SUB-TENON'S BLOCK ANAESTHESIA FOR OCULAR SURGERIES IN DOGS

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General anaesthesia at surgical plane causes ventromedial deviation of eyeball in dogs, however, central fixation of globe is crucial for better exposure of cornea for performing corneal and intraocular surgeries. Seventeen dogs which had undergone cataract surgeries at Ophthalmology unit, Department of Veterinary Surgery and Radiology, Madras Veterinary College, Chennai were included in present study. Sub-Tenon's block (STB) was performed at the dorso-lateral quadrant of the globe at 5 mm away from the limbus following general anaesthesia of these patients. Two ml of 2% lignocaine was infused into the sub-Tenon's space and gentle digital compression was applied over the eyeball for a minute. Akinesia, mydriasis and central positioning of cornea were achieved within 10 minutes of administration of local anaesthetic in to the Sub-Tenon's space. Post-operatively, these patients had a smooth recovery without any discomfort. In conclusion, the dorsolateral quadrant Sub-tenon's block could produce good centration of cornea, mydriasis, post-operative analgesia for intraocular surgeries in dogs. However, use of long acting local anaesthetics would provide a better post-operative analgesia which is essential in veterinary practice.
Key words: Anaesthesia, Cataract, Dog, Eye, Sub-tenon block.

General anaesthesia is essential for canine ocular surgeries, but it causes ventromedial deviation of eyeball (Fig. 1). Central fixation of globe to get better exposure of cornea is essential to perform ocular surgeries in dogs. To achieve central fixation of cornea, neuromuscular blocking agents are used in veterinary practice. After administration of neuro-muscular blocking agents, the patient requires adequate mechanical or assisted ventilation and should be monitored for apnoea and respiratory acidosis due to hypoventilation or respiratory muscle paralysis (Sullivan *et al.,* 1998). Other techniques such as retrobulbar nerve block requires sharp needles to administer the local anaesthetic, in such instance chance of haemorrhage and swelling around the globe may hinder surgery and produces post-operative discomfort to the patient (Wagatsuma *et al.,* 2014, Enache *et al.,* 2015 and Accola *et al.,* 2006). The Tenon's capsule or Vagina bulbi is a thin structure encapsulating the sclera and it is well developed in dogs (Murphy *et al.,* 2013). The episcleral space which is present between the tenon's capsule and the sclera is called as Sub-Tenon's space. Many reports stated that the Sub-Tenon's block anaesthesia produces excellent akinesia and post-operative analgesia in human patients undergoing ocular surgeries without any complications (Guise, 2003 and Bergman *et al.,* 2007) however, only few studies have been conducted in dogs (Ahn *et al.,* 2013; Bayley and Read, 2018). The objective of this study is to assess the changes and effect of sub-tenon's block anaesthesia intraoperatively and post-operatively in dogs.

Materials and Methods

The present study was conducted during April 2017 to March 2018 in Small Animal Ophthalmology unit, Department of Veterinary Surgery and Radiology, Madras Veterinary College, Vepery, Chennai. The present study comprised of seventeen dogs of various breeds and both sexes with a history of cataract and loss of visual acuity. These dogs had undergone detailed ophthalmic examination and routine haemato-biochemical evaluation. All the patients were premedicated with butorphanol (0.2 mg/kg, I/V), diazepam (0.2 mg/kg, I/V) and induction of anaesthesia was achieved by propofol (2-4 mg/kg, I/V) and maintained under isoflurane inhalant anaesthesia. Once

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the patient was in surgical plane of anaesthesia, the eye was prepared for surgery, aseptically using diluted 0.5% povidone iodine solution. Materials required for performing sub-tenon's anaesthesia were sterile eye drape, 2% lignocaine, 23 G sub-tenon's cannula, 2ml disposable syringe, a sterile 24G needle, colibri forceps and Westcott's scissors. The dorsolateral quadrant (2 clock hour position in right eye; 10 clock hour position in left eye) was selected for the Sub-Tenon block (STB).

The scleral conjunctiva was lifted using colibri forceps 5 mm away from the limbus and a small snip was made (Fig. 2), and the conjunctiva was bluntly dissected using Westcott's scissors (Fig. 3). Thereafter the exposed Tenon's capsule was held using colibri forceps and a small snip was made to visualize the sclera and a tunnel was created between the capsule and sclera only by blunt dissection using Westcott's scissors. Then, the 23G Sub-Tenon's cannula was introduced into the tunnel (Fig. 4) by gliding over the sclera. Two ml of sterile 2% lignocaine was injected slowly to avoid reflux of the local anaesthetic fluid. The cannula was removed, and gentle compression was made over the eyeball for a minute while monitoring the heart rate. Phacoemulsification or Intracapsular lens extraction was performed to remove the cataractous lens. The dogs were monitored for three hours, post-operatively.

