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Topical versus peribulbaranaesthesia for cataract surgery

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ABSTRACT
Background: To assess and compare the efficacy and safety of topical versus peribulbaranaesthesia in patients undergoing routine cataract surgery.
Patient and Methods: This prospective randomized clinical trial study was conducted in the Postgraduate Department of Ophthalmology, Government Medical College, Srinagar from October2018 to June2019.. A total of 100 patients who underwent phacoemulsification with intraocular lens (IOL) implantation were included in this study. Patients were randomly assigned to topical group (group 1, n=50) whoreceived 0.5% proparacaine in conjunctival sac every 5 minutes for half an hour before surgery. and peribulbargroup (group 2, n=50) in whom 10ml of 2% lignocaine hydrochloride and 1:10000 adrenaline with preaddedhyalase) was given in peribulbar space 5ml was injected with 24G needle at the junction of medial two third and lateral one third; and 5ml superiorly just medial to supra-orbital notch. Patients refusing informed consent, having communication problem and nystagmus were excluded from the study. All surgeries were performed by the same surgeon.
Results: The difference between two groups regarding analgesia was found to be statistically insignificant. Peribulbar group provided significant akinesia. Almost same level of difficulty was encountered by surgeon in both groups.
Conclusion: Topical anaesthesia is an effective alternative to peribulbaranaesthesia for phacoemulsification reducing the risks associated with peribulbar injection.
Key Words: Phacoemulsification, Peribulbar , Topical , akinesia.

I. INTRODUCTION

Cataract surgery has become one of the most commonly performed surgical procedures. In recent years, advances in cataract surgery have led to greater levels of refractive precision, faster visual rehabilitation, improved comfort and safety. Newer techniques like small corneal or limbal incisions, phacoemulsification of the lens nucleus [1,2,3], and implantation of foldable intraocular lenses [4] have made it possible to switch from general anesthesia to local anesthesia [5,6], including retrobulbar or peribulbar injections of local anesthetics. The advent of small, stepped, and self-sealing corneal incisions, in which very little manipulation is required, has allowed the use of Sub-Tenon [7,8] and topical anesthesia [9,10]. Retrobulbar block remained popular for ages. But each time with a needle introduced into the orbit there is definite risk of complications[11]. Since 1986, peribulbaranaesthesia has replaced retrobulbar as a safe and effective method of block[12]. However injection related complications such as orbital bleeding, ocular perforation, optic nerve trauma, intra vascular injection of anaesthetic agent and extra ocular muscle dysfunction have been reported[13]. Although these blocks provide excellent anaesthesia but risk of vision threatening and even life threatening complications is always there[14]. These complications can be avoided by using topical anaesthesia[15] .In 1884 Koller for the first time used cocaine for Topical anesthesia[16]. Topical anaesthesia increased from 8% in 1995 to 63% in 1998 for high volume cataract surgeries[17]. Topical anesthesia for phacoemulsification was first reported by Kershner in 1993 [10,18]. After one century, Fichman used an attractive alternative method of injecting local anaesthetic agents resulting in faster visual recovery and high patient satisfaction [16,19]. 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 [20]. The technique is also economical, avoids undesirable cosmetic adverse effects, and allows instant visual rehabilitation [20]. Topical anesthesia blocks the trigeminal nerve ending in the cornea and the conjunctiva only [21], leaving the intraocular structures in the anterior segment un-anesthetized. Thus the manipulation of the iris or stretching of ciliary and zonular tissues which may be irritable during surgery in complicated cases could irritate the un anaesthetized ciliary nerve ending and result in patient discomfort and

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inadvertent eye movement, compromising the overall safety of the procedure [22]. Also the optic nerve and motor neurons are not affected, and the ocular motility is maintained. Some reports indicate that topical anesthesia is safe and effective in most uncomplicated cataract procedures. Other studies suggested that topical anesthesia should not be considered in eyes with severe concomitant ocular pathological features. Various studies have assessed patient satisfaction with topical versus peribulbar anesthesia with conflicting results [23,24]. The purpose of the present study was to evaluate the difference between peribulbar and topical anaesthesia for cataract surgery.

