

**COMPARISON OF PERIBULBAR AND TOPICAL ANESTHESIA IN MODERN
CATARACT SURGERY****Dr. Surbhi Gupta¹ and Dr. Akhil Gupta^{2*}**¹Department of Ophthalmology, Government Medical College, Jammu, Jammu and Kashmir, India: 180001.²Department of Anesthesia, Government Medical College Jammu, Jammu and Kashmir, India: 180001.***Corresponding Author: Dr. Akhil Gupta**

Department of Anesthesia, Government Medical College Jammu, Jammu and Kashmir, India: 180001.

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ABSTRACT

Background: Topical anesthesia for phacoemulsification is not new. The advantages of topical anesthesia are known, like: ease of application, minimal discomfort, rapid onset, rapid visual recovery and reduction of risks associated with retrobulbar or peribulbar injection, but not validated by many studies, therefore, this study was planned to compare the efficacy of topical anesthesia with peribulbar anesthesia in phacoemulsification. **Methods:** This was a hospital based prospective comparative randomized study conducted in Department of Ophthalmology, Government Medical College, Jammu, during the period: January 2015 to June 2015, on 100 patients, with age 40 years and above, assigned to either two groups: peribulbar group (group 1) and topical group (group 2). All patients of senile cataract, undergoing phacoemulsification cataract surgery with intraocular lens implantation, were included. **Results:** Demographic characteristics and backgrounds of the Patients in both the groups were comparable and similar. 50% patients in group 1 and 42% in group 2 did not feel any pain. Only 1 patient of periocular and 3 (6%) patients of topical anesthesia group had severe pain. Mean for analgesia in both the groups was comparable and similar. No significant difference in duration of surgery was noted. Mean value for akinesia in group 1 was 0.68 ± 0.61 , and the mean for akinesia in group 2 was 2.30 ± 0.64 , which was significantly higher, or a disadvantage, but with good patient selection, proper counseling and patient cooperation this problem can be avoided. **Conclusion:** Topical anesthesia can replace the other methods of anesthesia in cataract surgery.

KEYWORDS: Phacoemulsification, Topical Anesthesia, Peribulbar Anesthesia, Analgesia, Akinesia.**INTRODUCTION**

Cataract surgery has become one of the most commonly performed surgical procedures. Newer techniques like small corneal or limbal incisions, phacoemulsification of the lens nucleus, have made it possible to switch from general anesthesia to local anesthesia, including retrobulbar or peribulbar injections of local anesthetics.^[1,2] Each time, during a retrobulbar block, when a needle is introduced into the orbit there is definite risk of complications, which could be sight and life threatening.^[3,4] Since 1986, peribulbar anesthesia has replaced retrobulbar as a safe and effective method of block.^[5] The complications arising out of peribulbar and retrobulbar blocks can be avoided by using topical anesthesia.^[6]

Topical anesthesia is not new. Topical anesthesia was first used by Koller in 1884 in the form of cocaine. Fichman reported the use of topical anesthesia for the first time for modern cataract extraction in 1927.^[7] It was first used by Kershner for phacoemulsification in an attempt to reduce the needle related complications of local anesthesia.^[8] The advantages of topical anesthesia

include its ease of application, minimal to absent discomfort on administration, rapid onset of anesthesia, rapid visual recovery and more important reduction of risks associated with retrobulbar or peribulbar injection. The technique is also economical, avoids undesirable cosmetic adverse effects, and allows instant visual rehabilitation.^[9] The three most common methods of applying topical anesthesia are by eye drops, by eye drops with intracameral lidocaine injection, and in gel form.^[10] Topical anesthesia by eye drops is a noninvasive method, but in some cases it may provide insufficient analgesia and require an additional intracameral lidocaine injection.^[11] Advances in the techniques of phacoemulsification, self sealing incisions and foldable IOLs has renewed interest in topical anesthesia. Since the state of the eye in topical anesthesia closely emulates the physiological state of the eye at rest, it affords better and faster visual recovery. Absence of post-operative chemosis, ecchymosis, or ptosis facilitate immediate visual recovery and therefore better patient satisfaction.^[12]

The purpose of the present study was to evaluate the

efficacy and safety of topical anesthesia and assess and compare the usefulness of peribulbar and topical anesthesia for cataract surgery.

