



## International Journal of Allied Medical Sciences and Clinical Research (IJAMSCR)

ISSN:2347-6567

IJAMSCR | Volume 4 | Issue 4 | Oct - Dec - 2016  
www.ijamscr.com

Research article

Medical research

### Comparative study of topical versus peribulbar anaesthesia in phacoemulsification cataract surgery.

Srinivasan Gopalan<sup>1</sup>\*Aarthi Panneerselvam<sup>2</sup>.

<sup>1</sup>\*Assistant Professor, Department of Ophthalmology, Saveetha Medical College & Hospital, Chennai, Tamilnadu, India.

<sup>2</sup>Resident, Department of Ophthalmology, Saveetha Medical College, & Hospital, Tamilnadu, India

\*Corresponding Author: Srinivasan Gopalan

Email id: kgsvasans@gmail.com

#### ABSTRACT

##### Aim

To compare and evaluate patients discomfort and complications during phacoemulsification and implantation of foldable intraocular lenses under topical and peribulbar anesthesia in cataract.

##### Materials and methods

In this comparative study a total of 200 patients who underwent phacoemulsification with intraocular lens (IOL) implantation were included. Patients were randomly assigned under Topical anaesthesia (group 1, n=100) and Peribulbar anaesthesia (group 2, n=100).

##### Results

Group 1, 2% had no movements and 51% had no movements. 14% of group 1 and 34% of group 2 patients exhibited slight movements. 47% of group 1 and 14% of group 2 had moderate movements. 37% of group 1 and 1% of group 2 exhibited full movements. Mean value of group 1: 2.21, SD: 0.78 and mean value of group 2: 0.69, SD: 0.84.

##### Conclusion

Topical anaesthesia is an effective alternative to peribulbar anaesthesia for phacoemulsification reducing the risks associated with peribulbar injection.

**Keywords:** Intraoperative pain, Surgeons satisfaction, Complications.

#### INTRODUCTION

Peribulbar injection of anesthetic agents has been used for more than a century in cataract surgery and various modifications have been devised over the last two decades to reduce the risks of injury of intraorbital structures during surgery. The blind insertion of a needle into the

retrobulbar space has never been completely free from sight and life threatening complications. [1]

Topical anesthesia was first used in 1884 by Koller who used cocaine. [2] After one century, Fichman used an attractive alternative method of injecting local anesthetic agents resulting in faster visual recovery and high patient satisfaction 1995 [3]. The advantages of topical anesthesia include its

ease of application, minimal to absent discomfort on administration, rapid onset of anesthesia 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. Topical anesthesia blocks the trigeminal nerve ending, provides at least analgesia of the eye. The optic nerve and motor neurons are not affected, and the ocular motility is maintained. [4] Some reports indicate that topical anesthesia is safe and effective in most uncomplicated cataract procedures. Other studies [5] suggested that topical anesthesia should not be considered in eyes with severe concomitant ocular pathological features. Manipulation of the iris or stretching of ciliary and zonular tissues which may be irritable during surgery in complicated cases could irritate the anaesthetized ciliary nerve ending and result in patient discomfort and inadvertent eye movement, compromising the overall safety of the procedure. [6]

## MATERIALS AND METHODS

A total of 200 patients who underwent phacoemulsification surgery with foldable intraocular lens in Ophthalmology department, Saveetha Medical College were included in this study. They were randomly assigned by systematic random sampling method to either the topical group (group 1, n=100) or peribulbar group (group 2, n=100). In group 1, 0.5% proparacaine eye drops were instilled every 5 minutes half an hour before surgery. The patients in group 2 received 4-5ml of local anaesthetic (4ml of 2%xylocaine and 1ml 0.5% bupivacaine) into the peribulbar space with 1 inch 25 gauge needle No sedation was given. All of the patients under went phacoemulsification with IOL implantation. 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 as depicted:



### Inclusion Criteria

- Patients with senile cataract

### Exclusion Criteria

- Patients refusing informed consent
- Patients with communication difficulty
- Patients suffering from dementia, deafness
- Patients with nystagmus
- Patients unable to understand pain scale
- Patients with hazy cornea
- 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 allergic to xylocaine.
- Patient with past history of long term local /systemic steroids use as this would affect wound healing.

All surgeries were done by same surgeon to avoid inter-observer bias. Convenient sampling of patients was done in order to avoid bias in selection. The data was analyzed by SPSS version 10. Standard errors and standard deviation for all variables were calculated, where necessary. Data of anaesthesia and akinesia was compared between two groups using chi square test.

## RESULTS

The descriptive data for akinesia and analgesia for all subjects is given in Table 1. The relationship of akinesia with peribulbar and topical anaesthesia is given in Table 2 whereas relationship of analgesia between two groups is shown in Table 3. Group 1 comprised 21% males and 79% females while in Group 2, there were 26 % males and 74% females. In Group 1, 2% had no movements and 51% had no movements. 14% of group 1 and 34% of group 2

patients exhibited slight movements .47% of group 1 and 14% of group 2 had moderate movements.37% of group 1 and 1% of group 2 exhibited full movements.

