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Clinical Article

MANUAL SMALL INCISION CATARACT SURGERY IN DOGS: A STUDY OF THREE CASES

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SUMMARY

Three dogs of non-descript breed with mature bilateral cataract brought during an ophthalmic camp for cataract surgery were operated by manual small incision cataract surgery (MSICS) technique under general anaesthesia. All the dogs were injected with a combination of xylazine @ 1 mg/kg and ketamine hydrochloride @ 5 mg/kg body weight after 15 minutes of premedication with atropine sulphate @ 0.02-0.04 by intramuscular route, thereafter maintained with inhalation anaesthesia using 1-2% Isoflurane. Retrobulbar injection of 2% lignocaine HCl was used to fix the globe. The dogs were positioned in lateral recumbency keeping eye to be operated upward. A continuous curvilinear capsulorhexis was done using a capsulorhexis needle entered through side port entry made at the 9 O'clock position using a 15-degree lancet tip blade. A sclera-corneal tunnel was made starting about 1-2 mm posterior to limbus using a crescent knife. The nucleus was prolapsed into anterior chamber using a Sinskey hook along with hydrodissection and extracted out of the eye through sclera-corneal tunnel with the help of a vectis. Cortical cleansing was done with the help of a Simcoe cannula. The side port was sealed by stromal hydration. Subconjunctival injection of a combination of Gentamicin and Dexamethasone 0.5 ml each was given and temporary tarsorrhaphy sutures were placed in all the dogs, post operatively. The tarsorrhaphy sutures were removed next day and systemic antibiotics anti-inflammatory course for 3 days. Antibiotic and anti-inflammatory eye drops were prescribed for 7 days. All the dogs under study got ambulatory aphakic vision.

Keywords: Aphakic vision, Cataract, Dogs, ECCE, Eye, MSICS

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Although not with a pace as that of human ophthalmology, the veterinary ophthalmology is marching ahead with an appreciable speed. The pet owners are approaching to vets for treatment of diverse ophthalmological affections of their pets. Cataract is one of the major causes of treatable blindness in dogs. The major etiologies for cataract in dogs may include congenital anomaly, genetic mutations, diabetes mellitus, uveitis, trauma, toxins, and dietary deficiency (Davidson and Nelms, 2007). The only treatment possible for cataract is surgical extraction of cataractous lens and phacoemulsification with intraocular lens implantation is the standard technique (Jhirwal *et al.*, 2020). However, this technique requires a steep learning curve and is expensive in terms of instrumentation used. Therefore, another cost effective technique known as manual small incision cataract surgery, commonly being used in human being as an alternative to phacoemulsification is also being practiced in veterinary ophthalmology.

Manual Small Incision Cataract Surgery (MSICS) is a form of extracapsular cataract extraction (ECCE) with advantages of speed, ease of surgery, low cost and low dependence on machines. It is an effective alternative to phacoemulsification that is widely accepted and practiced in the developing world (Singh *et al.*, 2017).

History of vision changes, age, any injury, use of recent medications and presence of diabetes was obtained from the dog owners. All the cases were evaluated for vision abnormality by gross and ophthalmic examinations. Gross examination included periocular injury/lesion, clarity of cornea, conjunctival appearance and vascularity and ocular discharge, if any. Ophthalmic examination included Schirmer'stear test (STT), pupillarylight reflex test, fluorescein dye test (FDT) and direct and indirect ophthalmoscopy.

Preoperative procedure: Owners were advised to instill antibiotic eye drop Moxifloxacin (5 mg/ml) @ two drops b.i.d. for 7 days and eye drop tropicamide 1%@ two drops b.i.d. for 2 days before the cataract surgery for proper sterilization of cornea and for proper dilation of pupil, respectively. Flubriprofen eye drops t.i.d. was started on the day before surgery. Further, tropicamide (1%) was used as mydriatic agent and was instilled 30 minutes before operation at the rate of two drops every 5 minutes in the eye to be operated. Povidone iodine drops (0.5%) were instilled on cornea prior to surgery.

Anaesthesia: After considering all preoperative preparations, the dogs were premedicated with inj. atropine sulphate @ 0.04 mg/kg along with a combination of xylazine @ 1 mg/kg body weight and inj. Ketamine @ 5 mg/kg body weight for induction of general anaesthesia intramuscularly which was maintained with inhalation anaesthesia using 1-2% Isoflurane. Retrobulbar nerve block was achieved by the palpation of ventral orbital rim and depositing 3 ml of 2% lignocaine behind the globe at

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Table 1

Showing details of clinical examination

Case No.	Breed	Age	Sex	Ocular Affection Diagnosed	Unilateral/ Bilateral	Vision Loss	PLR	Visual Axis	Fundus	Etiology
01.	ND	12 yrs	M	Mature Cataract	Bilateral	Chronic	Normal	Obscured	Not visible	Senile
02.	ND	7 yrs	F	Mature Cataract	Bilateral	Chronic	Normal	Obscured	Not visible	Unknown
03	ND	10 yrs	F	Mature Cataract	Bilateral	Chronic	Normal	Obscured	Not visible	Senile