II. PATIENT AND METHODS

A total of 100 patients who underwent phacoemulsification surgery with foldable intraocular lens in Department of Ophthalmology, Government Medical College Srinagar were included in this study from October 2018 to June 2019. This was prospective randomized clinical trial.They were randomly assigned by systematic random sampling method to either the Topical group (group 1, n=50) or Peribulbar group (group 2, n=50).

Consent was obtained from patients and relatives for possible topical or peribulbar anesthesia, according to the policy of our ethical committee. Patient's level of pain and discomfort was judged by the same person in all cases to reduce bias. All our patients were day care cases. All surgical procedures were performed by the same surgeon.In group 1, 0.5% proparacaine eye drops were instilled every 5 minutes half an hour before surgery.The patients in group 2 received (Diffusing agent hyalase was added to the combination of lignocaine hydrochloride and adrenaline, 10ml of 2% lignocaine hydrochloride and 1:10000 adrenaline with preaddedhyalase) was given (in peribulbar space 5ml was injected with 24G needle at the junction of medial two third and lateral one third; and 5ml superiorly just medial to supra-orbital notch in the peribulbar space). No sedation was given. All of the patients under went phacoemulsification with IOL implantation. Pain was scored using visual analogue scale. Each patient was shown a visual analogue scale with numerical and descriptive ratings from 0 (no pain), 1 – 2 (slight stinging), 3 – 4 (mild pain), 5 – 8 (moderate pain) and 9 – 10 (severe pain). Patients were briefed about the use of this pain scale to rate the level of pain felt Pre-operatively (during administration of anesthesia topical / peribulbar), intra-operatively i.e. phacoemulcification with intra ocular lens implantation and 4 hours post operatively. Discomfort and feeling of pressure in the eye during administration of injection, during surgery and 4 hours post operatively were assessed as No = 0 or Yes = 1. Akinesia was also assessed on four point scale as depicted. The difficulties encountered by the surgeon during the surgeries were also graded as not difficult (grade 0), slightly difficult (Patient uneasy = grade 1), moderately difficult (Patient repeatedly squeeze eyes = grade 2) and extremely difficult requiring additional analgesia (Unbearable pain = grade 3).

Pain scoring:
No Pain (0)
Slight Pain(1-2)
Mild Pain (3-4)
Moderate Pain (5-8)
Severe Pain (9-10)

Akinesia scoring:
No Movement (0)
Slight Movement (1)
Moderate Movement (2)
Full Movement (3)

Inclusion Criteria
- Patients with senile cataract

Exclusion Criteria
- Patients refusing informed consent
- Patients with communication difficulty
- Patients suffering from dementia
- Patients with nystagmus
- Patients unable to understand pain scale
- Patients with hazy cornea,allergy to lidocaine, poor pupillary dilatation (less than 3 mm), anterior segment pathology, anxiety, dementia, deafness, nuclear sclerosis grade 4 and ocular movement disorders were excluded from the study.

Statistical Analysis
The data was analyzed by SPSS version 10. Standard errors and standard deviation for all variables were calculated, where necessary. Chi- square test was used for categorical data. Numerical data was analyzed using unpaired two tailed t- test. Nominal data and proportions were compared with Chi-squared analysis. A $p < 0.05$ was considered statistically significant.

III. RESULTS

This study was conducted at Department of Ophthalmology, Government Medical College Srinagar from Otober 2018 to June 2019. 50 patients underwent phacoemulsification under topical anesthesia and 50 patients underwent phacoemulsification under peribulbar anesthesia. In

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Group 1, there were 34 % males and 66% females while Group 2 comprised 32% males and 68%females.