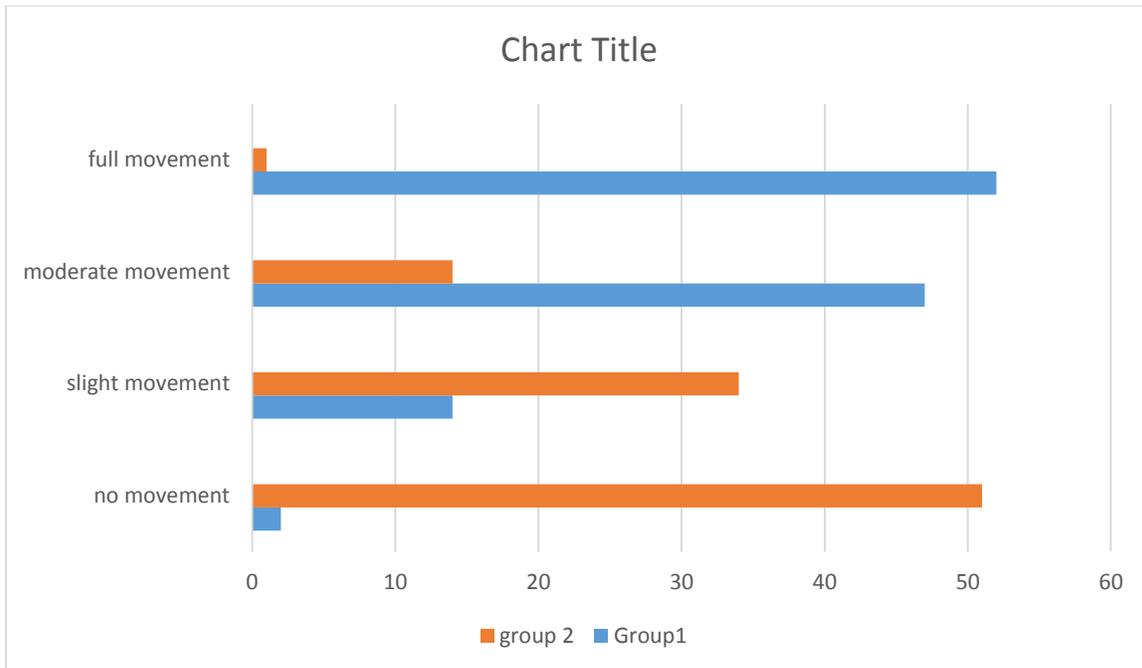
Mean value of group 1:2.21, SD: 0.78 and mean value of group 2:0.69, SD: 0.84. The chi-square value came out to be 1432.63 with p value of less than 0.005 which is statistically significant. 46% in group 1 and 52% of patients in group 2 did not feel any pain. Mild pain was felt by 45% patients in group

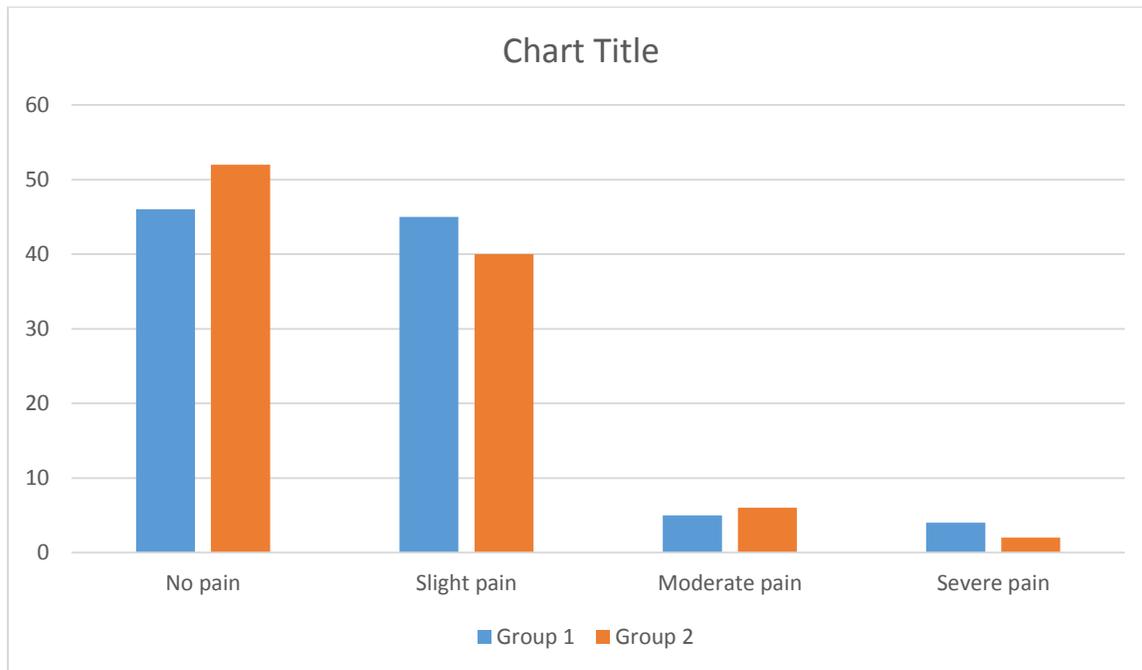
1 and 40% of group 2. 6% patients of periocular and 5% patients of topical anaesthesia group had moderate pain. Severe pain was felt by only 4% patients of group 1 and 2% of group 2. Mean for analgesia in periocular group was 0.56 with SD 0.64, whereas mean value for analgesia in topical group was 0.78 with SD 0.85. The chi-square value was 3.484 with p value of 0.323 which is statistically insignificant.

