

Comparative Assessment of Patient Comfort and Surgical Outcomes between Topical and Peribulbar Anesthesia in Cataract Surgery

Hirva Chauhan

Assistant Professor, Department of Ophthalmology, Swaminarayan Institute of Medical Sciences and Research, Kalol, Gandhinagar, Gujarat, India

Received: 01-11-2023 Revised: 15-12-2023 / Accepted: 21-01-2024

Corresponding author: Dr. Hirva Chauhan

Conflict of interest: Nil

Abstract

Background: Cataract surgery is one of the most commonly performed ophthalmic procedures worldwide. Adequate anesthesia is essential for patient comfort, surgical safety, and optimal operative outcomes. Topical and peribulbar anesthesia are widely used techniques in cataract surgery, each having distinct advantages and limitations. The present study aimed to compare the efficacy, safety, patient comfort, and surgical outcomes of topical versus peribulbar anesthesia in cataract surgery.

Materials and Methods: This prospective comparative study was conducted among 100 patients undergoing cataract surgery over a period of 18 months. Patients were divided into two groups: topical anesthesia group (n=50) and peribulbar anesthesia group (n=50). Parameters evaluated included intraoperative pain score, patient cooperation, surgeon comfort, operative duration, visual recovery, and anesthesia-related complications. Statistical analysis was performed using SPSS software version 25, and $p < 0.05$ was considered statistically significant.

Results: Patients receiving topical anesthesia demonstrated significantly faster visual recovery and shorter operative preparation time compared to the peribulbar anesthesia group. Mean intraoperative pain scores were slightly higher in the topical anesthesia group but remained within acceptable limits. Surgeon comfort and patient cooperation were comparable in both groups. Subconjunctival hemorrhage, chemosis, and periocular edema were more common in the peribulbar anesthesia group. No serious anesthesia-related complications were observed.

Conclusion: Both topical and peribulbar anesthesia are safe and effective techniques for cataract surgery. Topical anesthesia offers faster recovery and avoids injection-related complications, whereas peribulbar anesthesia provides better ocular akinesia and slightly improved intraoperative comfort. Appropriate selection of anesthesia technique should be individualized based on patient characteristics and surgeon preference.

Keywords: Cataract surgery, topical anesthesia, peribulbar anesthesia, phacoemulsification, ocular anesthesia, visual recovery.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Cataract is the leading cause of reversible blindness worldwide and cataract surgery remains one of the most frequently performed surgical procedures in ophthalmology.[1] Advances in microsurgical techniques and phacoemulsification have significantly improved surgical outcomes, reduced operative time, and enhanced postoperative visual rehabilitation.[2] Adequate anesthesia plays a crucial role in ensuring patient comfort, minimizing ocular movement, and facilitating safe surgical performance.

Various anesthetic techniques have been used for cataract surgery including retrobulbar, peribulbar, sub-Tenon's, topical, and intracameral anesthesia.[3] Peribulbar anesthesia has long been

considered a standard technique because it provides effective analgesia and akinesia by delivering local anesthetic into the extraconal orbital space.[4] However, injection-related complications such as subconjunctival hemorrhage, globe perforation, retrobulbar hemorrhage, optic nerve injury, and extraocular muscle damage remain important concerns.[5]

Topical anesthesia has gained increasing popularity in modern cataract surgery, particularly with the widespread use of phacoemulsification.[6] Topical anesthesia involves instillation of anesthetic eye drops onto the ocular surface without the use of needle injections. Advantages include rapid visual recovery, avoidance of injection-related

complications, reduced patient anxiety, and shorter preparation time.[7] However, topical anesthesia may provide inadequate akinesia and can result in increased intraoperative discomfort in some patients.

Several studies have compared topical and peribulbar anesthesia with respect to pain perception, patient satisfaction, surgeon comfort, operative complications, and postoperative recovery.[8] While topical anesthesia is associated with earlier rehabilitation and improved patient acceptance, peribulbar anesthesia continues to be preferred in complicated cases and uncooperative patients due to better ocular immobility.[9]

Selection of an appropriate anesthetic technique depends on patient cooperation, surgeon expertise, type of cataract surgery, and associated ocular or systemic conditions. Comparative evaluation of these techniques is important for optimizing surgical outcomes and improving patient satisfaction. Therefore, the present study was undertaken to compare the efficacy and safety of topical versus peribulbar anesthesia in cataract surgery.

