

To Compare the Effectiveness of Sub-Tenon's Anesthesia with Peribulbar Anesthesia in Patients Undergoing Manual Small-incision Cataract Surgery

T M Nithisha¹, N Neethu²

¹Associate Professor, Department of Ophthalmology, Rajarajeswari Medical College and Hospital, Bengaluru, Karnataka, India,

²Junior Resident, Department of Ophthalmology, Rajarajeswari Medical College and Hospital, Bengaluru, Karnataka, India

Abstract

Background: Blindness due to cataract presents an enormous problem in terms of human morbidity, economical loss, and social burden. Retrobulbar anesthesia was commonly used for cataract surgery. Rare but serious complications led many ophthalmologists to replace retrobulbar with peribulbar anesthesia. However, even peribulbar anesthesia does not eliminate the serious complications totally. These concerns have led to increased use of blunt needle sub-Tenon's block over the sharp needle blocks.

Materials and Methods: 200 cases were selected, of which 100 were in the sub-Tenon's group and the remaining 100 were in the peribulbar group. The efficacy of anesthesia between the two groups was compared in terms of analgesia at various intervals, akinesia of the globe and eyelids attained after the block. They were graded on a subjective scale and recorded. Minor complications such as chemosis, sub-conjunctival hemorrhage, and rise in increased intraocular pressure (IOP) were also compared and analyzed.

Results: Sub-Tenon's anesthesia provided better analgesia than peribulbar anesthesia although the akinesia was poorer than the latter. Minor complications such as sub-conjunctival hemorrhage were more in sub-Tenon's group while instantaneous rise in IOP was more in peribulbar group. The incidence of chemosis was almost comparable in both the groups.

Interpretation and Conclusion: Sub-Tenon's anesthesia is recommended as a safe and effective alternative to peribulbar anesthesia for small-incision cataract surgery as it provides good analgesia, adequate akinesia, and rare minor complications.

Key words: Akinesia, Analgesia, Chemosis, Intraocular pressure, Local anesthesia, Manual small-incision cataract surgery, Peribulbar anesthesia, Subconjunctival hemorrhage, Sub-Tenon's anesthesia

INTRODUCTION

The most common elective ophthalmic surgery done under local anesthesia is cataract surgery.^[1] Manual small-incision cataract surgery (MSICS) is a low budget procedure suitable for developing countries because of the lesser magnitude of reliance on machine and broader

applicability. Its safety and easy learning curve are its add-on plus point.

Previously retrobulbar anesthesia was commonly used for MSICS, but the associated complications led to the discovery of a low-risk surrogate which is peribulbar anesthesia. However, peribulbar anesthesia has its own snag and constraints.^[2] Multiple compartments in the orbit lead to patchy and non-equivalent spread of local anesthetic.^[3] This accounts for inferior blocks, the need for multiple injections, or very large injected volumes.^[4]

Furthermore, the drawback of being a sharp needle procedure and its associations with retinal hemorrhage, globe perforations, central retinal hemorrhage, and rarely,

Access this article online



www.ijss-sn.com

Month of Submission : 05-2019

Month of Peer Review : 06-2019

Month of Acceptance : 07-2019

Month of Publishing : 07-2019

Corresponding Author: Nithisha T M, Associate Professor, Department of Ophthalmology, Rajarajeswari Medical College and Hospital, Bengaluru, Karnataka, India.

death have been reported.^[5,6] This led to the development of sub-Tenon's block, which results in less pain and less unfavorable incidents when compared to peribulbar block.^[7,8]

Sub-Tenon's anesthesia, also known as pinpoint anesthesia, parabolbar block or episcleral block is a blunt needle approach which is simple, safe, and effective for ocular surgeries such as conventional extracapsular cataract extraction, MSICS, phacoemulsification, panretinal photocoagulation, trabeculectomy, and strabismus surgery, especially in patients with a single eye, glaucomatous eye, and in old patients with poor cardiac function.^[1,8,9]

Sub-Tenon's anesthesia eliminates injury to retinal vasculature, optic nerve and globe and provides better anesthesia to ocular surgeries without drawbacks of topical anesthesia.

Therefore, an attempt is made to compare the efficacy of sub-Tenon's with peribulbar anesthesia in MSICS using randomized controlled trial.

