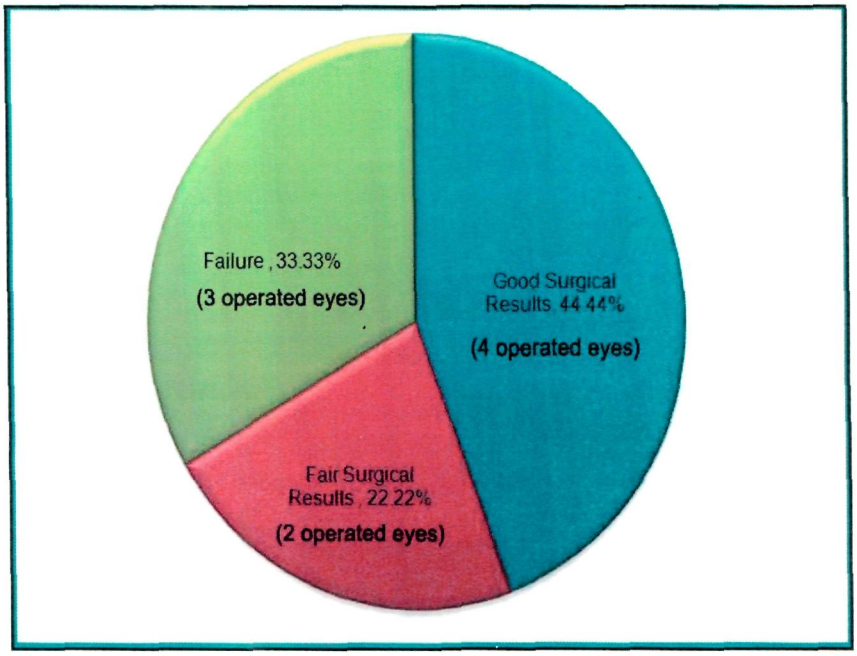


Chart-6. Pie chart showing results of cataract surgery

Good surgical result was observed in 44.44 % operated eyes (4 out of 9 eyes), Fair result was seen in 22.22 % operated eyes (2 out of 9 eyes) and failure was noted in 33.33 % operated eyes (3 out of 9 eyes) (Chart-6).

1. GROSS EXAMINATIONS OF EYES OF CATARACT CASES

1.1 Clarity of Cornea

Fig.1.1 (a) – A cataractous eye showing focal corneal opacity

Fig.1.1 (b) – A cataractous eye showing corneal haziness with vascularisation

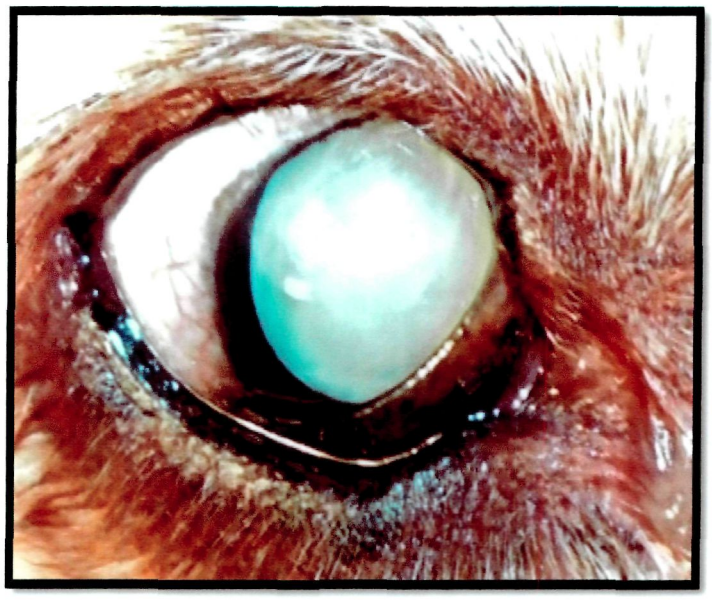


Fig.1.1 (c) – A cataractous eye showing clear cornea

1.2 Conjunctival appearance and vascularity

Fig.1.2 (a) – A cataractous eye showing vascularisation of conjunctiva

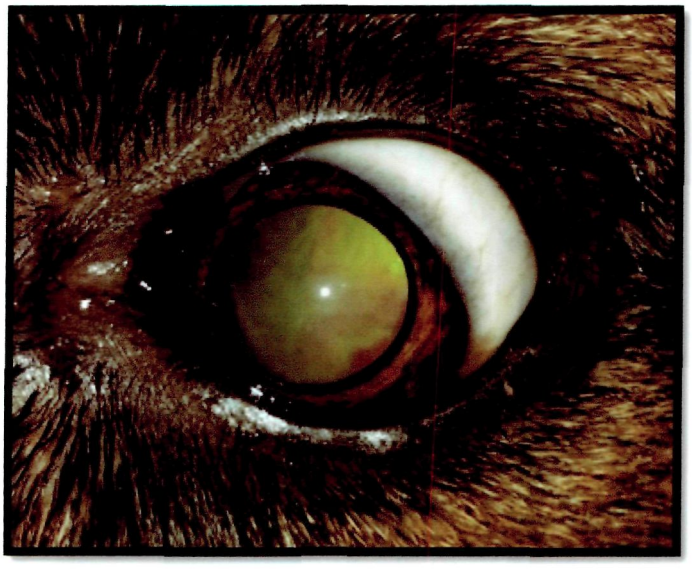


Fig.1.2 (b) – A cataractous eye with clear conjunctiva

1.3 Ocular discharge

Fig.1.3 (a) – A cataractous eye with clear ocular discharge

Fig.1.3 (b) – A cataractous eye with *mucoid* ocular discharge

2. OPHTHALMIC EXAMINATIONS OF EYES OF CATARACT CASES

2.1 Menace Reflex Test

Fig.2.1 (a) – A cataractous eye showing positive menace reflex test

Fig.2.1 (b) – A cataractous eye showing negative menace reflex test

2.2 Corneal Reflex Test

Fig.2.2 (a) – A cataractous eye showing positive corneal reflex test

Fig.2.2 (b) – A cataractous eye showing negative corneal reflex test

2.3 Pupillary light reflex test

Fig.2.3 (a) – A cataractous eye showing positive pupillary light reflex test

Fig.2.3 (b) – A cataractous eye showing negative pupillary light reflex test

2.4 Ultrasonographical Examination

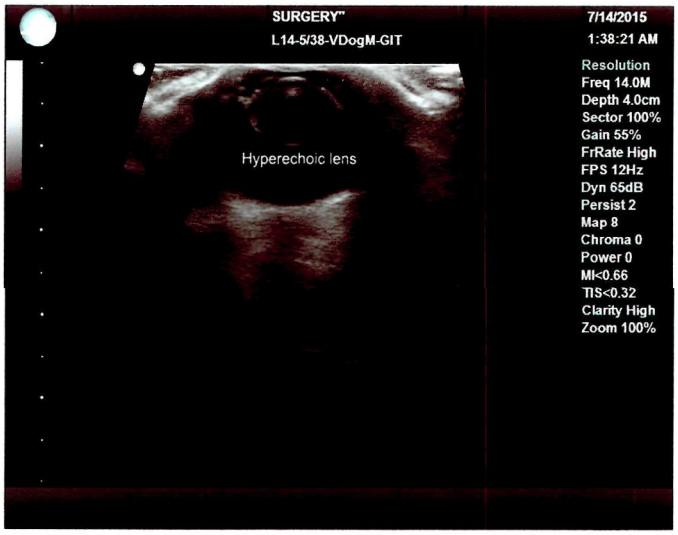


Fig.2.4 (a) – A cataractous eye showing Hyperechoic lens

Fig.2.4 (b) – A normal eye showing anechoic lens

2.5 Obstacle Course Test

Fig.2.5 – A dog with cataract showing positive obstacle course test

3. INSTRUMENTATION

Fig.3 (a) – Operating microscope (LABOMED, ENT)