*ND-Non Descript

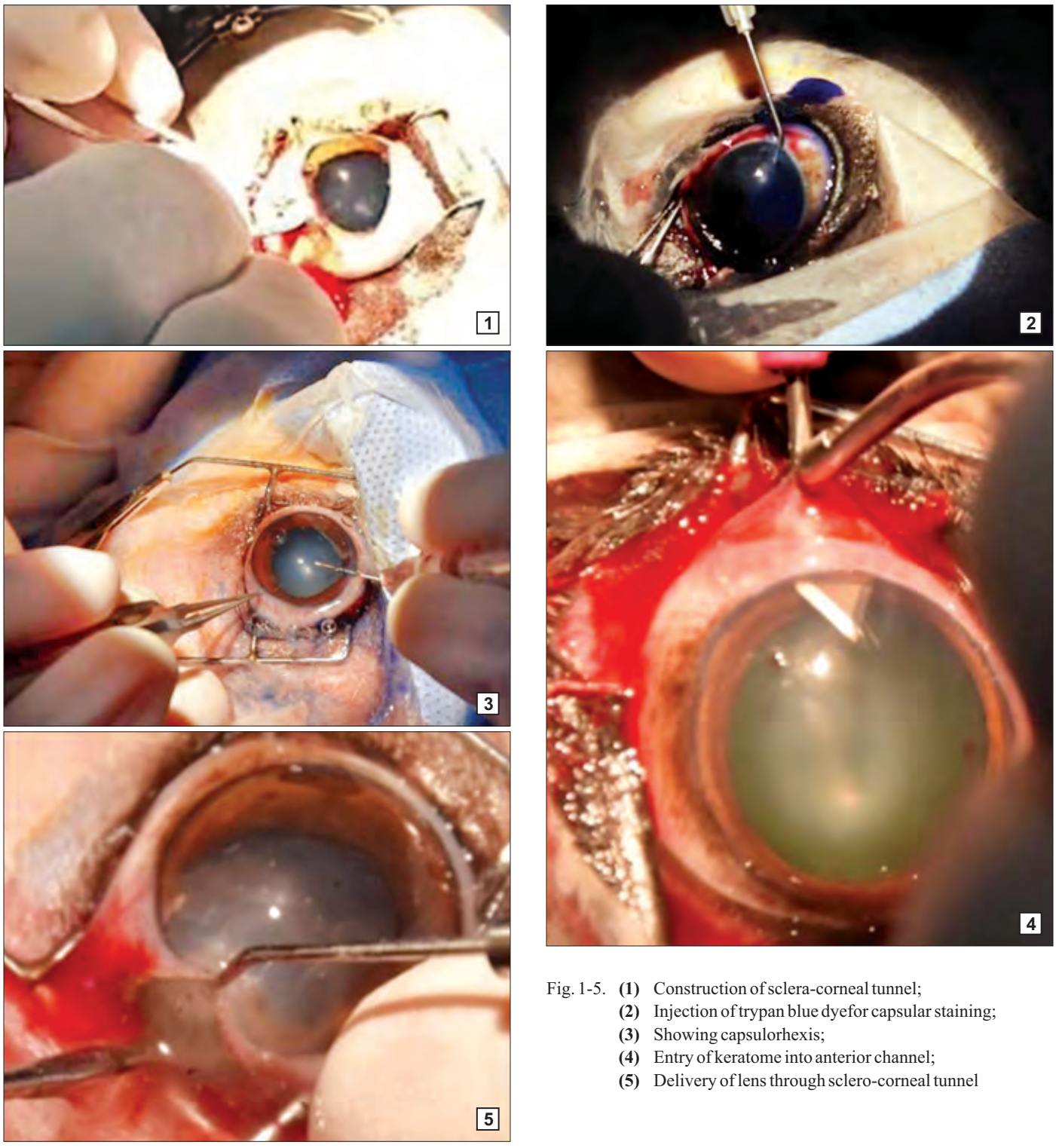

Fig. 1-5. **(1)** Construction of sclera-corneal tunnel;
(2) Injection of trypan blue dyefor capsular staining;
(3) Showing capsulorhexis;
(4) Entry of keratome into anterior channel;
(5) Delivery of lens through sclero-corneal tunnel

orbital stalk.

Operative procedure: After aseptic preparation of site the dogs were taken in lateral recumbency on the operation table keeping operating eye upward and positioning under the operating microscope. Frown shaped incision about 2 mm from the limbus was made using anangled 2.8 mm bevel-up crescent blade (Fig. 1). The depth of the incision was about half the thickness of the sclera. The desired depth of tunnel was assured by the blade being just seen through the overlying sclera. The tunnel was extended forwards as well as sideways maintaining a uniform depth. Once this horizontal step was created, it was extended forwards by swiveling the blade to and fro while holding the globe firmly taking care not to hold the tunnel lip to avoid distortion of the tunnel.

