

ORIGINAL RESEARCH

Study to assess the efficacy and safety of sub-tenon block to peribulbar block: A multi-centric study

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ABSTRACT

Aim: The aim of the present study is to compare the efficacy and safety of sub-tenon block to peribulbar block with respect to analgesia, akinesia, and complications. **Methods:** Patients who came to the outpatient department for cataract surgery were included in the study. A written, informed consent was taken from all patients before their participation in the study. Patients were randomized into two groups of 50 each. **Results:** The baseline and postoperative pain scores were significantly greater in the peribulbar group $P < 0.001$. The time of onset of akinesia in both the groups showed a significant difference, with a mean time of 196.44 s in peribulbar and 92.38 s in the sub-tenons group $P < 0.001$. The presence of chemosis and subconjunctival hemorrhage showed no statistically significant difference in both groups. We noted that only 6% in the peribulbar group and 20% in the sub-tenons group had chemosis. None of the patients in the peribulbar group had a subconjunctival hemorrhage, whereas 10% in the sub-tenons group had subconjunctival hemorrhage. **Conclusion:** Sub-Tenon block is an effective and safer technique of ocular anesthesia for SICS. It can be considered as an alternative to the conventional peribulbar block.

Key words: Akinesia, analgesia, peribulbar block, SICS, sub-tenons block

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INTRODUCTION

Local anesthesia involves the blockage of a nerve supplying a given part of the body by infiltration of the area around the nerve with a local anesthetic agent¹. The use of local anesthesia in cataract extraction has increased over the years. This is due to advances in drugs, surgical instruments such as use of blunt sub-Tenon cannula and modification of techniques and routes of administration². Some of its merits include ease of administration, preservation of consciousness, good postoperative analgesia, reduced stress response, early mobilization, and discharge of patients as well as minimal respiratory and cardiovascular systems complications²⁻⁵. Regional anesthesia has been popularized in ophthalmic surgery because of its high success rate and a wide margin of safety⁴. It ensures quicker patient recovery thereby enabling day-surgery cases and reduction in cost of

surgery⁶. Multiple co-morbidities and multiple drug use are very common in cataract patients⁷. Therefore, researchers have focused on anesthetic techniques for cataract surgery that ensure patients' safety, comfort and attain optimum safe conditions for the surgical procedure⁶.

Peribulbar and retrobulbar anesthesia cause multiple complications⁸. A newer technique is sub-tenons anesthesia. Peribulbar anesthesia is the most commonly used anesthesia for intraocular procedures⁹. It has less incidence of optic nerve damage but akinesia produced is less as compared to the older retro bulbar technique. Although the peribulbar technique is considered safer as compared to retrobulbar block, cases of brainstem anesthesia after peribulbar block have been reported¹⁰. Globe perforation is one of the most serious complications associated with this technique⁸. It presents with intense

ocular pain, sudden loss of vision, and hypo tonicity of the globe. This condition requires immediate surgical management. Sub-tenon anesthesia is a technique of injecting the anesthetic agent into the sub-tenons space with prior use of topical anesthesia⁹. It decreases the incidence of patient anxiety and the painful experience associated with the use of needles in the peribulbar block¹¹.

The aim of the present study is to compare the efficacy and safety of sub-tenon block to peribulbar block with respect to analgesia, akinesia, and complications.

MATERIALS AND METHODS

This study was conducted in multiple tertiary care hospitals. Over a period of one year 2023-2024. Patients who came to the outpatient department for cataract surgery were included in the study. A written, informed consent was taken from all patients before their participation in the study. Patients were randomized into two groups of 50 each by the surgeon. The pre-operative evaluation included visual acuity, a detailed anterior segment examination under slit-lamp including the lids and adnexa, and a fundus examination. Intraocular pressures, sac syringing, and routine examinations such as random blood sugars and blood pressures were evaluated before the surgery. Moxifloxacin 0.5% eyedrops QID were instilled in the eyes to be operated on 1 day before the surgery. One hour before the surgery, phenylephrine 5% with tropicamide 0.8% eyedrops were instilled in the eyes to be operated on as one drop/10 min until full dilation of the pupil. Povidone iodine 5% eye drops were instilled in the eyes before administration of the block. One 30 mL vial of 2% lidocaine with adrenaline 1:200,000 mixed with one vial of lyophilized hyaluronidase (1500 I.U.) was used as an anesthetic agent.

For the peribulbar block, 5% proparacaine eyedrops were instilled. Using a 26 G 13 mm needle, 2 mL of the anesthetic agent was injected each into the inferior

and superior peribulbar space using a 10 mL syringe. A 5 mL syringe could have also been used. The inferior site of injection was along the infraorbital margin just above the notch and superiorly at the supraorbital notch. Immediate digital massage was given after the block to control the rise in IOP. A total of 4 mL of the anesthetic agent is used. For the sub-tenons block, the site was painted and draped on the operation table under all aseptic conditions. After instilling 5% proparacaine eyedrops, under microscopic visualization, a nick was made in the conjunctiva using a Westcott's scissor inferonasally 4 mm from the limbus. The Tenon's tissue was then separated and the sub-tenons space was exposed. Using a 2 mL syringe loaded with 2 mL of the anesthetic agent, the drug was injected into the posterior sub-tenons space using a 23 G bent cannula, which was then introduced into the exposed sub-tenons space. Any chemosis noted at the site of injection was managed by a digital massage with closed eyelids to spread the drug to all the quadrants.