MATERIALS AND METHODS

This was a hospital based prospective comparative randomized study conducted in Department of Ophthalmology, Government Medical College, Jammu on the senile cataract patients who will be undergoing phacoemulsification with IOL implantation, under topical and peribulbar anesthesia during the 6 months' period: January 2015 to June 2015. A total of 100 patients, with age 40 years and above, were included in this study. They were conveniently assigned to either the peribulbar group (group 1, n=50) or topical group (group 2, n=50). The patients in group 1 received 4-5 ml of local anesthetic (equal quantities of 2% xylocaine and 0.5% bupivacaine) into the peribulbar space with 1 inch 25 gauge needle. In group 2, 0.5% proparacaine eye drops were instilled every 5 minutes half an hour before surgery. No sedation was given.

Inclusion Criteria

All patients of senile cataract, undergoing phacoemulsification cataract surgery with intraocular lens implantation; Patients willing to give written informed consent.

Exclusion Criteria

- Patients not willing to give written informed consent.
- Patients suffering from excessive anxiety, dementia, hearing impairment or poor fixation due to strabismus or nystagmus.
- Cases of recurrent uveitis, known previous retinal detachment surgery, corneal opacity, cases of severe

external eye diseases (keratoconjunctivitis, blepharitis) and underlying collagen vascular diseases.

- Patients with hazy cornea
- Patients unable to understand pain scale
- Patients with age less than 40 years
- Patients allergic to xylocaine.
- Patient with past history of long term local /systemic steroids use as this would affect wound healing.
- Patients with complex anterior segment pathologies.

Approval by Institutional Ethics Committee was taken. Well informed written consent was taken and patients were randomly distributed to peribulbar or topical anesthesia. Parameters like age, surgery duration, blood pressure, oxygen saturation and intra-operative pain were compared in two groups to determine the efficacy and safety a particular an aesthetic method out of the two methods being compared. A four point verbal pain scale was used for analgesia. Patients were asked to grade the pain during different stages of surgery. Akinesia was also assessed on four point scale.

Convenient sampling of patients was done in order to avoid bias in selection. The data was analyzed by SPSS version 16.0. Data was compared between two groups using chi square test.

RESULTS

Both the groups were predominated by females, with 33 (66%) in Group 1 and 32 (64%) in Group 2. Other demographic characteristics and backgrounds of the Patients in both the groups were similar too.

Mean akinesia was poor in group 2, however mean analgesia was comparable. (Table 1)

Table 1: Descriptive data for akinesia and analgesia for the two groups.

Description	Group 1			Group 2		
	Min.	Max.	Mean \pm SD	Min.	Max.	Mean \pm SD
Age	40	87	62.21 \pm 13.39	42	79	61.21 \pm 11.94
Akinesia	0	3	0.68 \pm 0.61	0	3	2.30 \pm 0.64
Analgesia	0	3	0.63 \pm 0.57	0	3	0.84 \pm 0.69

The relationship of akinesia with peribulbar and topical anesthesia showed that In group 1, 56% (28) of patients had no movements whereas only 4%(2) patients had no movements in group 2. 44%(22) patients with periocular anesthesia exhibited slight or moderate movements whereas 60%(30) patients of topical anesthesia had such movements. No patient in periocular group had full movements, while 36% of patients in topical group exhibited full movements. (Table 2).

Mean value for akinesia in group 1 was 0.68 \pm 0.61, and the mean for akinesia in group 2 was 2.30 \pm 0.64. The chi-square value came out to be 2018.16, with p value of less than 0.001 (statistically significant). (Table 1; Table 2).

Table 2: Akinesia in Group 1 and Group 2.

	Group 1 (n=50)	Group 2 (n=50)	Cumulative (n=100)
No Movement (0)	28	2	30
Slight Movement (1)	15	7	22
Moderate Movement (2)	7	23	30
Full Movement (3)	0	18	18

Chi Square (χ^2) Value = 2018.16; $p < 0.001$

50% (25) of patients in group 1 and 42% (21) in group 2 did not feel any pain. Slight to Moderate pain was felt by 48% (24) patients in group 1 and 52% (26) of group 2. Only 1 patient of periocular and 3 (6%) patients of topical anesthesia group had severe pain. (Table 3)

Mean for analgesia in periocular group was 0.63 ± 0.57 , whereas mean value for analgesia in topical group was 0.84 ± 0.69 . The chi-square value was 52.70 with p value of 0.168. (Table 1; Table 3)

Table 3: Analgesia in Group 1 and Group 2.