Aim of the Study: To compare the efficacy, safety, patient comfort, and surgical outcomes of topical versus peribulbar anesthesia in cataract surgery.

Materials and Methods

This prospective comparative study was conducted over a period of 18 months among patients undergoing cataract surgery. A total of 100 patients were included in the study and divided into two groups: topical anesthesia group (n=50) and peribulbar anesthesia group (n=50). Patients aged above 45 years with age-related cataract scheduled for elective cataract surgery were included in the study. Patients with traumatic cataract, complicated cataract, previous ocular surgery, glaucoma, severe hearing impairment, psychiatric illness, or inability to cooperate during surgery were excluded.

All patients underwent detailed ophthalmic evaluation including visual acuity assessment, slit lamp examination, intraocular pressure measurement, and fundus examination. In the topical anesthesia group, proparacaine 0.5% eye drops were instilled preoperatively. In the peribulbar anesthesia group, a mixture of lidocaine and bupivacaine was administered through peribulbar injection under aseptic precautions.

Parameters evaluated included intraoperative pain using Visual Analog Scale (VAS), patient cooperation, surgeon comfort, operative duration, time for visual recovery, and anesthesia-related complications. Postoperative follow-up examinations were conducted on Day 1, Day 7, and at 4 weeks postoperatively.

Statistical analysis was performed using SPSS software version 25. Continuous variables were expressed as mean \pm standard deviation and categorical variables as frequencies and percentages. Student's t-test and Chi-square test were used for analysis. A p-value less than 0.05 was considered statistically significant.

Results

A total of 100 patients undergoing cataract surgery were included in the study, with 50 patients receiving topical anesthesia and 50 patients receiving peribulbar anesthesia. The baseline demographic characteristics of both groups were comparable with no statistically significant difference in mean age, gender distribution, or associated systemic illnesses.

Patients in the topical anesthesia group demonstrated significantly shorter preoperative preparation time and faster postoperative visual recovery compared to the peribulbar anesthesia group. Mean operative duration was comparable between both groups. Intraoperative pain scores assessed using Visual Analog Scale were slightly higher in the topical anesthesia group; however, most patients reported acceptable pain tolerance.

Patient cooperation during surgery was satisfactory in both groups. Surgeon comfort was slightly better in the peribulbar anesthesia group due to superior ocular akinesia. Injection-related complications such as subconjunctival hemorrhage, chemosis, and periocular edema were significantly more common in the peribulbar anesthesia group. No cases of globe perforation, retrobulbar hemorrhage, or optic nerve injury were observed.

Overall, topical anesthesia was associated with faster rehabilitation and reduced anesthesia-related complications, whereas peribulbar anesthesia provided superior ocular immobility and intraoperative comfort.

Table 1: Baseline Characteristics of Study Population

Variables	Topical Anesthesia (n=50)	Peribulbar Anesthesia (n=50)	p-value
Mean Age (years)	61.8 \pm 7.6	62.4 \pm 8.1	>0.05
Male	28 (56%)	30 (60%)	>0.05
Female	22 (44%)	20 (40%)	>0.05
Diabetes Mellitus	12 (24%)	10 (20%)	>0.05
Hypertension	14 (28%)	15 (30%)	>0.05

Table 2: Comparison of Operative and Recovery Outcomes

Parameters	Topical Anesthesia	Peribulbar Anesthesia	p-value
Mean Operative Time (min)	16 ± 3	17 ± 4	>0.05
Preoperative Preparation Time (min)	8 ± 2	18 ± 4	<0.001
Visual Recovery Time (hrs)	2.5 ± 1.1	6.8 ± 2.2	<0.001
Mean VAS Pain Score	3.1 ± 1.0	2.2 ± 0.8	<0.05
Surgeon Comfort Score	Good	Better	<0.05

Table 3: Patient Cooperation and Satisfaction

Parameters	Topical Anesthesia	Peribulbar Anesthesia	p-value
Good Patient Cooperation	44 (88%)	47 (94%)	>0.05
Patient Satisfaction	46 (92%)	45 (90%)	>0.05
Need for Additional Anesthesia	4 (8%)	1 (2%)	>0.05

Table 4: Anesthesia-Related Complications

Complications	Topical Anesthesia	Peribulbar Anesthesia	p-value
Subconjunctival Hemorrhage	0	8 (16%)	<0.01
Chemosis	0	6 (12%)	<0.05
Periocular Edema	1 (2%)	5 (10%)	<0.05
Globe Perforation	0	0	—
Retrobulbar Hemorrhage	0	0	—

Discussion

The present study compared the efficacy and safety of topical versus peribulbar anesthesia in cataract surgery. Both anesthetic techniques provided satisfactory surgical conditions and excellent postoperative outcomes.