The pain was scored at the time of administration of block, during surgery and 4 h after the surgery using the Wong-Baker Facial Grimace Scale. The level of akinesia was assessed on a grade of 0-8 where each of the recti muscles akinesia was given a score of 0, 1, or 2. Where 0 is no akinesia/full movement, 1 is partial akinesia/reduced movement, and 2 is absolute akinesia/no movement. A total score of <2 was considered as unsuccessful akinesia.¹² The time of onset of akinesia was noted in seconds just at the time of infiltration of the block.

The presence or absence of the chemosis or subconjunctival hemorrhage was noted at the time of administration of the block. The data collected is analyzed by descriptive statistics. The comparison between the two groups was done using the Chi-square test and the student unpaired t-test. A statistical package SPSS version 24.0 was used to do the analysis. $p < 0.05$ was considered significant.

RESULTS

Table 1: Comparison of pain in the groups

Variable	Group	n	Mean	SD	T statistic (P)
Baseline pain	Peribulbar	50	1.65	0.832	0.001 (Sig.)
	Sub Tenon	50	0.07	0.320	
Perioperative pain	Peribulbar	50	0.05	0.164	0.65 (NS)
	Sub Tenon	50	0.07	0.323	
Postoperative pain	Peribulbar	50	1.65	0.743	0.021 (Sig.)
	Sub Tenon	50	1.28	0.556	

The baseline and postoperative pain scores were significantly greater in the peribulbar group $P < 0.001$.

Table 2: Comparison of time of onset of akinesia in both groups

Variable	Group	n	Mean (sec)	SD	T statistic (P)
Akinesia onset	Peribulbar	50	196.44	64.916	0.001 (sig.)
	Sub Tenon	50	92.38	22.108	

The time of onset of akinesia in both the groups showed a significant difference, with a mean time of 196.44 s in peribulbar and 92.38 s in the sub-tenons group $P < 0.001$.

Table 3: Distribution of chemosis and subconjunctival hemorrhage

Chemosis	Peribulbar	Sub Tenon
Present	3	10
Absent	47	40
Subconjunctival Hemorrhage		
Present	0	5
Absent	50	45

The presence of chemosis and subconjunctival hemorrhage showed no statistically significant difference in both groups. We noted that only 6% in the peribulbar group and 20% in the sub-tenons group had chemosis. None of the patients in the peribulbar group had a subconjunctival hemorrhage, whereas 10% in the sub-tenons group had subconjunctival hemorrhage.

DISCUSSION

A cataract is a leading cause of preventable blindness in the world. This is because cataract extraction with intraocular lens (IOL) implantation is one of the most effective surgical procedures¹³. Local anesthesia is commonly used in ocular surgeries, which involves blocking the nerve by infiltration of the area around the nerve with a local anesthetic agent¹⁴. Local anesthesia is popular in ophthalmic surgery because of its wide range of safety, high success rate and faster patient recovery. Patients with multiple comorbidities can be operated on under local anesthesia with better patient comfort and under optimum safe conditions for the procedure¹⁴.

The mean perioperative pain score was 0.03 in peribulbar and 0.06 in sub-tenons. It was noted that patients who experienced perioperative pain in the sub-tenons group during the SRBS step of the surgery. Postoperative pain score was significantly higher in the peribulbar group $P (0.02)$ in our study, whereas in a study by Adekola *et al.*¹⁴ there was no significant difference in the postoperative pain in both groups. Parkar *et al.*⁹ also observed no significant difference in both the groups during the perioperative and postoperative periods. The time of onset of akinesia was significantly longer in the peribulbar group. The proportion of patients with greater akinesia grade was significantly greater in the peribulbar group ($P < 0.001$). However, a study by Al-Yousuf showed better akinesia in the sub-tenons group¹⁵. The baseline and postoperative pain scores were significantly greater in the peribulbar group $P < 0.001$. The time of onset of akinesia in both the groups showed a significant difference, with a mean time of 196.44 s in peribulbar and 92.38 s in the sub-tenons group $P < 0.001$. The presence of chemosis and subconjunctival hemorrhage showed no statistically significant difference in both groups. The presence of chemosis showed no significant difference in both groups $P (0.15)$. Previous studies showed a significantly higher

number of patients with chemosis in the sub-tenons group^{14, 16}. There was no statistically significant difference in the presence of subconjunctival hemorrhage after administering the block $P (0.07)$. However, a previous study by Iganga *et al.*¹⁶ showed a significant difference in both groups with respect to a subconjunctival hemorrhage. No globe perforation was noted in any of the cases. The incidence of chemosis was found to be significantly higher ($P = 0.005$) in the sub-Tenon technique compared to the peribulbar group in this study. Budd *et al.*¹⁷ and Parkar *et al.*⁹ however, found no difference in the incidence of chemosis between sub-Tenon and peribulbar anesthesia. Probably the injection was deposited into wrong anatomical planes such as mid sub-Tenon space in some presumed cases of posterior sub-Tenon injection. Incidence of chemosis and subconjunctival hemorrhage increases with injection into anterior and mid sub-Tenon spaces compared to posterior sub-Tenon space¹⁸.

