

Practice Pattern of Regional Ophthalmic Anaesthesia in Cataract Surgery - A Survey among Indian Trainees

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Received: March 11, 2020; **Published:** August 29, 2020

Abstract

Purpose: The aim of this study was to survey ophthalmology trainee fellows, to assess their current knowledge, and preferred practice pattern with relation to anaesthesia in cataract surgery.

Methods: A 10-item survey questionnaire was developed by the study researchers and was circulated among newly enrolled post-graduation fellows at our institution between the period of April 2015 to May 2017.

Results: A total of 145 complete survey responses were included for analysis. 92% of the trainees preferred to perform cataract surgery under needle blocks and about 98% of respondents preferred to administer first injection at the inferotemporal quadrant. 48% of the respondents were not aware about the size of needle being used for administering inferotemporal injection. More than 90% of the responders started practicing needle blocks just by observing their seniors performing blocks.

Conclusion: The present study shows that trainees still follow the traditional outdated technique of needle block administration. The current teaching in regional ophthalmic anaesthesia needs an immediate change involving hands-on practice on simulators and animal models.

Keywords: Regional Anesthesia; Ophthalmology; Post-Graduate Fellows; Survey; Cataract Surgery

Introduction

Regional anaesthesia in cataract surgery ranges from akinetic (needle or sub-Tenon's block) [1,2] to non-akinetic (application of topical local anaesthetic drops or gel) techniques [3]. Higher incidences of both local and systemic complications have been reported to occur following needle blocks compared with sub-tenon's and topical techniques [2]. In countries like United States and United Kingdom, survey studies have been reported to capture the preferred practice methods of anaesthesia among the surgeons for performing cataract surgery. These studies reported decline in the use of retrobulbar and peribulbar injection techniques, with sub-Tenon and topical techniques gaining popularity [4,5].

In India such surveys have not been reported till date. Hence, in the present study we conducted a survey among the trainees, who were enrolled for post-graduation at our institution between the period from April 2015 to May 2017, to assess their preferred practice pattern with relation to anaesthesia in cataract surgery.

Materials and Methods

This cross-sectional survey-based study involved newly joined postgraduate ophthalmology trainee fellows. Ethics approval was granted by the institutional review board and the study followed the tenets of Declaration of Helsinki.

The self-administered, anonymous questionnaire consisted of 10 items, developed by the study researchers. The questionnaire consisted of four main sections: (1) demographics; (2) knowledge about block and needle entry site; (3) practice pattern of needle type and bevel tip used; (4) source of information used for learning regional blocks. The questions surveyed in each section are summarized in table 1.

Question number	Questions surveyed
1	Years of experience in ophthalmology field
2	Forced choice selection (peribulbar block/retrobulbar block/sub-tenon’s block/topical anaesthesia) to preferred choice of regional anaesthesia while performing cataract surgery
3	Forced choice selection (inferotemporal quadrant/superomedial quadrant/medial peribulbar region/ others) to which quadrant they prefer for primary injection
4	Forced choice selection (junction of medial 2/3 rd and lateral 1/3 rd /junction of medial 1/3 rd and lateral 2/3 rd /junction of lateral wall and floor of the orbit /at any site along the floor of the orbit) to needle entry site of inferotemporal quadrant block
5	Forced choice selection (inferotemporal quadrant/superomedial quadrant/medial peribulbar region/ others) to which quadrant do they generally prefer for second or supplementary injection
6	Forced choice selection [yes/no] towards administration of medial peribulbar block in the past
7	Forced choice selection (one-and-half-inch/one inch/half inch/do not know) to size of the needle used for administering injection at inferotemporal quadrant
8	Forced choice selection (sharp/blunt/do not know) to type of bevel-tip they commonly prefer
9	Forced choice selection [yes/no] towards administration of sub-tenon block in the past
10	Selection of an unrestricted number of responses from 5 (just observing our seniors performing block/ by practicing at any mannequin/our faculties taught us/by reading books/by attending conferences and CME) options regarding what sources do they use to guide regional block procedure

Table 1: Summary of the survey questions.

The survey was initially piloted among 25 newly joined postgraduate ophthalmology fellows, to assess the clarity of the questions and the time commitment required. Minor tweaks were made to the questionnaire based on their feedback.

The final survey questionnaire was circulated in hardcopy on the orientation day of the newly joined trainee fellows and the responses were collected before introducing them to our institutional method of regional eye block practices.