During administration of anesthesia feeling of pain (p= 0.004) wassignificantly lower with topical anesthesia as compared to peribulbar block. Intraoperative pain and four hours post operative pain scores were almost comparable in both groups(Fig 1A – B).

Feeling of pressure (p=0.001) and feeling of discomfort (p=0.0001) was significantly lower in topical group at the time of drug administration as compared to peribulbar group. Almost same values were obtained intra operatively and 4 hour hours post operative in both groups (Fig 2-3).

Pain with topical anaesthesia

Y axis no of patients, X axis pain score

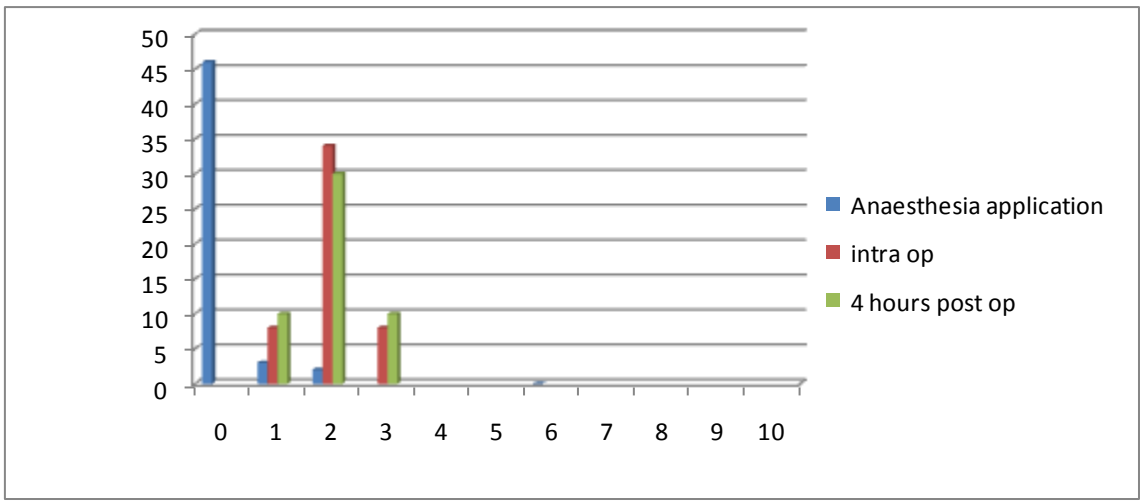

Fig 1A

Pain wihperibulbaranaesthesia

Y axis no of patients, X axis pain score