MATERIALS AND METHODS

This study was conducted in the Department of Ophthalmology, Rajarajeswari Medical College and Hospital, Kambipura, Bengaluru, from August 2017 to August 2018. All patients in the age group of 30–90 years, with a visual acuity of >6/12 with no pinhole improvement and undergoing MSICS were eligible for the study after physical fitness for surgery was given by the physician. Patients with pre-existing ocular muscle paresis or neurological deficits, co-existing infective or any other inflammatory condition, with history of ocular trauma, subluxated lens, sensitivity to lignocaine and/or bupivacaine, pupil size <5 mm and patients who opted for and/or required general anesthesia were excluded from the study. 200 cases were enrolled for the study with 100 cases in the sub-Tenon's group (Group A) and 100 cases in the peribulbar group (Group B). Ethical committee clearance obtained from the institutional review board. All patients were in-patients of the hospital. Informed consent was obtained from all the patients for the surgery and the anesthetic procedure.

Detailed history and ocular examination (vision testing, slit-lamp biomicroscopic examination, tonometry, lacrimal sac syringing, fundus examination, A-scan biometry, and B-scan ultrasonography) were done. Pre-operative preparation was done with moxifloxacin eye drops, tropicamide 0.5% and flurbiprofen 0.03%. Anesthetic mixture was prepared using 1 vial injection hyaluronidase containing 1500 IU, 20 ml vial

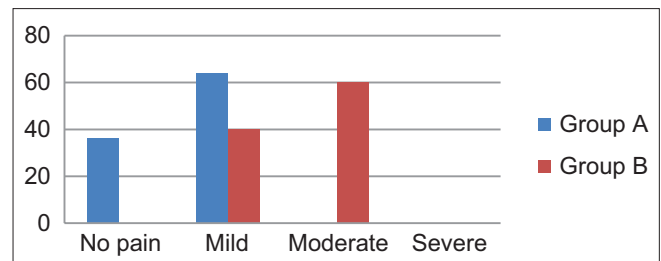


Figure 1: Analgesia at the time of administration of block

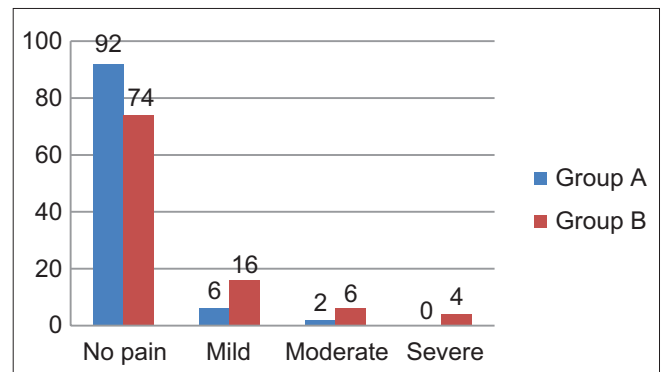


Figure 2: Analgesia during intra operative duration

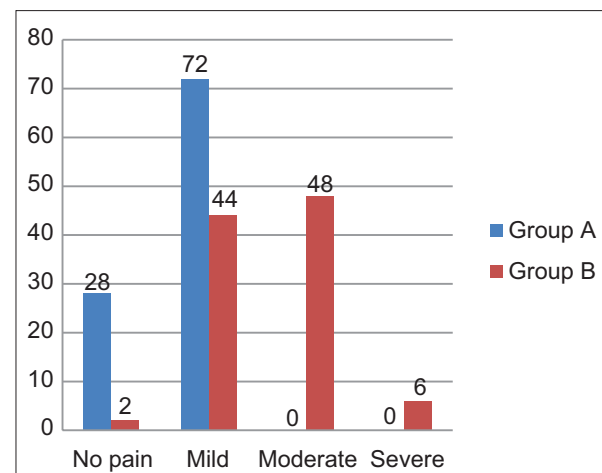


Figure 3: Analgesia 4 h post operatively

containing 2% lignocaine and (1:200,000) adrenaline, and 20 ml vial containing 0.5% bupivacaine. Sensitivity to the local anesthetic mixture was tested. The eye to be operated was cleaned with 10% povidone-iodine solution and after 5 min the anesthetic block given.

Sub-Tenon's anesthesia was given after topical instillation of 0.5% proparacaine followed by insertion of universal eye speculum to expose inferonasal quadrant and a small tent of conjunctiva raised and incised. Sub-Tenon's capsule was dissected by blunt dissection and 3 ml of local anesthetic mixture was injected slowly using a curved blunt irrigating cannula (23G, 25 mm) introduced along the contour of the globe until the tip passes beyond the equator. Peribulbar

Table 1: Demographic distribution of the study population

Feature	Group S		Group P		P-value
Age distribution	62.11±9.73		60.48±9.38		0.229
Gender distribution	Male	Female	Male	Female	0.886
	58	42	57	43	
Diagnosis	IMC	MC	HMC	IMC	0.817
	73	26	1	69	
	30	1	30	1	
Laterality	Left eye	Right eye	Left eye	Right eye	0.773
	39	61	49	51	