Results

A total of 145 complete survey responses were included for analysis. Respondents years of experience in ophthalmology ranged from minimum of two years to maximum of seven years. Almost 92% of the trainees preferred to perform cataract surgery under needle blocks. Although, about 98% of respondents preferred to administer first injection at the inferotemporal quadrant, still 91.72% preferred to administer the first injection at the traditional site i.e. at the junction of medial 2/3rd and lateral 1/3rd floor of the orbit.

About 93% of the respondents preferred to administer supplementary injection at the superonasal quadrant (Figure 1). However, 42% and 89% of the trainees have not performed medial peribulbar and sub-tenon’s block respectively. Around 48% of the respondents were not aware about the size of needle being used for administering inferotemporal injection. Similarly, 62% of the responders were not aware about the type of bevel-tip used for injection. More than 90% of the responders started practicing needle blocks just by observing their seniors performing blocks and few practiced by learning from their faculties (27.6%).

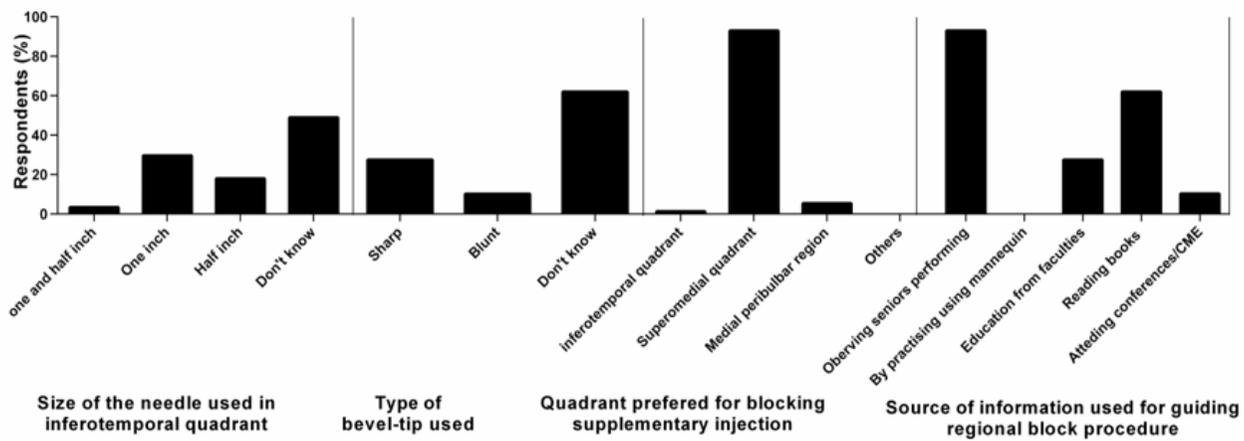


Figure 1: Percentage of response for questions; size of needle used in the inferotemporal quadrant, type of bevel tip used, quadrant preferred for supplementary injection and source of information used for learning regional block procedure.

Discussion

The survey studies among ophthalmology trainees were reported from UK [6], USA [7,8], Canada [9], Nigeria [10], Jordan [11], India [12] and China [13]. In these surveys’ questionnaire was focused on the surgical teaching programme, training methods, level of satisfaction towards the teaching and their future interests of studies in ophthalmology sub-specialties. Though there are survey studies published with regard to preferred practice pattern of anaesthesia techniques, these were mainly done for the consultants performing cataract surgery [14-16]. Previous studies, involving consultants showed that there is a decline in the use of retrobulbar and peribulbar injection techniques, with sub-Tenon and topical techniques gaining popularity [14-16].

The trainees are in the learning curve period and they would find it easier to complete the surgery if there is complete absence movement of the globe for longer duration of time. Hence, it is quite natural for many of them to prefer peribulbar anaesthesia as it produces denser analgesia and complete akinesia compared to Sub-Tenon’s and topical anaesthesia. We found the same results in our survey too. The trainee’s number of years of experience in ophthalmology can act as a confounding factor in the study results. But, as their number of years of experience varied from minimum of two years to maximum of seven years of experience only, the confounding factor is eliminated in our study.

Peribulbar block is generally administered by a fractionated technique, usually dual injection. The traditional block includes two injections. The first injection is given at the inferotemporal quadrant wherein the percutaneous needle entry site is at the junction of medial two-third and lateral one-third along the floor of the orbit. Following the first injection, digital ocular massage is done. If akinesia is still not achieved, then supplementary injection is administered at the superonasal quadrant.