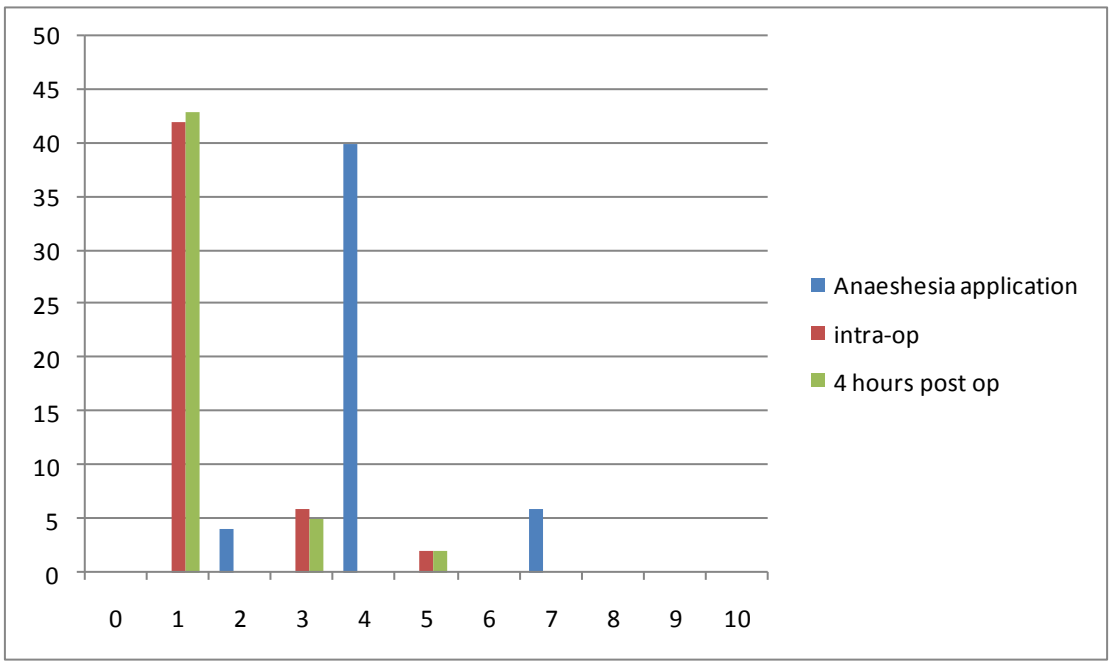

Fig 1B

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Feeling of discomfort

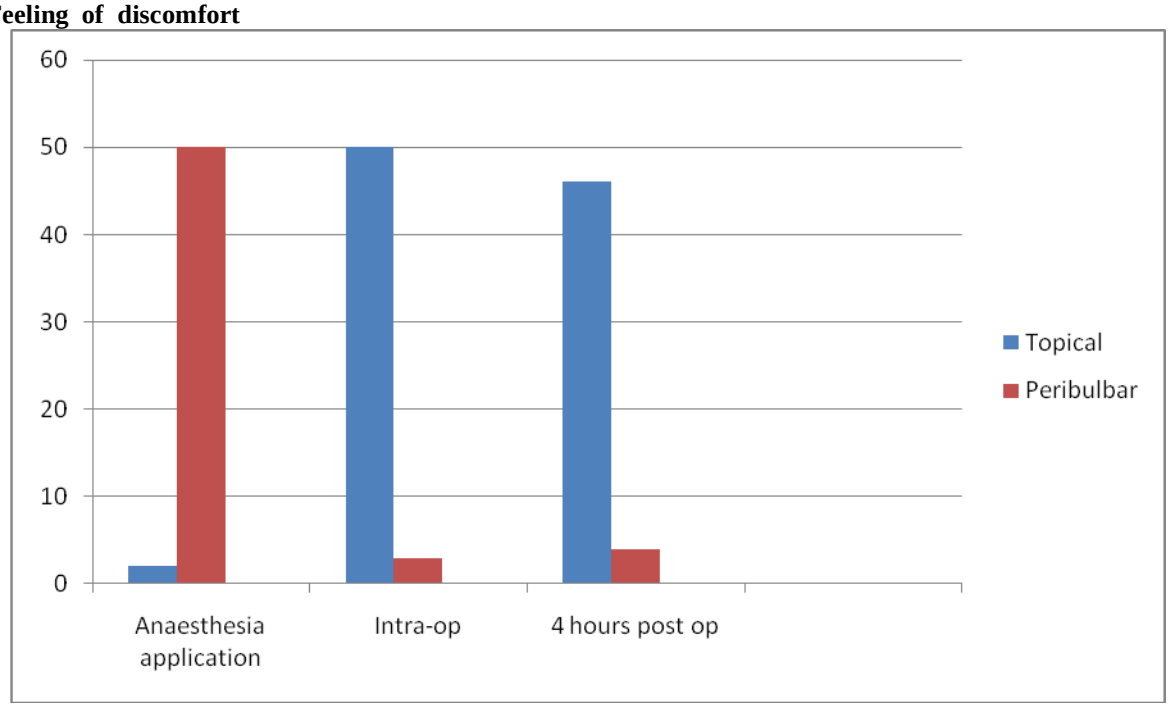

Fig: 2

Feeling ofPresure

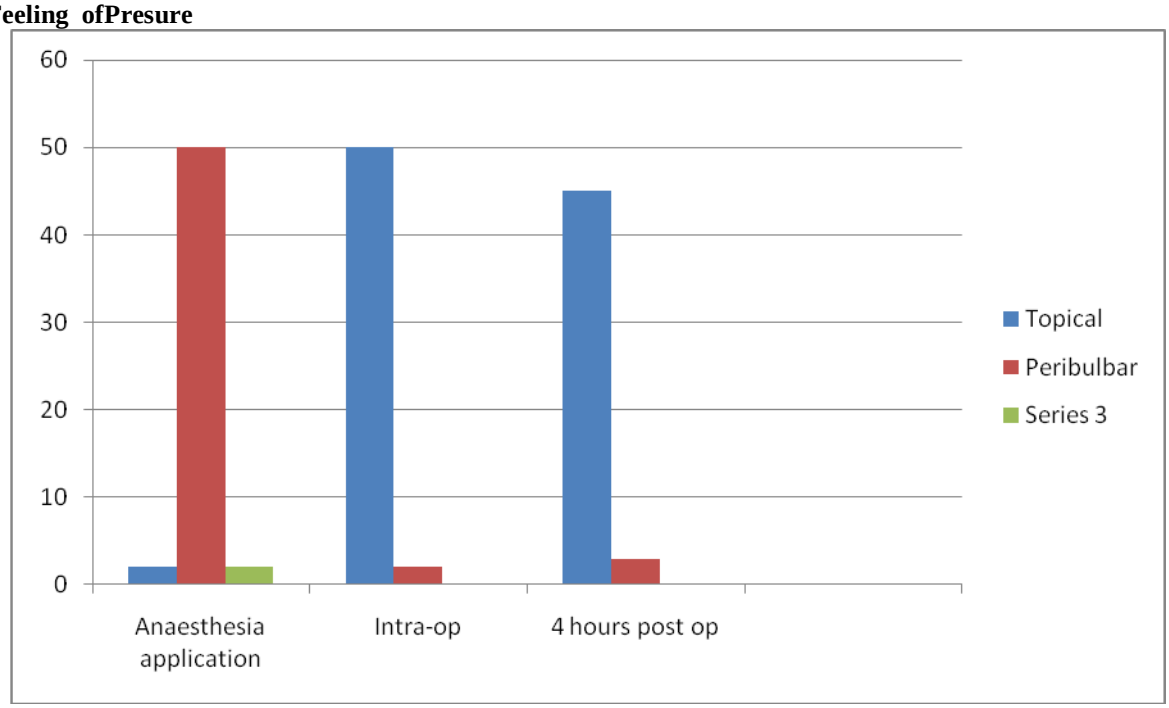

Fig: 3

The relationship of akinesia with peribulbarand topicalanaesthesia is given in Table 1.

Table:1

Akinesia value	Topical 50 Cases n(%)	Peribulbar 50 Cases n(%)
No movement (0)	2 (4)	30 (60)
Slight movement	6 (12)	18 (36)

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(1)		
Moderate movement (2)	28 (56)	2 (4)
Full movement (3)	14 (28)	0

In group 2, 60% of patients had no movements whereas only 2% patients had no movements in group 1. 36% patients with peribulbaranaesthesia exhibited slight movements whereas 12% patients of topical anaesthesia had slight movements. 4% patients had moderate and none of the patient had full movements in peribulbar group. 56% of patients in topical group showed moderate movements and 28% exhibited full movements.

The descriptive data regarding the level of difficulty encountered by the surgeon is given in table 2.

Table:2

Level of difficulty	Topical 50 Cases n(%)	Peribulbar 50 Cases n(%)
Not difficult	42(84)	47 (94)
Mild difficult	5 (10)	2 (4)
Moderate difficult	2(4)	1 (2)
Severe difficult	1 (2)	0

Anesthesia related complications were only seen in peribulbar group which included chemosis, ecchymosis, subconjunctival hemorrhage and peribulbar hemorrhage.