Fig.3 (b) – Ophthalmic set used for Extracapsular cataract extraction (ECCE) surgery

4. PRE-OPERATIVE MEDICATIONS OF EYE

Fig.4 –Instillation of eye drop tropicamide in catractous eye

5. MEDICINES AND SUTURE MATERIAL USED IN EXTRACAPSULAR CATARACT SURGERY

Fig.5 –Viscomate, trypan blue dye and 8/0 vicryl suture material used in extracapsular cataract surgery

6. SURGICAL PROCEDURE OF EXTRACAPSULAR CATARACT EXTRACTION (ECCE) METHOD

Fig.6 (a) –Position of the patient on operating table

Fig.6 (b) –Position of the eye under operating microscope

Fig.6 (c) – Retrobulbar nerve block anaesthesia

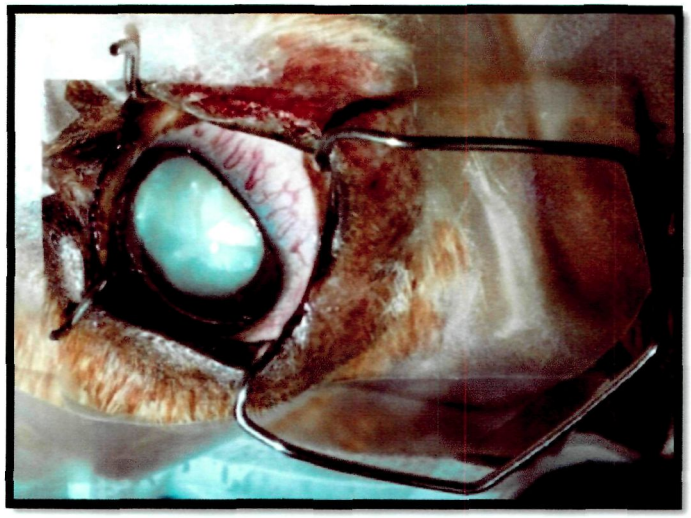


Fig.6 (d) –Application of the self adjustable eye speculum

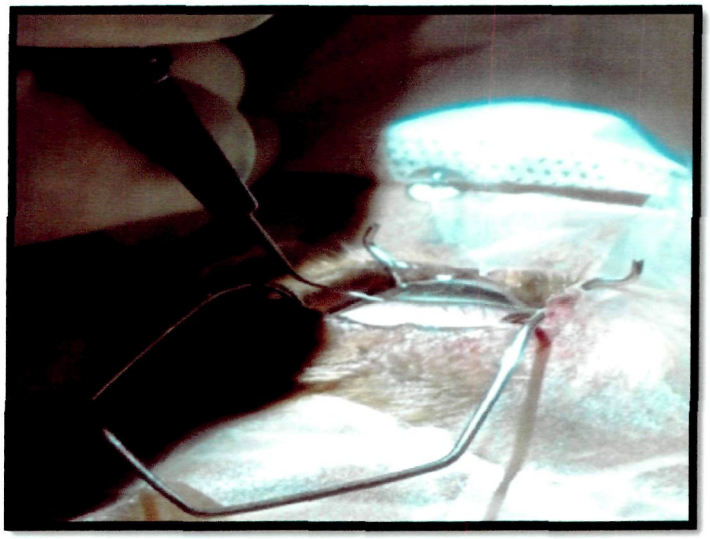


Fig.6 (e) – Incision on cornea with Keratotome