In the past two decades both the above percutaneous needle entry injection sites are no more recommended. Several cases of diplopia owing to iatrogenic needle injury to inferior rectus and oblique muscles following needle entering at the junction of medial two-third and lateral one-third along the floor of the orbit have been reported in the literature [17,18]. Also, the neurovascular bundle supplying the inferior oblique muscle is present over there. Hence, an alternative safe needle entry site is now recommended, and it is just above the junction of the floor and the lateral wall of the orbit i.e. at the extreme inferolateral orbital margin [19,20]. It is an avascular area filled

with pad of fat and it produces lesser physical hindrance towards the advancement of the needle into the quadrant. But, in our study we found that majority (91.72%) of them still administer the inferolateral quadrant injection at the traditional site and only few (5.52%) of the trainees administer percutaneous injection at the site recommended now.

Injection at superomedial quadrant is no more recommended. This quadrant is more vascular in nature when compared to the remaining other three quadrants resulting in more chances of haemorrhage to occur in the lid and can result in complete ecchymosis of the eye. Moreover, as the globe is closer to the roof than to the floor, superomedial block per se can result in perforation of the globe [21], even in patients with normal axial length. The risk factors for globe perforation described in literature were myopia followed by superonasal injection [21]. The superonasal quadrant injection requires a sound technique due to restricted clearance.

For a safe supplementary injection, medial peribulbar site should be preferred which is administered using 26 G half inch needle passed in a blind pit between the caruncle and the medial canthal angle [19,22]. This extraconal space is an excellent site for administering local anaesthesia, as it communicates freely with the intraconal space. Also, with this injection, eyelids may fill with the anaesthetic solution which provides excellent orbicularis akinesia too. In patients with increased axial length or those presenting with staphyloma, a single medial peribulbar injection can be administered safely without any inadvertent perforation of the globe [23,24]. Hence, it is imperative that ophthalmologists especially the trainees to know and start practice to administer medial peribulbar injection. Astonishingly, still 93.1% were found to administer the superonasal injection and 42.07% have not administered the medial peribulbar block at all.

Also, the present study results found that many were not aware about the size and bevel-tip of the needle used for administering routine inferolateral block. The trainees must have thorough knowledge about the length and type of the needle tip used for performing needle blocks. Needle length of not more than 1 inch is required. Longer needle can result in brainstem anaesthesia owing to optic nerve sheath penetration by the sharp needle tip. Moreover, about 90% of the trainees have not performed sub-tenon's block itself, which is of-late regarded as much safer mode of delivering regional anaesthesia for cataract surgery.

The above survey result analysis clearly shows that most of the trainees need to understand the risks involved in the traditional technique of administering regional anaesthesia particularly the superonasal injection and there have to be an immediate change in their practice to much safer ways of regional anaesthesia for cataract surgery like medial peribulbar injection and sub-tenon's anaesthesia.

This change in the practice cannot be attained over a fortnight. From our survey, it is understood that the trainee's practice to perform regional anaesthesia mostly either by observing their seniors performing the needle blocks or by reading traditional books. The basic knowledge of anatomy of globe, orbit, extraocular structures, globe-orbit-needle static relationship, physiology, pharmacology of local anaesthetic agents and adjuvants used etc. must be included in the syllabus of their first year of teaching curriculum. Hands on-practice of needle and sub-tenon's block on simulators must be done before performing regional anaesthesia on patients. To develop and improve their skills in administering needle blocks, modules such as Ophthalmic Anaesthesia Simulation System (OASiS) [25] and real time view mannequin [26] can be considered. To know-how sub-tenon's block administration, hands-on practice using either goat's or pig eye model can be done [27]. Though trainees enrolled in our study were from all parts of India, it was a single center study. Multicenter study involving not only the trainees but also the surgeons practicing from private and government teaching institute will in turn can produce interesting results to analyze in future.

Conclusion

The main implication of this survey is that it shows that ophthalmology trainees still practices traditional needle blocks, which are not only out dated but can lead to both systemic and ophthalmic complications. The current teaching in regional ophthalmic anaesthesia needs an immediate change involving hands-on practice on simulators and animal models.

Conflict of Interest

None.