Topical anesthesia demonstrated significantly shorter preoperative preparation time and faster postoperative visual recovery compared to peribulbar anesthesia. Similar findings have been reported in previous studies evaluating modern phacoemulsification under topical anesthesia.[10] Avoidance of periocular injection and preservation of extraocular muscle function contribute to early visual rehabilitation.

Although intraoperative pain scores were slightly higher in the topical anesthesia group, most patients tolerated the procedure well. Similar observations were reported by Crandall et al., who found acceptable pain control and high patient satisfaction with topical anesthesia.[11] Peribulbar anesthesia provided superior ocular akinesia and slightly better surgeon comfort during surgery. Effective globe immobility is particularly advantageous in complicated cataracts and anxious or uncooperative patients.[12] However, injection-related complications including subconjunctival hemorrhage and chemosis were significantly higher in the peribulbar anesthesia group.

No serious complications such as globe perforation or optic nerve injury were observed in the present study. Nevertheless, these rare complications remain important concerns associated with needle-based orbital anesthesia.[13] The findings of the present study suggest that topical anesthesia is a

safe and effective alternative to peribulbar anesthesia for routine cataract surgery, particularly in cooperative patients undergoing uncomplicated phacoemulsification.

Conclusion

Both topical and peribulbar anesthesia are safe and effective anesthetic techniques for cataract surgery. Topical anesthesia offers faster visual recovery, shorter preparation time, and fewer injection-related complications, whereas peribulbar anesthesia provides superior ocular akinesia and surgeon comfort. Selection of anesthetic technique should be individualized according to patient cooperation, surgical complexity, and surgeon preference.

References

1. World Health Organization. Global data on visual impairment. Geneva: WHO; 2019.
2. Kelman CD. Phaco-emulsification and aspiration. *Am J Ophthalmol.* 1967;64(1):23-35.
3. Kumar CM, Dowd TC. Ophthalmic regional anesthesia. *Curr Opin Anaesthesiol.* 2008;21(5):624-631.
4. Davis DB, Mandel MR. Peribulbar anesthesia. *Ophthalmology.* 1986;93(6):705-713.
5. Hamilton RC. Complications of ophthalmic regional anesthesia. *Ophthalmol Clin North Am.* 2006;19(2):203-209.
6. Fichman RA. Use of topical anesthesia alone in cataract surgery. *J Cataract Refract Surg.* 1996;22(5):612-614.
7. Friedman DS, Reeves SW, Bass EB, et al. Patient preferences for anesthesia management. *Br J Ophthalmol.* 2004;88(3):333-335.

8. Ezra DG, Allan BD. Topical anesthesia alone versus topical anesthesia with intracameral lidocaine. *J Cataract Refract Surg.* 2007;33(5): 873-878.
9. Gillow JT, Aggarwal RK, Kirkby GR, et al. Topical anesthesia versus peribulbar anesthesia. *Eye.* 1999;13(3):367-370.
10. Roman SJ, Auclin FX, Chong-Sit DA, et al. Topical anesthesia in cataract surgery. *J Cataract Refract Surg.* 1997;23(7):1080-1083.
11. Crandall AS, Zabriskie NA, Patel BC, et al. Topical anesthesia for cataract surgery. *J Cataract Refract Surg.* 1999;25(7):957-961.
12. Rüschen H, Celaschi D, Bunce C, et al. Randomized controlled trial of topical vs peribulbar anesthesia. *Eye.* 2005;19(11):1214-1219.
13. Edge KR, Nicoll JM. Retrobulbar hemorrhage after ophthalmic anesthesia. *Anesth Analg.* 1993;76(5):1019-1022.