We noted that only 6% in the peribulbar group and 20% in the sub-tenons group had chemosis. None of the patients in the peribulbar group had a subconjunctival hemorrhage, whereas 10% in the sub-tenons group had subconjunctival hemorrhage.

CONCLUSION

Sub-tenons block is an effective and safer technique of ocular anesthesia for SICS. It can be considered as an alternative to the conventional peribulbar block.

CONFLICT OF INTEREST

None to be declared.

REFERENCES

- Alhassan MB, Kyari F, Ejere HO. Peribulbar versus retrobulbar anaesthesia for cataract surgery. Cochrane Database of Systematic Reviews. 2008(3).
- Aitkenhead AR, Smith G, Rowbotham DJ, editors. Textbook of anaesthesia. Elsevier Health Sciences; 2007.
- Barker JP, Vafidis GC, Robinson PN, Burrin JM, Hall GM. The metabolic and hormonal response to cataract surgery: A comparison between retrobulbar and peribulbar blockade. Anaesthesia. 1993 Jun;48(6):488-91.

4. McLure HA, Rubin AP. Local anaesthesia for ophthalmic surgery. *Current Anaesthesia & Critical Care*. 1999 Feb 1;10(1):40-7.
5. Biscope J. Advantages of regional anesthesia over general anesthesia. In: Hoerster W, Kreusscher H, Niesel HC, Zenz M, editors; Dekornfeld TJ, translator. *Regional Anesthesia*. 2nd ed. London: Mosby Year Book; 1990. pp. 31-45.
6. Malik A, Fletcher EC, Chong V, Dasan J. Local anesthesia for cataract surgery. *Journal of Cataract & Refractive Surgery*. 2010 Jan 1;36(1):133-52.
7. McKibbin M. The pre-operative assessment and investigation of ophthalmic patients. *Eye*. 1996 Jan;10(1):138-40.
8. Kumar CM. Orbital regional anesthesia: complications and their prevention. *Indian journal of ophthalmology*. 2006 Apr 1;54(2):77-84.
9. Parkar T, Gogate P, Deshpande M, Adenwala A, Maske A, Verappa K. Comparison of subtenon anaesthesia with peribulbar anaesthesia for manual small incision cataract surgery. *Indian J Ophthalmol*. 2005 Dec;53(4):255-9.
10. Kazancıoğlu L, Batçık Ş, Kazdal H, Şen A, Gediz BŞ, Erdivanlı B. Complication of Peribulbar Block: Brainstem Anaesthesia. *Turk J Anaesthesiol Reanim*. 2017 Aug;45(4):231-233.
11. Guise P. Sub-Tenon's anesthesia: an update. *Local Reg Anesth*. 2012;5:35-46.
12. Ngwu RA, Adekoya BJ, Adejumo OA, Ibidapo OO, Vera OA. Comparison of the Akinetic properties of subtenon's anaesthesia versus peribulbar anaesthesia among cataract patients in Nigeria. *Niger J Ophthalmol* 2017;25:95-100.
13. Ashok A, Krishnagopal S, Jha KN. Comparison of peribulbar anesthesia with sub-tenon's in manual small incision cataract surgery. *TNOA Journal of Ophthalmic Science and Research*. 2018 Apr 1;56(2):67-70.
14. Adekola OO, Aribaba OT, Musa K, Olatosi JO, Asiyanbi GK, Rotimi-Samuel A, Onakoya A, Akinsola FB. Regional anesthesia for small incision cataract surgery: Comparison of subtenon and peribulbar block. *Journal of Clinical Sciences*. 2018 Jan 1;15(1):1-7.
15. Al-Yousuf N. Subtenon versus peribulbar anaesthesia for cataract surgery. *Bahrain Med Bull*. 2003 Sep;25:115-8.
16. Iganga ON, Fasina O, Bekibele CO, Ajayi BG, Ogundipe AO. Comparison of Peribulbar with Posterior Sub-Tenon's Anesthesia in Cataract Surgery Among Nigerians. *Middle East Afr J Ophthalmol*. 2016 Apr-Jun;23(2):195-200.
17. Budd JM, Brown JP, Thomas J, Hardwick M, McDonald P, Barber K. A comparison of sub-Tenon's with peribulbar anaesthesia in patients undergoing sequential bilateral cataract surgery. *Anaesthesia*. 2009 Jan;64(1):19-22.
18. Kumar CM, Dodds C, McLure H, Chabria R. A comparison of three sub-Tenon's cannulae. *Eye (Lond)*. 2004 Sep;18(9):873-6.