IMC: Immature cataract, MC: Mature cataract, HMC: Hypermature cataract

Table 2: Grading of analgesia achieved among the study population

Analgesia	Group S	Group P	P-value
At the time of administration of block			
No pain	36	0	<0.001
Mild	64	40	
Moderate	0	60	
Severe	0	0	
Intra operative			
No pain	92	74	0.004
Mild	6	16	
Moderate	2	6	
Severe	0	4	
4 h post-operative			
No pain	28	2	<0.001
Mild	72	44	
Moderate	0	48	
Severe	0	6	

Table 3: Akinesia of eyeball and eyelid achieved among the study group

	Group A	Group B	P-value
Akinesia of globe			
Complete movement remaining	40	0	<0.001
Moderate movement	50	6	
Slight movement	10	32	
No movement	0	62	
Akinesia of lids			
Normal	4	0	0.007
Reduced movements	26	14	
No movements	70	86	

anesthesia was given with a 24G needle inserted at the junction of outer and middle third of the inferior orbital margin (2.5 cm depth) parallel to the floor of the orbit where 4 ml of the local anesthetic mixture was injected. Eyelid closed and ocular massage applied for 3–4 min. For patients who did not develop satisfactory akinesia, a supplementary superonasal injection was given.

The efficacy of sub-Tenon's versus peribulbar anesthesia with regard to pain during needle insertion, intraoperative pain, pain in the immediate 4 h post-operative period, akinesia of the globe, and eyelids during surgery were compared. The rate of complications such as rise in increased intraocular pressure (IOP), subconjunctival

Table 4: Mean IOP distribution among the study population at different time intervals

IOP (mmHg)	Group S	Group P	P-value
At the time of block	16.41±2.79	16.20±2.36	0.563
1 min after block	18.83±2.77	20.61±2.43	<0.001
10 min after block	17.49±2.75	17.52±2.42	0.950

IOP: Increased intraocular pressure

Table 5: Conjunctival chemosis and sub conjunctival hemorrhage seen in the study group

	Group A	Group B	P-value
Conjunctival chemosis			
No chemosis	61	64	0.133
Chemosis in 1 quadrant	29	20	
Chemosis in 2 quadrant	6	14	
Chemosis in 3 or 4 quadrants	4	2	
Sub conjunctival hemorrhage			
No hemorrhage	44	64	0.003
Hemorrhage in 1 quadrant	46	22	
Hemorrhage in 2 quadrant	8	12	
Hemorrhage in 3 or 4 quadrant	2	2	

hemorrhage, and conjunctival chemosis after administration of the block was assessed. Significance was assessed at 5% level of significance. Student *t*-test and Chi-square/Fisher's exact test were used for statistical analysis.

DISCUSSION

In this ever-changing medical field, age wherein retrobulbar was most popular is replaced by safer alternatives. Need for safer alternatives has introduced the ophthalmic society to peribulbar anesthesia and sub-Tenon's anesthesia and much more recently to topical application technique. Several studies have been done on sub-Tenon's anesthesia since its introduction in 1992. In this study, we have made an attempt to compare the efficacy of sub-Tenon's anesthesia with peribulbar anesthesia. A total of 200 cases fulfilling the inclusion criteria were identified. They were divided into two groups: Group S receiving sub-Tenon's anesthesia and Group P receiving peribulbar anesthesia, with 100 cases each. The distribution of study population in both groups were comparable [Table 1].

Pain assessment was our primary objective and it was graded by a subjective scoring with Grade 0 as no pain and grade 3 as severe or intense pain. In our study more number of patients receiving peribulbar block had higher grading of pain during administration of block, during intraoperative period and after 4 hours post surgery which was statistically significant ($P < 0.001$) when compared with the sub tenons group [Figures 1-3 and Table 2]. In spite of higher grades with peribulbar group none of the patients required any additional anaesthesia during the surgery.^[10]

Narendra P Datti *et al.* compared sub tenons and peribulbar anaesthesia technique in 500 patients. They concluded that sub tenons anaesthetic technique was better.^[13] Also El Sherbeny et al had statistically significant difference in pain when sub tenons was compared with peri bulbar and concluded that sub tenons anaesthesia was superior.^[11]

The intraoperative eyeball movements and lid movements were significantly less in cases who received peribulbar block.^[12] There was no such significant IOP rise in cases receiving sub-tenon's block [Table 3].^[14] There was significant rise in intraocular pressure one minute after administration of the peribulbar block, but it came down to basal levels within 5 minutes [Table 4].^[15] The rate of conjunctival chemosis was similar in both groups but the incidence of sub-conjunctival hemorrhage was significantly higher in cases receiving sub-tenon's block [Table 5].^[16]

The only comparison that was not recognized and included in the initial part of our study was the difficulty in the operative procedure faced by the surgeon. However, since all the surgeries were not performed by a single surgeon, not including the comparison would be easy to defend.