Fig. 1. Before STB – Ventromedial deviation of eyeball during general anaesthesia

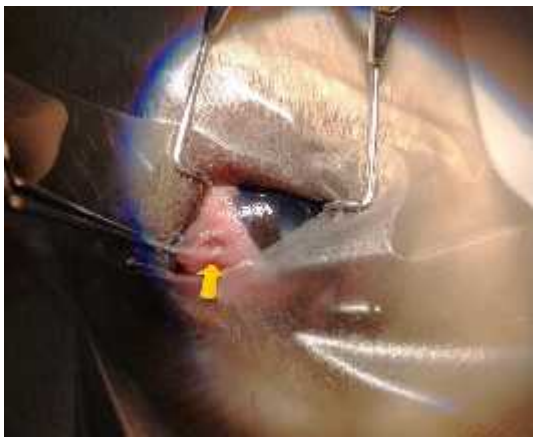

Fig. 2. A snip made 5mm away from the limbus (arrow)- Dorsolateral quadrant

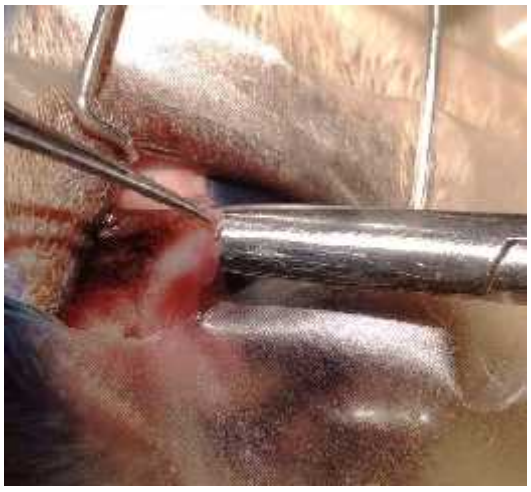

Fig. 3. Sub-Tenon's space - Blunt dissection using Westcott scissors

Fig. 4. Su-bTenon's cannula introduced in Sub-Tenon's space - 2% lignocaine being injected

The data such as time taken for centration of cornea after the block, pupil dilatation, duration of akinesia and intraocular pressure (IOP) were recorded. The IOP was evaluated

using an indentation tonometer (Schiotz tonometer). The data were subjected for statistical analysis such as mean ± Standard error (SE), range and Paired Sample T- test (confidence interval - 95%) using IBM, SPSS software version 23.

Results and Discussion

The Study comprised of various breeds of dog such as Spitz (N = 6), Labrador Retriever (N = 4), Mongrel (N=2), Beagle, Lhasa Apso, Golden Retriever, Yorkshire Terrier and Cocker Spaniel (N = one each). Out of the seventeen presented dogs, ten were female and seven were male. The age of those dogs ranged from two to twelve years.

The mean ± SE value of time taken to achieve centration of the cornea was 4.06 ± 0.56 minutes and it ranged from 1 - 10 minutes. The mean ± SE value of duration of akinesia of eye ball was 107.24 ± 4.74 minutes and it ranged from 70 – 150 minutes. The time taken for centration of the cornea and duration of akinesia were similar to the findings of Ahn *et al.* (2013).

In present study, significantly ($p < 0.05$) higher Pre-STB intraocular pressure (17.74 ± 0.28 mmHg, Range: 16 – 20.1 mmHg) recorded as compared to Post-STB intraocular pressure (16.66 ± 0.22 mmHg, Range: 15.7 – 18.4 mmHg). In other studies, no significant difference in intraocular pressure was noticed but this might be due to the use of different tonometry instruments employed; by Ahn *et al*. (2013) and Bayley and Read (2018). However, further Stamper (2011), has been reported that the Schiotz tonometry readings are affected by scleral rigidity of the patients. Dog and cat have lesser scleral rigidity as compared to human due to its elastic nature; therefore, the effect of extra-muscular tone on IOP was high as also reported by Gelatt (2011).

The mydriasis produced (Fig. 5) was sufficient to perform cataract surgery in all the dogs except in two dogs where use of intracameral adrenaline (preservative free) was needed. This poor dilatation of pupil in two dogs was observed during the beginning of the study period, as it may have contributed to the learning curve of the technique by the surgeons. Stay sutures for fixation of the eyeball were found to be not required during the surgical procedure as excellent exposure of cornea and akinesia of eyeball were achieved and manoeuvre of the eyeball was done using colibri forceps.

Fig. 5. Centration of cornea and mydriasis Fig. 6. Chemosis (arrows) – Post Sub-Tenon's block

Mild chemosis (Fig. 6) and proptosis were noticed in all the dogs, but it didn't affect the manoeuvre employed during surgical procedure. Similarly, chemosis was also observed as a complication in other studies of Sub-Tenon's anaesthesia in dogs by Ahn *et al.* (2013) and Bayley and Read, (2018). Vitreal expansion was observed in 9 out of 17 dogs in this study, which was higher when compared to a recent study of Bayley and Read (2018). Vitreous expansion caused shallow anterior chamber and difficulty

during intraocular lens implantation, but it was managed by using viscoelastic agents. The contributing factors for vitreous expansion or positive vitreous pressure during the phacoemulsification procedure were use of large volume of local anaesthetic solution for the STB block, leaky corneal incision leading to hypotony of anterior chamber or irrigation fluid escape into the posterior segment due to increased lens zonular permeability in aged dogs as also reported by Schutz and Mayrakanas (2010) and Kang *et al.* (2015). The authors of the present study had noticed vitreous expansion due to pressure exerted by eyelid speculum against the mildly proptosed globe, which had overcome by removing the eyelid speculum during IOL implantation. The small conjunctival incision made for performing the STB anaesthesia was left to heal by secondary intention healing process.

Post-operatively, all the dogs did not exhibit any discomfort or blepharospasm while examining the status of the eye, except for mild proptosis of globe and chemosis. The recovery was smooth from general anaesthesia. The Sub-Tenon's block anaesthesia was considered safe due to involvement of blunt cannula and blunt dissection to create the space as also mentioned by Bergman *et al.* (2007). The STB incision wound was found to be healed within ten days post-operatively, in all the dogs.

In conclusion, the dorsolateral quadrant Sub-Tenon's block could produce good centration of cornea, mydriasis, post-operative analgesia for intraocular surgeries in dogs.

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