**Table 1: Relationship of akinesia between group 1 and group 2**

	GROUP 1		GROUP 2	
	MEAN	S.D	MEAN	S.D
AGE	62.08	13.48	62.32	12.67
ANALGESIA	0.78	0.85	0.56	0.64
AKINESIA	2.21	0.70	0.69	0.84

**Table 2: Relationship of analgesia between group 1 and group 2**



**TABLE 3: Relationship of Analgesia between Group 1 (TOPICAL) and Group 2 (PERIBULBAR) Anaesthesia (n=200) Chi square: 3.484, Pvalue: 0.323**

## DISCUSSION

Although retrobulbar and peribulbar anaesthesia is sufficient for nerve blockage during cataract surgery complications related to the anaesthesia can be sight threatening or even life threatening such as ptosis, conjunctival or eyelid bruising, orbital hemorrhage, globe perforation, optic nerve damage, CRVO, CRAO, brain stem anaesthesia and even death have been reported [8-12]. Topical anaesthesia eliminates these risks and has several other benefits like:

- The return of vision is more rapid.
- It is less costly.
- Patients can have surgery without discontinuation of systemic anticoagulants or aspirin.
- There is more patient satisfaction [13]

Sutureless clear corneal incision techniques have gained popularity among cataract surgeons owing to the many advantages they offer, including a reduction of ocular tissue manipulation and surgical time. With topical anaesthesia alone, potentially serious complications associated with retrobulbar and peribulbar Anaesthesia could be avoided. Since its introduction, topical anaesthesia has become increasingly popular. On the other hand,

topical anaesthesia can in certain circumstances be more demanding for the surgeon.

The surgeon must be very competent and not every patient is a good candidate: that is the reason why very anxious patients, patients with communication problems, those with miotic pupils were excluded from our study. The main disadvantage of topical anaesthesia is the absence of akinesia. To achieve akinesia, our patients were asked to look at the light of the operating microscope. To reduce photophobia, light intensity of the microscope was set initially to its lowest level and gradually raised to normal values at the beginning of capsulorrhexis. With topical anaesthesia, only the trigeminal nerve endings in the cornea and the conjunctiva are blocked. Failure of topical anaesthesia to block the impulses in the long sensory fibers makes manipulation of the iris or stretching of the ciliary and zonular tissues uncomfortable for patients. As we know, some manipulations performed during phacoemulsification cause significant levels of pain. O'Brien et al showed that hydrodissection, phacoemulsification, lens aspiration and intraocular lens insertion require the most manipulation of the iris and were associated with higher pain scores during surgery. As patients with topical anaesthesia are more sensitive to IOP

elevation after surgery, we recommend careful and complete viscoelastic removal. Pain killers and acetazolamide tablet after surgery would minimize pain and maintain IOP. Up till now we have mostly been able to achieve these goals with good patient satisfaction. 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, is not a problem for experienced surgeons especially if the patients are also cooperative.

Roman and Auckin have demonstrated that overall, 62.2% patients preferred topical over peribulbar anaesthesia, citing lack of periocular injection as a reason [14]. Similar superiority of topical anaesthesia over peribulbar anaesthesia has been demonstrated in many other studies<sup>15</sup>. Our results are contrary to the findings of Lindely, who found that patients experience more pain with topical anaesthesia as compared to peribulbar anaesthesia [16]. Many authors report the same findings [17] Jacobi PC and Dietlein have gone a step ahead in evaluating the efficacy and usefulness of

topical anaesthesia in complicated cataract surgery [14]. They recommend the use of topical anaesthesia even in coexisting ophthalmic diseases like glaucoma, uveitis and patients with previous intraocular surgeries. Topical anaesthesia is justified as a means of improving safety without causing discomfort to the patients even in complicated cases. If topical anaesthesia proves to be inadequate in any case, the self-sealing incision allows safe intra operative conversion to peribulbar or subtenon anaesthesia. For a trained surgeon, complications of topical anaesthesia are neither more frequent nor more difficult to manage.

## CONCLUSION

Our results demonstrate that topical anaesthesia is a safe and an effective alternative to peribulbar anaesthesia in cataract surgery using phacoemulsification and IOL folded lenses for experienced surgeons. As trend of less invasive cataract surgery is rapidly growing, topical anaesthesia should replace the other methods of anaesthesia in most cases.

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**How to cite this article:** Srinivasan Gopalan Aarthi Panneerselvam. Comparative study of topical versus peribulbar anaesthesia in phacoemulsification cataract surgery. Int J of Allied Med Sci and Clin Res 2016; 4(4): 737-742.

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