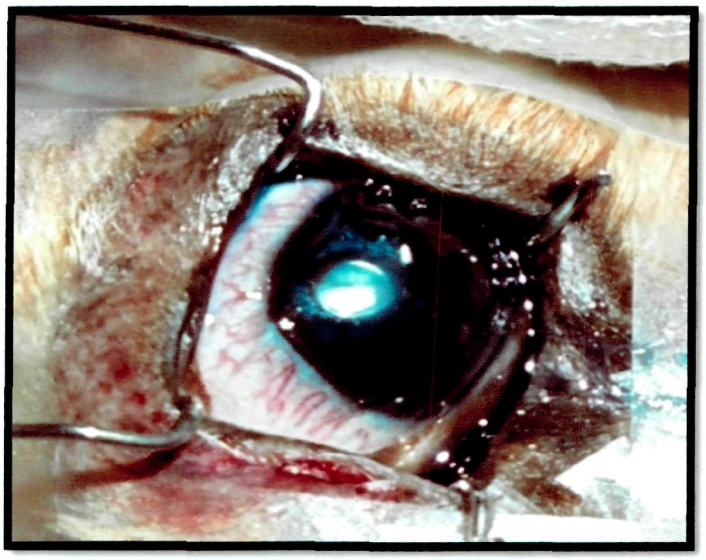


Fig.6 (f) – Staining of anterior lens capsule by trypan blue dye

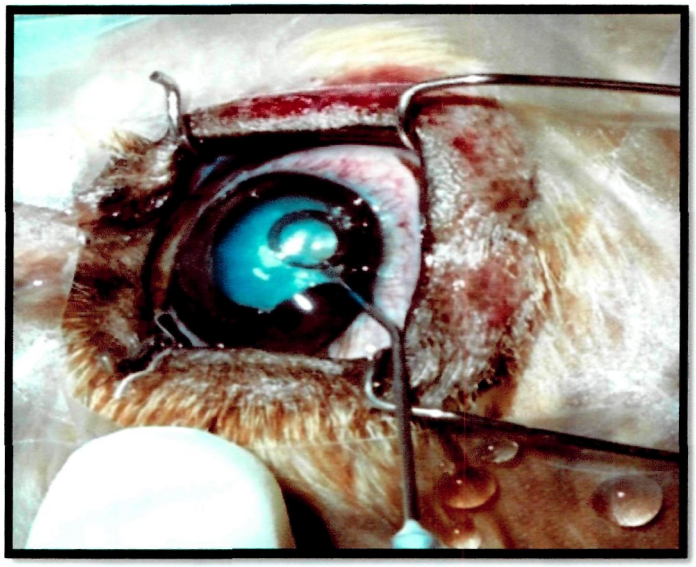


Fig.6 (g) - Injection of viscoelastic material into the anterior chamber

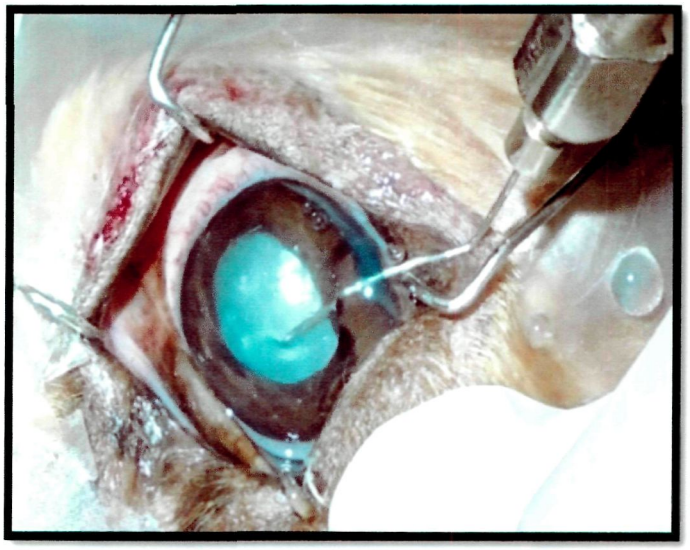


Fig.6 (h) - Capsulotomy of stained anterior capsule by Double bended needle

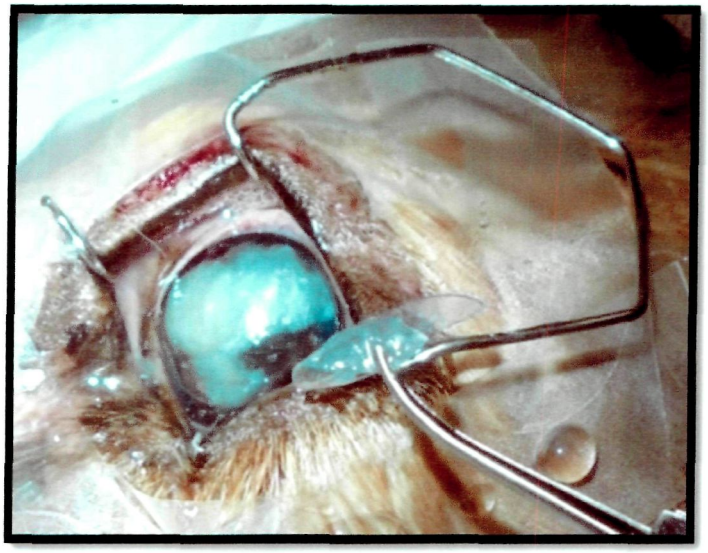


Fig.6 (i) - Removal of broken anterior lens capsule

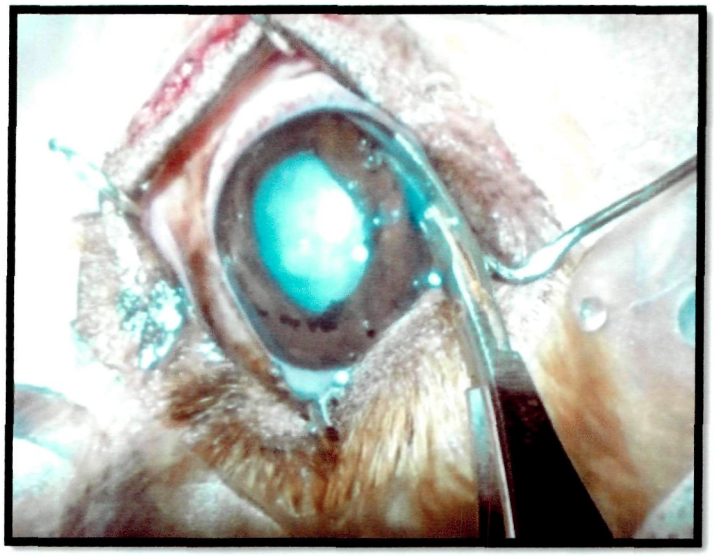


Fig.6 (j) - Enlargement of corneal incision with corneal scissors

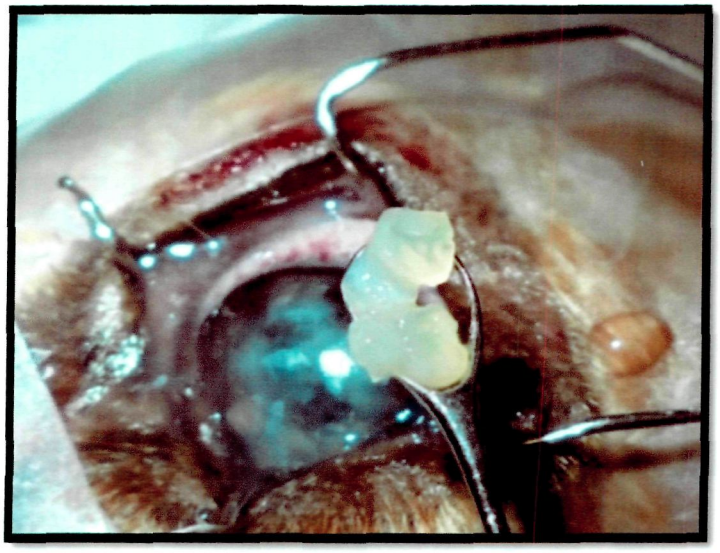


Fig.6 (k) - Removal of hypermature cataractous lens

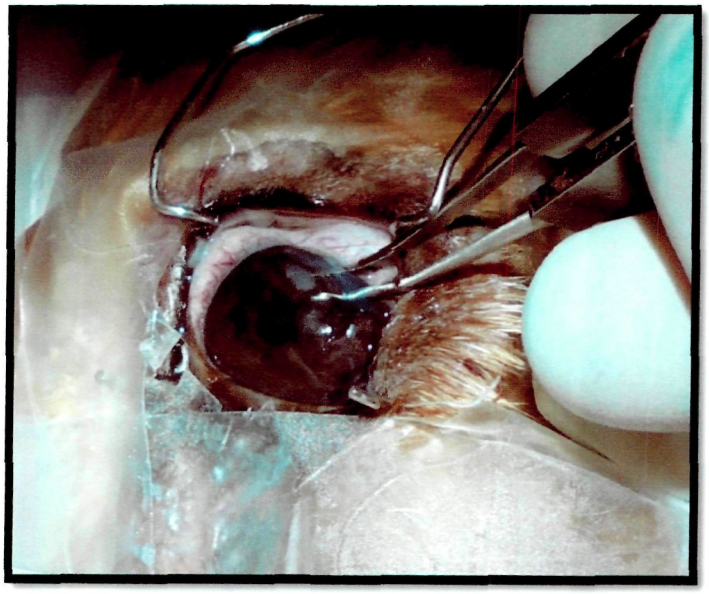


Fig.6 (l) - Removal of remaining lens and cortical material

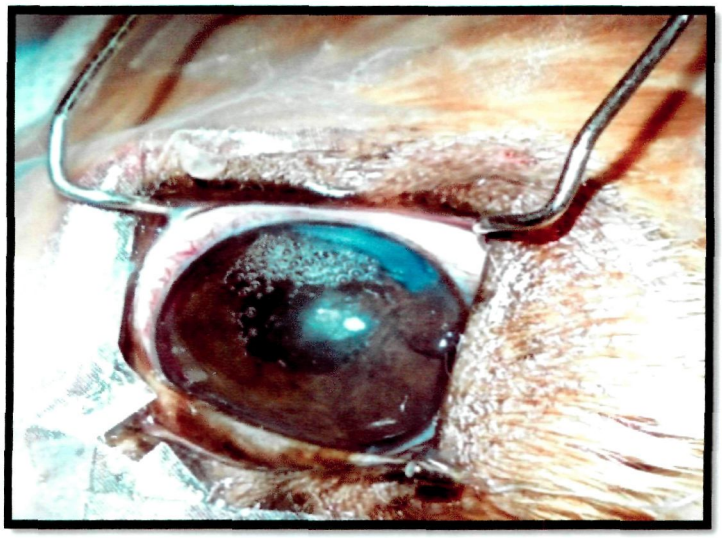