Bibliography

1. The Royal college of Anaesthetists and the Royal college of Ophthalmologists. "Local anaesthesia for intraocular surgery". The Royal college of Anaesthetists and the Royal college of Ophthalmologists (2001).
2. Stephen J Mather, *et al.* "Loco-regional anaesthesia for ocular surgery. Anticoagulant and antiplatelet drugs". *Current Anaesthesia and Critical Care* 21 (2010): 158-163.
3. Katz J, *et al.* "Study of medical testing for cataract surgery team. Risks and benefits of anticoagulants and antiplatelet medication use before cataract surgery". *Ophthalmology* 110 (2003): 1784 -1788.
4. Leaming DV. "Practice styles and preferences of ASCRS membersd2003 survey". *Journal of Cataract and Refractive Surgery* 30 (2004): 892-900.
5. Adeela Malik, *et al.* "Local anesthesia for cataract surgery". *Journal of Cataract and Refractive Surgery* 36 (2010):133-152.
6. Dean WH, *et al.* "Ophthalmology specialist trainee survey in the United Kingdom". *Eye* 33 (2019): 917-924.
7. Abdelfattah NS, *et al.* "Perspective of ophthalmology residents in the United States about residency programs and competency in relation to the International Council of Ophthalmology guidelines". *Journal of Current Ophthalmology* 23 (2016): 146-151.
8. McDonnell PJ, *et al.* "Perceptions of recent ophthalmology residency graduates regarding preparation for practice". *Ophthalmology* 114 (2007): 387-391.
9. Zhou AW, *et al.* "Canadian ophthalmology residency training: an evaluation of resident satisfaction and comparison with international standards". *The Canadian Journal of Ophthalmology* 44 (2009): 540-547.
10. Ayanniyi AA, *et al.* "Ophthalmology training in Nigeria: the trainee ophthalmologists' perspective". *Nigerian Postgraduate Medical Journal* 14 (2007): 94-98.
11. Al-Salem KM, *et al.* "Ophthalmology residency training in Jordan: an evaluation of quality and comparison with international standards". *International Journal of Ophthalmology* 7 (2014): 898-904.
12. Ajay K, *et al.* "Ophthalmic surgical training in Karnataka and Southern India: Present status and future interests from a survey of final-year residents". *Indian Journal of Ophthalmology* 63 (2015): 306-311.
13. Young AL, *et al.* "A survey of perceived training differences between ophthalmology residents in Hong Kong and China". *BMC Medical Education* 15 (2015): 158.
14. Cass GD. "Choices of local anesthetics for ocular surgery". *Ophthalmology Clinics of North America* 19 (2006): 203-207.
15. Eke T and Thompson JR. "Serious complications of local anaesthesia for cataract surgery: a year national survey in United Kingdom". *British Journal of Ophthalmology* 91 (2007): 470-475.
16. Eke T and Thompson JR. "The National Survey of Local Anesthesia for Ocular Surgery. I. Survey methodology and current practice. II. Survey profiles of local anaesthesia techniques". *Eye* 13 (1999): 189-204.
17. Gomez-Arnau JL, *et al.* "Anaesthesia-related diplopia after cataract surgery". *British Journal of Anaesthesia* 90 (2003): 189-193.

18. Taylor G., *et al.* "Early exploration of diplopia with magnetic resonance imaging after peribulbar anaesthesia". *British Journal of Anaesthesia* 92 (2004): 899-901.
19. Fanning GL. "Orbital regional anesthesia-ocular anaesthesia". *Ophthalmology Clinics of North America* 19 (2006): 221-232.
20. Kumar CM and Dowd TC. "Complications of ophthalmic regional blocks: Their treatment and prevention". *Ophthalmologica* 220 (2006): 780-782.
21. Gadkari SS. "Evaluation of 19 cases of inadvertent globe perforation due to periocular injections". *Indian Journal of Ophthalmology* 55 (2007): 103-107.
22. Jaichandran VV. "Shorter the wiser' - to obtain a safe medial canthal block". *Trends in Anaesthesia and Critical Care* 30 (2020): 20.
23. Vohra SB and Good PA. "Altered globe dimensions of axial myopia as risk factor for penetrating ocular injury during peribulbar anaesthesia". *British Journal of Anaesthesia* 85.2 (2000): 242-245.
24. Rubin AP and Editorial VI. "Local anaesthesia for eye surgery - no room for complacency". *British Journal of Anaesthesia* 86 (2001): 473-476.
25. Biswarup Mukherjee., *et al.* "Evaluation of an Ophthalmic Anesthesia Simulation System for Regional Block". *Ophthalmology* 12 (2015): 2578-2580.
26. NJ Kumar., *et al.* "Visual Feedback Enabled Training Mannequin for Ophthalmic Blocks: an Evaluative Study". Proceedings Cairo International Biomedical Engineering Conference (CIBEC), Cairo, Egypt (2018): 82-85.
27. Shashi B Vohra. "Equatorial sub-Tenon blocks: Animal model training". *Trends in Anaesthesia and Critical Care* 5 (2015): 141-145.

Volume 6 Issue 9 September 2020

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