CONCLUSION

Sub-Tenon's anesthesia is adept for MSICS in comparison with peribulbar anesthesia as it provides good analgesia, adequate akinesia and causes only rare, minor and inconsequential complications. Furthermore, the quantity of anesthetic mixture used in sub-Tenon's anesthesia is inferior when compared to peribulbar anesthesia. Hence, sub-Tenon's anesthesia appears to be a reasonable bargain and cost efficient in our country where organizations cater to a large number of deprived population.

REFERENCES

1. Wong DH. Regional anaesthesia for intraocular surgery. *Can J Anaesth* 1993;40:635-57.
2. Hamilton RC, Gimbel HV, Javitt JC. The prevention of complications of regional anesthesia for ophthalmology. *Ophthalmol Clin North Am* 1990;3:111-25.
3. Koornneef L. The architecture of the musculo-fibrous apparatus in the human orbit. *Acta Morphol Neerl Scand* 1977;15:35-64.
4. Bloomberg LB. Anterior periocular anesthesia: Five years experience. *J Cataract Refract Surg* 1991;17:508-11.
5. Kumar CM, Williamson S, Manickam B. A review of sub-tenon's block: Current practice and recent development. *Eur J Anaesthesiol* 2005;22:567-77.
6. Stevens JD. A new local anesthesia technique for cataract extraction by one quadrant sub-tenon's infiltration. *Br J Ophthalmol* 1992;76:670-4.
7. Friedman DS, Bass EB, Lubomski LH, Fleisher LA, Kempen JH, Magaziner J, *et al.* Synthesis of the literature on the effectiveness of regional anesthesia for cataract surgery. *Ophthalmology* 2001;108:519-29.
8. Kumar CM, Dodds C. Sub-tenon's anesthesia. *Ophthalmol Clin North Am* 2006;19:209-19.
9. Briggs MC, Beck SA, Esakowitz L. Sub-tenon's versus peribulbar anaesthesia for cataract surgery. *Eye (Lond)* 1997;11:639-43.
10. Khan SA, Alam M, Aftab AM, Iqbal M. Comparison of the efficacy of subtenon with peribulbar local anesthesia without hyaluronidase in patients undergoing cataract surgery. *J Coll Physicians Surg Pak* 2014;24:331-4.
11. EL-Sherbeny M, Kallil R, El-Gazzar H, Alrabiey M, Hamed M. Comparative study between sub-tenon's, conventional peribulbar block and low volume single injection medial canthus block for anterior segment surgery. *Ain Shams J Anesthesiol* 2011;4:15-23.
12. Matcha SC, Nandyala SK, Murahari VK. Comparison of subtenon's v/s peribulbar anesthesia in manual small incision cataract surgery cases. *MRIMS J Health Sci* 2015;3:20-6.
13. Datti NP, Krishnappa K, Guruprasad BS, Krishnappa P, Guha J, Bansal A. Efficacy and safety of Sub tenon and peribulbar anesthesia in MSICS. *J Clin Biomed Sci* 2013;3:20-26.
14. Parkar T, Gogate P, Deshpande M, Adenwala A, Maske A, Verappa K, *et al.* Comparison of subtenon anaesthesia with peribulbar anaesthesia for manual small incision cataract surgery. *Indian J Ophthalmol* 2005;53:255-9.
15. Roman SJ, Sit DA, Boureau CM, Auclin FX, Ullern MM. Subtenon anaesthesia. An efficient and safe technique. *Br J Ophthalmol* 1997; 81:673-76
16. Azmon B, Alster Y, Lazar M, Geyer O. Effectiveness of sub-tenon's versus peribulbar anesthesia in extracapsular cataract surgery. *J Cataract Refract Surg* 1999;25:1646-50.

How to cite this article: Nithisha TM, Neethu N. To Compare the Effectiveness of Sub-Tenon's Anesthesia with Peribulbar Anesthesia in Patients Undergoing Manual Small-Incision Cataract Surgery. *Int J Sci Stud* 2019;7(4):66-69.

Source of Support: Nil, **Conflict of Interest:** None declared.