Fig.6 (m) - Irrigation of anterior chamber of eye

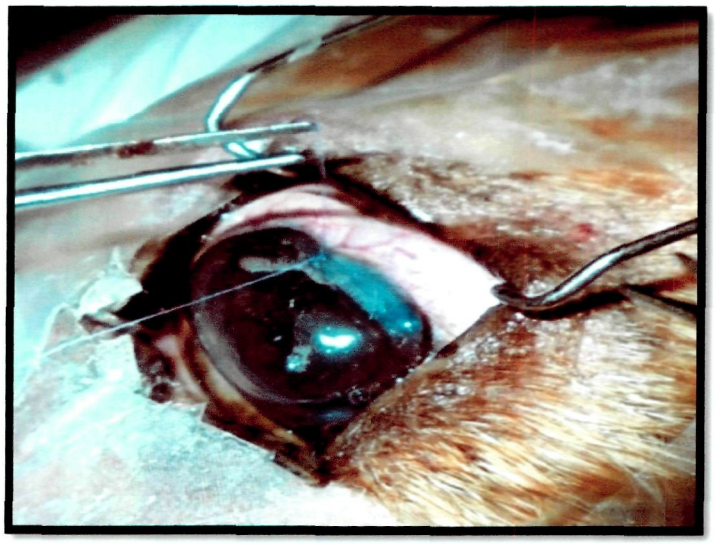


Fig.6 (n) - Suturing of cornea with 8/0 absorbable suture material

Fig.6 (o) - Immediate post-operative view of eye

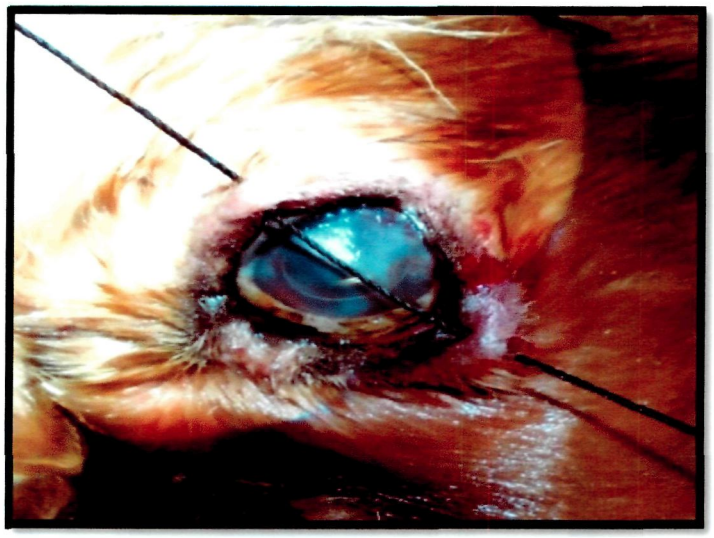


Fig.6 (p) - Tarsorrhaphy of operated eye

Fig.6 (q) - Post-operative bandaging of operated eye

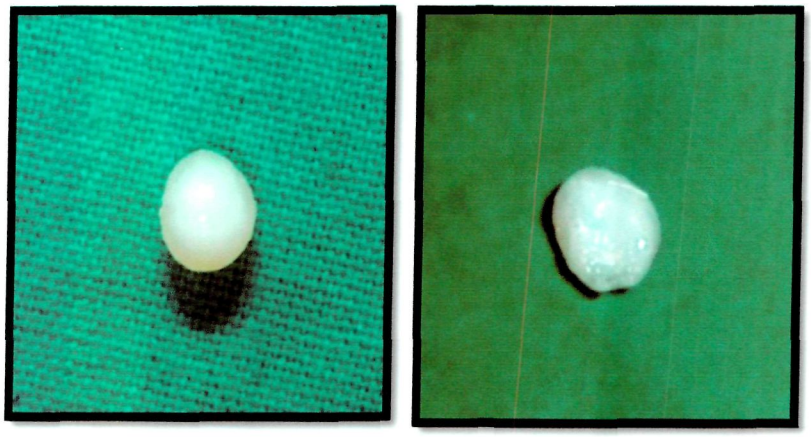


Fig.6 (r) - Recovered cataractous lenses

7. DIFFERENT TYPES OF CASES OF CATARACT IN DOGS

Fig.7 (a) – Clinical cases of immature cataract in dogs

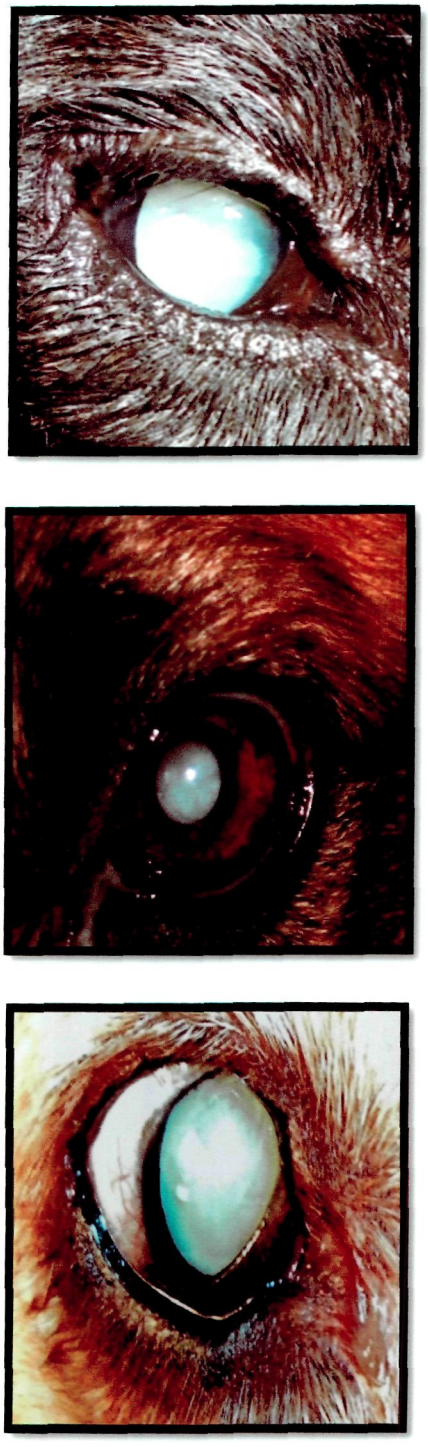


Fig.7 (b) - Clinical cases of mature cataract in dogs

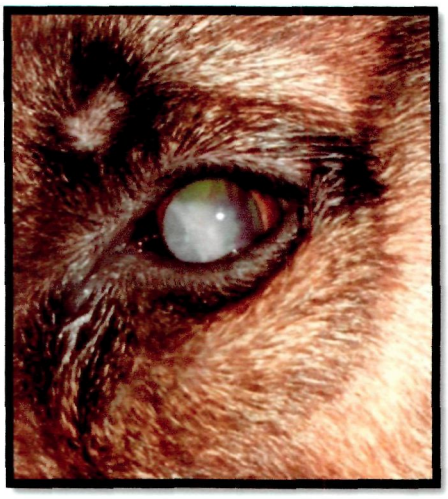


Fig.7 (c) - Clinical case of hypermature cataract with complete resorption of lens in dog