The tunnel was enlarged sideways to create pockets on either side that were broader than the external incision. The tunnel was then extended forwards uniformly in the cornea to up to about 1.5-2 mm keeping the crescent dissector angled upwards at the limbus to avoid a premature entry into the anterior chamber. The total length of the tunnel from the external scleral incision to the internal corneal incision was therefore about 3.5-4 mm. Before entering into the anterior chamber a side port entry was made using a 150 lancet tip blade and trypan blue dye was injected through it to stain the lens capsule (Fig. 2). After about 1 minute the trypan blue dye was washed out using Ringer's lactate solution. A large continuous curvilinear capsulorhexis was performed for easier prolapse of the lens (Fig. 3). Now, the keratome was used to extend the tunnel into the anterior chamber and the incision was extended on both sides creating an internal incision parallel to the limbus (Fig. 4). The nucleus was prolapsed into the anterior chamber with the help of hydrodissection by injecting Ringer's lactate solution. The lens vectis was introduced through the tunnel and placed beneath the lens to deliver the lensout from the anterior chamber (Fig. 5). Two ways Simcoe cannula was used for cortical clean up. The side port was closed by stromal hydration by injection Ringer's lactate solution into the corners of the incision. The scleral wound was closed by a single mattress suture using 10-0 polyglactin 910 suture material. The surrounding conjunctiva was pulled over the scleral wound and kept in position by hydrating it. Finally, temporary tarsorrhaphy of the operated eye was done using polyamide 2-0 suture material and sterile eye dress was applied.

Post-operative care and medication: Inj. gentamicin and dexamethasone @ 0.5 ml + 0.5 ml each sub-conjunctival immediately post-operative was carried out. Post-operatively, sterile adhesive eye dress was applied for one day. Elizabethan collar was advised for 24 hours during the first three weeks. Temporary tarsorrhaphy sutures were removed on the next day of surgery. Instillation of moxifloxacin eye drops @ 2 drop q.i.d. for 1st week, t.i.d. for 2nd week, b.i.d. for next 15 days, flurbiprofen eye drops @ q.i.d. for first week, b.i.d. for next 7 days and atropine eye drops @ t.i.d. for first three days and then b.i.d. for next 4 days was prescribed. Besides these, injection ceftriaxone and tazobactum@ 25 mg/kg b.w. and meloxicam @ 0.3 mg/kg b.w. for 3 days were administered intramuscularly.

On the basis of history and clinical examination chronic bilateral mature cataract was diagnosed in all the dogs and MSICS was planned for surgical extraction of cataractous lens. All the dogs (2 female and 1 male) were of non-descript bred and aged between 7 to 12 years with chronic loss of vision. Similarly, Nair and Vasanth (2007) and Park *et al.* (2009) have also reported higher incidence in females than males. All the dogs were having a clear cornea with no abnormal ocular discharge. The value of STT were within normal range and FDT was negative in all the three dogs. The PLR was present and visual axis was obscured in all the dogs. After ophthalmological examination cataract was assigned as senile in two dogs and one as unknown for etiology (Table 1). However, various causes of cataract have been described such as congenital cataract, senile cataract, cataracts secondary to diabetes and dietary deficiencies, traumatic and toxic substances (Davidson and Nelms, 2007). The preoperative regimens used helped to decrease the intraoperative and postoperative intraocular inflammation, conjunctival bacterial flora, dilate the pupil, and prevent miosis during surgery (Adkins and Hendrix, 2003).

In present study inj. Atropine sulphate, inj. Xylazine and inj. ketamine were used intramuscularly for induction of general anaesthesia which was maintained with inhalation anaesthesia using 1-2% Isoflurane. MSICS was successfully performed with this anesthetic regimen without any anesthetic complication. No literature regarding use of similar protocol for MSICS has been found in peer reviewed literature for dogs. However, similar anaesthetic regimen has been advocated by Guimaraes *et al.* (2017) for phacoemulsification with intraocular acrylic lens implantation in dogs. Retrobulbar nerve block resulted in protrusion of eyeball and prevention of eyeball movement during phaco-surgery. Sclero-corneal tunnel created using crescent knife was sufficient to deliver cataractous lens through it in present study and has been practiced effectively in human

ophthalmology. Mistry (2010) also created similar sclera-corneal tunnel for delivering cataractous lens in dogs. MSICS is a safe surgery, however, the surgeon has to expertise the tunnel construction as an excellent self-sealing incision is vital for wound architecture and to avoid postoperative complications (Gogate, 2010, Singh *et al.*, 2017). Aphakic vision was observed in all three cases on next postoperative day after removal of tarsorrhaphy sutures. However, complete corneal clarity and scleral wound healing was seen on about day 28th postoperative. No other complication was recorded.

To the authors' knowledge, in respect with veterinary ophthalmology, Manual Small Incision Cataract Surgery (MSICS) has only a few publications described in the peer-reviewed literature until the work reported herein. As compared with phacoemulsification which is being practiced at our end since 2015, MSICS has been found easy to expertise, time saving, less complicated and least instrumentation required surgery. In time to come MSICS can be established as a poor man's phaco in field conditions for surgical extraction of cataractous lens in animals.

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