	Group 1 (n=50)	Group 2 (n=50)	Cumulative (n=100)
No Pain (0)	25	21	46
Slight Pain (1)	21	22	42
Moderate Pain (2)	3	4	8
Severe Pain (3)	1	3	4

Chi Square (χ^2) Value = 52.70; $p = 0.168$

DISCUSSION

Complications of retrobulbar and peribulbar anesthesia are numerous. Ptosis, conjunctival or eyelid bruising, orbital hemorrhage, globe perforation, optic nerve damage, CRVO, CRAO, brain stem anesthesia and even death have been reported.^[13,14] The complications of peribulbar and retrobulbar anesthesia led to the search for other alternatives. Fichman in 1996 proposed topical anesthesia.^[7] It causes faster visual recovery, higher patient satisfaction, easy to administer, minimal/no discomfort on instilling, rapid onset, is economic, no cosmetic side effects.^[15] This is possibly because, it blocks the trigeminal nerve ending in the cornea and the conjunctiva only leaving the intraocular structures in the anterior segment un-anesthetized.^[16] It being non-invasive, safe and effective, doesn't require much intra and post-operative monitoring compared to peribulbar anesthesia, which makes it cost-effective too.^[17] It allows full ocular motility which is helpful in relative enophthalmos and prominent orbital rims. Visual rehabilitation is also better and faster as extra ocular movements and Optic nerve are not partially blocked by anesthetics. Quite in support of the above studies, our study too showed that peribulbar anesthesia related complications did not prevent or delay any planned surgical intervention. Topical group required anesthesia less frequently than peribulbar group.

In our study there was no statistically significant difference in pain between the two groups. No significant difference in duration of surgery was noted. The ocular movements were quite marked in topical group and the difference was statistically significant, but mobility has not been found to be a problem for experienced surgeons especially if the patients are also cooperative.

Our study confirms the results of Agarwal et al,^[18] who had evaluated topical anesthesia and found it a technique of choice in small incision cataract surgery. Similarly, Saunder and Jonas did not find significant difference between two techniques in terms of subjective pain experienced by patients, either.^[19] Roman and Auckin have demonstrated that overall, 62.2% patients preferred topical over peribulbar anesthesia, citing lack of periocular injection as a reason.^[20] Our results correspond to these observations, as except some apprehensions and communication issues among aged people about the new technique, most of the patients showed much interest in the topical anesthesia for their cataract surgery. Lindely, et al,^[21] however, have found that patients experience more pain with topical anesthesia as compared to peribulbar anesthesia.

Phacoemulsification affects anterior chamber depth (ACD) due to mechanical and patient factors. The type of anesthesia may be a contributing factor for determining ACD. The ACD determines the final resting position of IOL and, thus, the resultant final refractive status of the eye. The increase in anterior chamber depth (ACD) after phacoemulsification was considered to be a result of a decrease in aqueous outflow resistance. Refraction also varies with the ACD, as was put forward by Arai et al.^[22] in their study, proposing that changes in ACD may result in a change in visual acuity after cataract surgery and PCIOL implantation.

Our study also showed an increase in ACD postoperatively both at week 1 and week 6 in both groups of patients, thus supporting the various studies reporting an increase in ACD post-phacoemulsification.

A study by Naik et al, have also concluded that post-phacoemulsification, the ACD is more after peribulbar

anesthesia as compared to topical anesthesia. Post-operative refractive outcome is better with the use of topical anesthesia.^[23] Where as a study by Badar- ud-din et. al.^[24] in 2007 had concluded topical anesthesia is to be an effective and reliable method for phacoemulsification. It has many benefits over retrobulbar and peribulbar anesthesia and a high level of patient satisfaction.

The main disadvantage of topical anesthesia is lack of akinesia which can make surgery technically difficult. But with good patient selection, proper counseling and patient cooperation this problem can be avoided. As patients with topical anesthesia are more sensitive to IOP elevation after surgery, it is recommended that a careful and complete viscoelastic removal is done. The key to successful cataract surgery with topical anesthesia is surgeon-patient communication; therefore, patients with hearing or language problems or dementia are poor candidates. For a trained surgeon, complications of topical anesthesia are neither more frequent nor more difficult to manage. If topical anesthesia proves to be inadequate in any case, the self sealing incision allows safe intra operative conversion to peribulbar or sub-tenon anesthesia. In our study supplemental periocular anesthesia was required in four cases of topical anesthesia group.

CONCLUSION

Topical anesthesia has advantages and supremacy over other modes of anesthesia owing to its ease of application, minimal discomfort, rapid anesthesia, rapid visual recovery and more importantly, the reduction of risks associated with retrobulbar or peribulbar injection, leading to a high level of patient satisfaction. As a catching trend also suggests, topical anesthesia should replace the other methods of anesthesia, and formal training of surgeons should be prioritized to overcome technical difficulties involved, if any.

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