Fig.7 (d) - Clinical case of hypermature cataract with cracks on lens in dog

Fig.7 (e) - Clinical case of hypermature cataract with glaucoma in dog

8. PERIOPERATIVE COMPLICATIONS

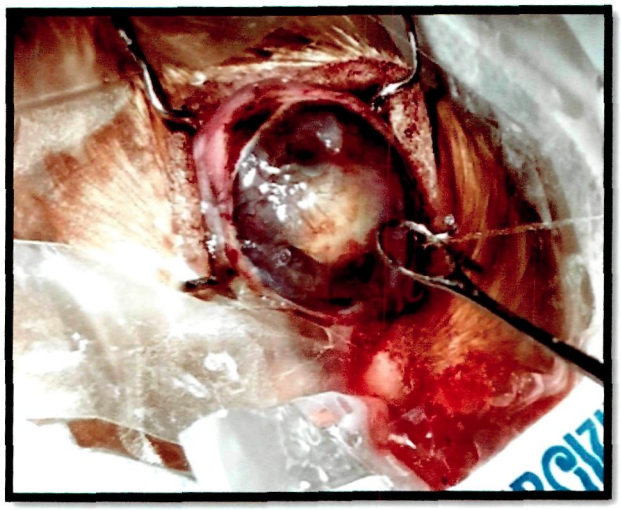


Fig.8 (a) – Haemorrhage

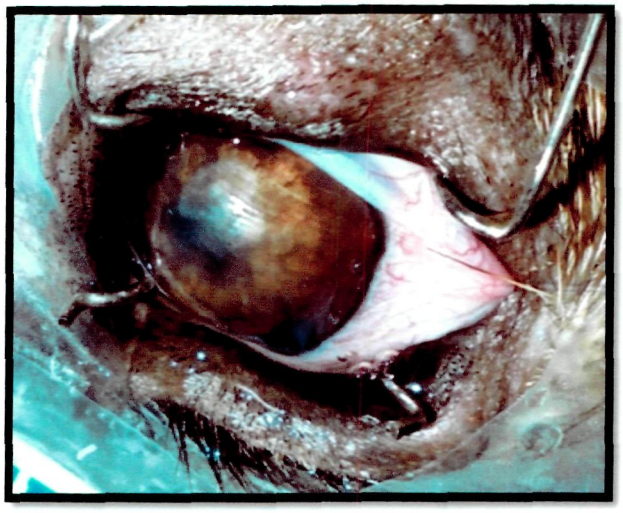


Fig.8 (b) – Miosis

9. POSTOPERATIVE COMPLICATIONS

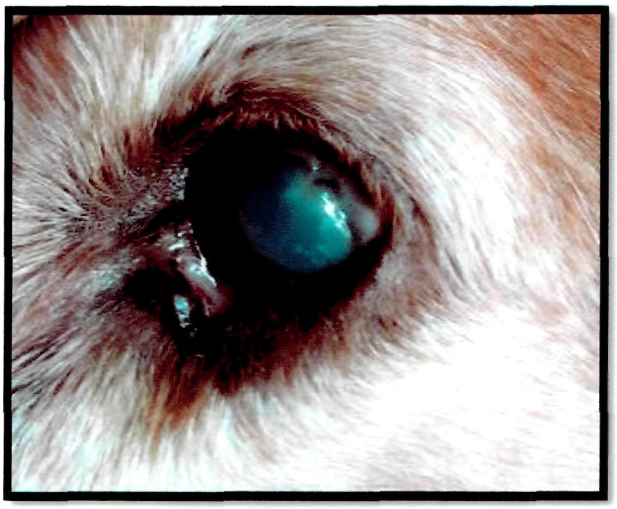


Fig.9 (a) – Posterior capsule opacity

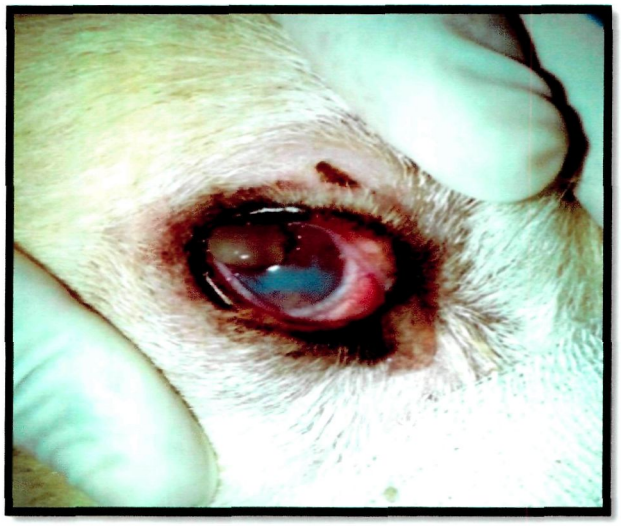
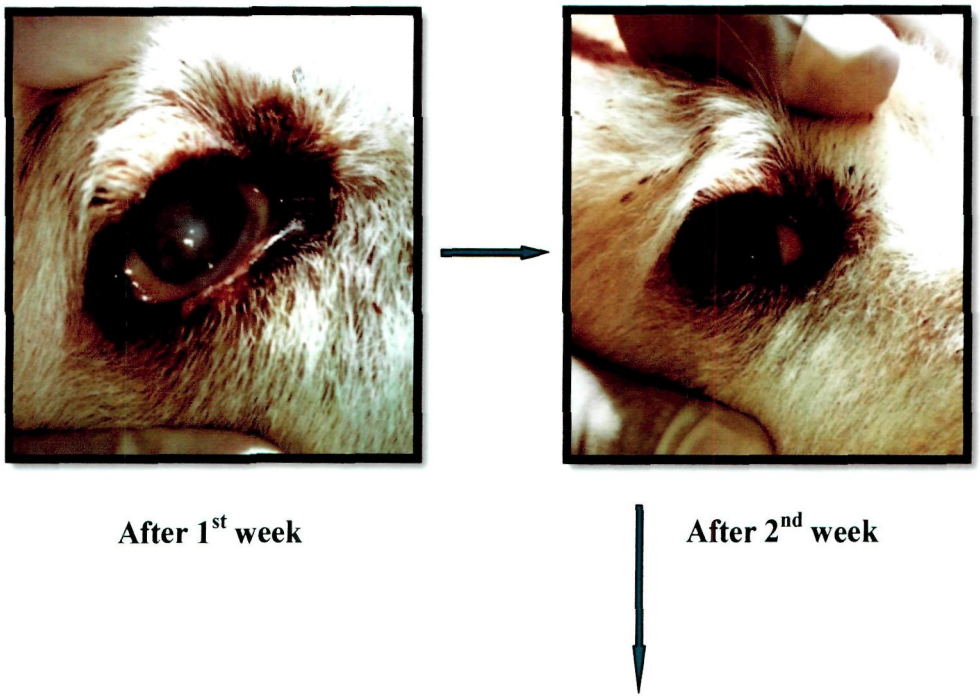


Fig.9 (b) – Suture breakage

10. POSTOPERATIVE FOLLOW UP IMAGES OF OPERATED CASES

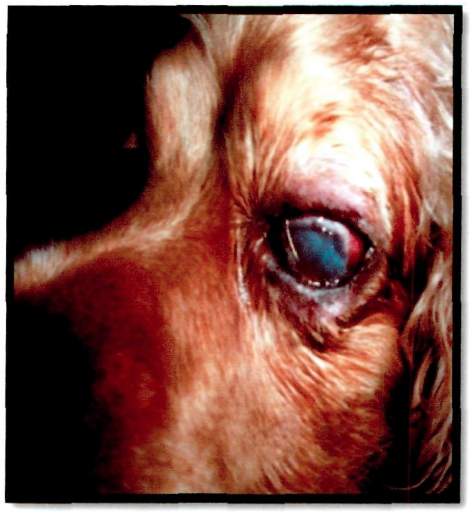


After 1st week

After 2nd week

After 4th week

Fig.10 (a) – Postoperative follow up images of operated case at 1st, 2nd and 4th week



After 1st week

After 4th week

Fig.10 – Postoperative follow up images of operated case at 1st and 4th week

DISCUSSION

DISCUSSION

In the present study German shepherd dogs had higher incidence of cataract (33.33 %) followed by Pomeranian (25.00 %), Cocker spaniel (16.67 %), Mongrel (16.67 %) and Spitz (08.33 %). Cook (2008) reported the commonly affected breeds of dog that include the American cocker spaniel, Poodle, Boston terrier, Miniature schnauzer, Bichon frise, and Labrador retriever. Whitley (1988) had also opinioned the higher susceptibility of Cocker spaniel, German shepherd, Poodle, Schnauzer, Labrador, Lhasa apso and Dalmatian breeds of dog to cataract. Therefore, it is advised that the breeding of dogs with a history of cataract should be avoided to check the transmission of these defective genes into the next generation. Adkins and Hendrix (2005) founded that the incidence of cataract was significantly higher in six pure breeds including the Cocker spaniel, Miniature schnauzer, Toy poodle, Boston terrier, Miniature poodle, and Bichon frise as compared with mixed-breed dogs.

In the present study the causative agents of the cataract were primarily senile and congenital in origin but some other unknown causes were also reported. Patil *et al.* (2014) reported some common etiologies of cataract and categorised 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.) and electricity (electric shock during bites on wires). Magrane (1969) stated that true senile cataract with loss of vision was not a common finding in canine population. Barnett (1986) studied the mode of inheritance of cataract in German shepherd dogs, and proved an autosomal recessive

gene as a causative factor. Basher and Roberts (1995) studied the cataract development in diabetic dogs and warned about the importance of recognition and maintenance of lens-induced uveitis in presurgical preparation of diabetic dogs.

In the present study the average age of the affected dogs was observed as 6.64 years. Williams *et al.* (2004) reported that old age dogs had higher prevalence of cataract and after 13.5 years of age all dogs had some degree of lens opacity.

Unilateral cataract was observed only in 3 cases out of 12 (25 %), while rest of the 9 cases (75 %) had bilateral involvement of the eyes. This finding might indicate that cataract could generally be a bilateral condition but the number of dogs in the present material was too small to allow any conclusions to be drawn. Barnett (1980) had recorded hereditary cataracts in different breeds with bilateral involvement. Hence bilateral cataracts could be related to hereditary predisposition.

Complete vision loss in the affected eye was seen only in the 12 eyes of mature cataract and 3 eyes of hypermature cataract, while the dogs with 6 eyes of immature cataract had satisfactory vision. Dogs with immature cataract had poor night vision and decreased vision in dim light. Such dogs showed difficulty in adjusting in new surroundings but were able to recognise larger objects like a human figure or table etc. Magrane (1969) had indicated that, dogs retain good ambulatory vision even after considerable opacification of the lens. Thus, the dogs which had lack of ambulatory vision were considered for the cataract surgery, while those who had partial vision were monitored till the complete impairment of the vision.

In the present study the ultrasonographic examinations of 21 eyes showed hyperechogenicity of lens because of cataract. Van der Woerdt and Davidson (1993) mentioned that ultrasonographic examination could detect abnormalities of the posterior segment when opacity of the anterior segment precludes complete ophthalmologic examination. They suggested this quick and easy procedure for screening dogs for retinal detachment prior to cataract surgery.

Evaluation of extracapsular lens extraction method

Heart rate, respiration rate and rectal temperature were not recorded in any of the cases on the day of surgery or after the surgery as previous studies had shown there is no significant difference in any of the parameters.

Brisk pupillary light reflex was found as a reliable indicator of intact retinal function and optic nerve in pre-surgical evaluation in cataract cases but the dogs which have lost pupillary light reflex had also regained the vision after surgery. Startup (1967) stated that it was essential that the pupillary response to the light should be prompt and absence or weak reflex could be considered as possible degenerative retinal change; further he stated that cases with early retinal degenerative changes showed prompt pupillary light reflex too. Whitely *et al.* (1993) mentioned that pupillary light reflex alone would be an insensitive indicator of retinal function and electro-retinography should be performed in each case while selecting it for cataract surgery.

Satisfactory pupillary dilatation was observed in cases in which tropicamide eye drops were applied twice daily for three days prior to surgery. Only in left eye of case No. 02 and right eye of case No. 04 pupillary constriction was observed after the stab incision at the

limbus. Startup (1967), Spreull (1980), Devarredy *et al.* (1998) and Shafiuzama *et al.* (1998) had recommended application of Tropicamide 1% eye drop twice or thrice daily for three days prior to surgery for better pupillary dilatation. Unsatisfactory pupillary dilatation in three cases could be due to carelessness in following the preoperative schedule of tropicamide by the handlers. Therefore, owner should always be taken into confidence through open discussion about the chances of complications as well as following the pre and postoperative medicine schedule. Magrane (1969) stated that pupils that failed to dilate prior to surgery had increased incidence of complications and failure due to adhesions.

In the present study, a combination of xylazine and ketamine was found excellent for performing the cataract surgery. Recovery from the anesthesia in all the cases was smooth and it was well tolerated by all the age groups. Cost wise, this anaesthetic combination appeared cheaper than the other available anesthetic preparations. Gelatt (1991) advised the administration of muscle relaxant for the fixation of globe in cataract surgery. Knite (1962) used the combination of chlorpromazine hydrochloride, thiopentone sodium and nitrous oxide, while combination of trifluprомazine hydrochloride and thiopentone sodium was used by Shaffiuzama *et al.* (1999).

Retrobulbar nerve block using 2 % lignocaine hydrochloride found extremely suitable for fixation of eye ball movement and resulted in protrusion of the eyeball, which allowed comfortable surgery. Otherwise, it was difficult to access the eyeball in anaesthetised dogs as it sank inside the orbital cavity due to the contraction of retractor bulbi muscle. Ormrod (1962) injected air instead of lignocaine hydrochloride in order to maintain the protrusion and central position of the eyeball and Spreull (1980) used 1% procaine hydrochloride for the retrobulbar block. The

advantage of using lignocaine was to produce postoperative analgesia for some time. Williams *et al.* (1996) stated that fixation of eye ball can be done with stay sutures, clamps or retrobulbar anaesthesia. He suggested that retrobulbar anaesthesia should be preferred over other two methods because it provide better fixation of eye ball.

The inbuilt light source of operating microscope was used for the illumination during all the surgeries because the routine shadow less light did not provide sufficient illumination. Startup (1967) stated that, the illumination was highly important during the cataract surgery. He stressed the focal light source should be used in dark room. Williams *et al.* (1996) opined that good visualisation of operating field with loup or operating microscope is necessary in a cataract surgery. Light coloured or white drapes made visualisation of the 8/0 absorbable vicryl suture material easier. This suture material being blue in color was easily seen against the white colored drape. In all the cases, after induction of anaesthesia, eyelids drooped and the nictitating membrane protruded out and covered half of the cornea during the surgery. A self-retaining adjustable speculum successfully held the third eyelid and the eyelids apart and provided easy access to the surgical field.

Incision from 10 O'clock to 2 O'clock on dorsal circumference through anterior clear cornea was observed as a good incision site. Iris prolapse was observed intra-operatively only in right eye of case no. 01 which was easily repositioned during the surgery. Manish Kumar *et al.* (2005) noticed the corneal edema, scarring of cornea at the site of incision in corneal incision technique.

Healing of the incision was uneventful in all the cases except in right eye of case no. 01. In this case dog broke the corneal suture by self

mutilation and complete corneal opacity was observed in 7 days and hindered the vision.

Trypan blue dye was used to stain the anterior capsule of lens before anterior capsulotomy. This dye stained the anterior capsule in blue colour and made it easier to visualise blue anterior capsule against the white coloured cataract. No side effect of trypan blue dye was observed after cataract surgery. Gelatt (1981) had mentioned about the difficulty in visualisation of the transparent anterior capsule during anterior capsulotomy. Chung *et al.* (2005) had used trypan blue 1% safely for assisting visualisation of the anterior capsule during phaco-emulsification of mature cataract.

Viscoelastic material was good in maintaining the anterior chamber space during intraocular manipulations and protected non-regenerative corneal endothelium by coating it. Whitley (1988) had mentioned the use of this material to protect the corneal endothelium during the intraocular surgery.

Anterior capsulotomy was successfully performed in all the cases except in left eye of case no. 02; it was slightly difficult to tear a circular piece of the tough anterior capsule. In all the cases, anterior capsule was removed by 24G cystotome needle and Utrata forceps. Bernays and Peiffer (2000) indicated that thickness of the anterior lens capsule in dog increases with age.

The delivery of the lens nucleus was smooth in all cases, but some amount of cortical material remained in the anterior chamber, which was removed successfully with the irrigation-aspiration cannula. Ameerjan (2005) advised to remove cataractous lens with the help of vectis. Normal saline solution was used as the irrigation fluid without any

damage to the corneal endothelium. Spreull (1980) used Ringer's lactate and normal saline solution and Whitley *et al.* (1993) used balanced salt solution and Ringer's lactate solution for irrigation of anterior chamber.

It was observed that iris constricted slightly after entering the anterior chamber, which constricted more during the anterior capsulotomy. The incision site was sutured with the 8/0 vicryl suture material that was easy even without any magnification. But a good magnification aid helped in reducing the time of the surgery. Ameerjan (2005) recommended that closure of anterior chamber can be done with absorbable suture material polyglactin 910 and polyglycolic acid or non-absorbable suture like nylon and prolene 10/0.

In case no. 01 and case no. 02 the tarsorrhaphy suture was removed on the first day after surgery but in all other cases the tarsorrhaphy suture was removed on 7^{th} day after surgery. On the first day after surgery blood tinged mucoid ocular discharge was present in right eye of case no. 02. Generalised corneal haze was observed in case no. 01, which cleared out within 15 days. The cases in which the tarsorrhaphy suture was removed on 7^{th} day after surgery, no such blood tinged mucoid ocular discharge was present.

In 6 out of 9 operated eye anterior chamber was completely clear without any signs of anterior uveitis or fibropupillary membrane. Knite (1962) and Taylor (1995) stated that, canine eye have highly resistance power against the infections.

Postoperative complications such as posterior capsular opacity, glaucoma, suture breakage, corneal edema and iris prolapse were observed in some cases after extracapsular cataract surgery. Whitley *et al.* (1993) stated that, posterior capsular opacities might be present

during the surgery or can develop after the surgery due to transformation of lens epithelial cells into myofibroblasts and caused opacification of the posterior capsule. Davidson *et al.* (2000) had suggested 100% removal of residual lens epithelium to prevent posterior capsular opacities. Collinson and Peiffer (2002) reported that failures of manual extracapsular surgical procedures were more commonly associated with postoperative synechia and glaucoma, compared with failures of phacoemulsification, which, were more commonly associated with infection and haematogenous retinal detachments. Jhala *et al.* (2009) reported the postoperative complications such as corneal opacity, corneal edema, posterior capsular opacity and uveitis. Joy *et al.* (2011) also reported corneal edema, suture line opacity suture dehiscence and subsequent iris prolapse was usually met in dogs with poor owner compliance.

Return of vision was not observed in most of the case at the end of first week but in case no. 03 and case no. 11 owners reported improvement in the activities of dogs. Four weeks after surgery, return of ambulatory vision was observed in 5 (6 eyes) out of 7 operated cases (9 eyes). Startup (1967) had mentioned that a variable period of adjustment of vision was required following the cataract surgery. Spreull *et al.* (1980), Whitley *et al.* (1993), Devareddy *et al.* (1998) advised postoperative examination of the patient at three weeks, six weeks and at six month intervals.

Good surgical result was observed in 44.44 % operated eyes (4 out of 9 eyes), Fair result was seen in 22.22 % operated eyes (2 out of 9 eyes) and failure was noted in 33.33 % (3 out of 9 eyes). Startup (1967) showed good result in 22% cases, Fair result in 28% cases a failure in 50% cases in an analysis of intracapsular surgeries performed over 1 year. Spruell (1980) got satisfactory outcome in 75% of the cases

operated by extracapsular cataract extraction method. However, Whitley *et al.* (1993) records 90% success rate and states that extracapsular lens extraction method would be a more successful procedure for cataract surgery for veterinarians with less experience of microsurgery with lack of advanced instruments and owners with less spending willingness for their cataractous dogs.

SUMMARY

SUMMARY

Cataracts are the leading causes of visual impairment in dogs, and are mostly due to advanced age, trauma, retinal diseases, and inherited genetic defects. Sometimes cataracts in dogs are associated with diabetes mellitus. Depending on the cause, cataracts may or may not progress to total blindness. Dogs with immature cataract retain considerable vision and hence should be operated only when the cataract is advanced and is causing visual deficit. The only treatment currently available for cataracts that impair vision is surgical removal of the affected lens. Without a lens, dog may not have completely normal vision after surgery, but they do regain some vision.

In the present study, extracapsular cataract surgery using operating microscope was conducted in 9 eyes from 7 dogs out of 12 clinical cases of cataract in dogs presented to the Department of Veterinary Surgery and Radiology, Bikaner with the history of vision abnormalities. These dogs were followed up to four weeks after the surgery.

Out of 12 dogs presented with cataract 8 dogs were from the age group of 6-13 years, 2 dogs were between 2-5 years of age and 2 dogs were between 2-5 months of age. The average age of the affected dogs was observed as 6.64 years indicating that dogs above 6 years of age are more prone to development of cataract. The German shepherd dogs had higher incidence of cataract followed by Pomeranian as compared to the other breeds (Cocker spaniel, Mongrel and Spitz) of the dogs. In the present study the incidence of cataract was more in the female than in the male dogs.

Bilateral cataract was observed in 9 cases and unilateral was in 3 cases out of 12 cases of cataract in the dogs. Complete vision loss in the

affected eye was seen only in 12 eyes due to mature cataract and in 3 eyes due to hypermature cataract, while the 6 eyes with immature cataract had satisfactory vision. In two cases of dog, their left eye was already lost when they were presented at the clinics. One dog was presented with severe glaucomatous condition in both eyes with rise in the intraocular pressure due to long term exposure of cataract.

Operating microscope provided the good exposure and visualisation of eyeball during operation. Retrobulbar nerve block using 2 % lignocaine hydrochloride found extremely suitable for fixation of eye ball movement before operation. Corneal incision when given at 2 O'clock position; its extension from 1 to 3 O'clock position were adequate to extract the anterior capsule by 24G hypodermic double bended needle and was also satisfactory to remove the nuclear material and cortex of lens. Injection of trypan blue dye helped in visualising the transparent anterior capsule while performing anterior capsulotomy. Viscoelastic material maintained the anterior chamber space and protected corneal endothelium during the intraocular manipulations.

Perioperative complications such as miosis in two cases, haemorrhage in one case and iris prolapse in one case were observed while post-operative complications such as posterior capsular opacity in three cases and glaucoma in one case were observed. At the end of four weeks, success rate of 66.67 % in terms of return of ambulatory vision was achieved. Owners of these dogs reported increased activity by the patient and founded that dog did not collide with the objects or walls.

Manual extracapsular cataract extraction (MECCE) under general anaesthesia along with retrobulbar nerve block found effective and easy to

operate cataract. Hence, it could be stated that extracapsular cataract extraction would be a successful method for the treatment of cataract in dogs, provided that owners commit for postoperative follow up, care and management.

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ABSTRACT

(English and Hindi)

Evaluation of Extracapsular Cataract Surgery in Canines

M.V.Sc. Thesis

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ABSTRACT

Cataracts are the most frequent causes of blindness in dogs which are characterized by a focal or diffused opacity of lens or lens capsule. Treatment of cataract in dogs can be either medical or surgical. Surgical removal of cataracts is the treatment of choice when restoration of vision is desired. Extracapsular extraction of lens is still the most widely used and recommended technique used for cataract removal in dogs. In the present study a total of 12 clinical cases of cataract in dogs were studied for evaluation of Extracapsular cataract extraction (ECCE) method, using operative microscope. Detailed ophthalmic examinations of all the clinical cases were carried out by the assessment of vision (Menace test), reflex test (Pupillary light reflex test and Corneal reflex test) and ultrasonographical examinations. In the present study German shepherd dogs had higher incidence of cataract (33.33 %) followed by Pomeranian

(25.00 %), Cocker spaniel (16.67 %), Mongrel (16.67 %) and Spitz (08.33 %).The highest incidence of cataract were from the age group of between 6-13 years (66.67 %). In the present study 7 dogs (9 eyes) out of 12 clinical cases were surgically treated for cataract by extracapsular lens extraction method. The return of ambulatory vision was observed in 6 eyes out of 9 operated eyes and good surgical result was observed in 4 operated eyes (44.44 %), Fair result was seen in 2 operated eyes (22.22 %) and failure of vision was noted in 3 operated eyes (33.33 %). Incision from 10 O'clock to 2 O'clock on dorsal circumference through anterior clear corneal was observed as good as a good incision site. In the present study peri-operative complications were haemorrhage, miosis and iris prolapse and post-operative complications were posterior capsule opacity, suture breakage and glaucoma. The study concluded that Extracapsular cataract extraction under general anaesthesia along with retrobulbar nerve block found effective and easy to operate cataract.

श्वानों में मोतियाबिन्द की बाह्य खोल निष्कर्षण शल्य चिकित्सा का मूल्यांकन

स्नातकोतर शोधग्रन्थ

पशु शल्य चिकित्सा एवं विकिरण विभाग,

पशु चिकित्सा एवं पशु विज्ञान महाविध्यालय,

राजस्थान पशु चिकित्सा एवं पशु विज्ञान विश्वविध्यालय,

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अग्रेषक: मुन्ना लाल

मुख्य उपदेष्टा: डॉ. एस. के. झीरवाल

अनुक्षेपण

मोतियाबिन्द श्वानों में अन्धेपन के मुख्य कारणों में से एक है जो कि लेंस या लेंस कैप्सूल को केन्द्रीय या विसरित रूप से अपारदर्शित बनाता है। श्वानों में मोतियाबिन्द का उपचार चिकित्सा या शल्य चिकित्सा के द्वारा किया जा सकता है। द्रष्टि को वापस प्राप्त करने के लिए मोतियाबिन्द को शल्य चिकित्सा के द्वारा हटाना ही वांछित उपचार है। लेंस का बाह्य खोल (एक्स्ट्रा कैप्सूलर) निष्कर्षण अभी भी स्वानों मे मोतियाबिन्द के उपचार के लिए सबसे व्यापक रूप से उपयोग होने वाली और सिफारिश की गयी तकनीक है। वर्तमान अध्ययन में श्वानों में मोतियाबिन्द के कुल 12 नैदानिक मामलों का अध्ययन ऑपरेटिव माइक्रोस्कोप के उपयोग द्वारा बाह्य खोल मोतियाबिन्द निष्कर्षण विधि के मूल्यांकन के लिए किया गया। सभी नैदानिक मामलों का विस्तृत रूप से नेत्र परीक्षण, द्रष्टि मूल्यांकन (मेनस परीक्षण), परिवर्ती परीक्षण (प्यूपिलरी प्रकाश परिवर्ती परीक्षण एवं कोर्नियल परिवर्ती परीक्षण) और अल्ट्रासोनोग्राफी परीक्षण किया गया। वर्तमान

अध्ययन में सबसे अधिक मोतियाबिन्द जर्मन शेफर्ड श्वानों में (33.33%) पाया गया, पोमेरेनियन में (25.00%), कोकर स्पेनियल में (16.67%), मोंग्रेल में (16.67%) और स्पिट्ज में (08.33%) पाया गया। मोतियाबिन्द के सबसे अधिक मामले 6-13 वर्ष की (66.67%) आयु वर्ग के श्वानों में पाया गया। वर्तमान अध्ययन में कुल 12 नैदानिक में से 7 श्वानों (9 आंखें) का मोतियाबिन्द की बाह्य खोल मोतियाबिन्द निष्कर्षण की विधि से उपचार किया गया। कुल 9 उपचारित आंखों में से 6 आंखों में द्रष्टि की पुनः वापसी पाई गयी, जिनमें से 4 आंखों में अच्छा शल्य चिकित्सीय परिणाम मिला एवं 2 उपचारित आंखों में संतुष्टिपूर्ण परिणाम मिला और 3 उपचारित आंखों में द्रष्टि की पुनः वापसी असफल रही। कॉर्निया की पृष्ठीय परिधि पर 10 बजे की स्थिति से लेकर 2 बजे की स्थिति तक लगाया गया चीरा एक अच्छी चीरे की जगह के रूप में प्रभावी पाया गया। वर्तमान अध्ययन में उपचार के दौरान रक्तस्त्राव, पुतली का सिकुड़ना एवं आइरिस का प्रोलेप्स आदि प्रमुख जटिलताएं गयीं और उपचार के बाद अंदरूनी खोल का अपारदर्शित होना, टांकों का टूटना और ग्लूकोमा आदि प्रमुख जटिलताएं पायीं गयीं। इस अध्ययन से यह निष्कर्ष निकला कि पश्चनेत्र गोलकीय तंत्रिका ब्लॉक और जनरल एनेस्थीसिया के साथ मोतियाबिन्द की बाह्य खोल मोतियाबिन्द निष्कर्षण विधि प्रभावी और आसान पाई गयी।