IV. DISCUSSION

For over a century anaesthesia for cataract surgery has been performed by injecting local anaesthetics into the retrobulbaror peribulbar space. This has been associated with a whole array of complications such as accidental perforationof the globe, retinal vesselocclusion, retrobulbarhaemorrhage,optic nerve injury, contralateral visualloss, retinal detachment, cardiopulmonaryand respiratory arrest andgrand mal seizures[25,26,27]. These complications have spurred the search for alternate ways of providing anaesthesia in cataractsurgery. Topical anaesthesia was proposedby Fichman[28] as analternative to the conventional techniqueof injecting local anaestheticagents into the peribulbar or retrobulbarspace. It led to faster visual recoveryand higher patient satisfaction.Further advantages of topical anaesthesiainclude its ease of application,minimal to no discomfort on administration,rapid onset of anaesthesia and most importantly, the elimination ofthe potential risks associated with retrobulbarinjections[25,28]. In addition to all ofthese advantages, the technique is economical,avoids undesirable cosmeticadverse effects and allows instantvisual rehabilitation. One of the maindisadvantages of topical anaesthesiais, however, the fact that it allowsfor fully preserved ocular motility. The results of the present prospective, randomized studysuggest that topical anaesthesia is as safe and effective as peribulbaranaesthesia for routine cataract surgery and is comparable to study conducted by Jacobi et al[29]. Additionally, in our study, there was no statistically significant difference in the pain scores supplied by the topical anaesthesia group and the peribulbaranaesthesia group. This suggests that routine cataract surgery may be performed using topical anaesthesia. Further reasons for using topical anaesthesia include the fact that it eliminates the risks inherent in carrying out a peribulbar injection into the orbit, such as perforation of the globe, injection into the optic nerve meninges with indirect involvement of the brain stem, laceration of the optic nerve, retrobulbarhaemorrhage, orbital infection, and additional damage to the optic nerve in patients with advanced glaucomatous optic nerve atrophy. Moreover, as topical anaesthesia is less invasive than peribulbaranaesthesia, patients may require less intraoperative and postoperative monitoring with topical anaesthesia than with peribulbaranaesthesia. This may reduce the costs associated with cataract surgery. Visual rehabilitation in the postoperative period may be faster with topical anaesthesia, as it allows patients to see just after surgery, whereas the optic nerve and extraocular muscles may still be partially blocked by local anaesthetics in patients who have undergone cataract surgery with peribulbaranaesthesia. Another advantage of topical anaesthesia compared to peribulbaranaesthesia is that it allows for full motility of the eye. It can be difficult to perform intraocular surgery, particularly in patients with a relative

enophthalmus and prominent orbital rims. However, if the patient can be asked to look in different directions, it is easier for thesurgeon to reach locations in the eye that otherwise might be almost inaccessible. Another advantage of topical anaesthesia applies to patients who have previously undergone ocular surgery, such as retinal detachment surgery including scleral buckling procedures. In these patients, scar formation in the orbit may limit the diffusion of peribulbaranaesthetics. Additionally, the increased risk of globe perforation with peribulbaranaesthesia in highly axially myopic patients may require such patients to undergo cataract surgery under general anaesthesia unless topical anaesthesia can be applied. In our study, anaesthesia-related complications prevailed, as expected, in the peribulbar group. Chemosis, subconjunctivalhaemorrhage and periorbitalhaematoma were exclusively observed in the peribulbaranaesthesia group. However, these adverse events were of no substantial clinical concern, as they did not prevent or delay the planned surgical intervention in any patient. The pain scoresreported by the patients immediately after completion of surgery did not differ significantly between the two studygroups. This suggests that topical anaesthesia was sufficiently analgesic to reduce pain for the majority of the patients involved in the study.

V. CONCLUSION

In conclusion, patients undergoing cataract surgery with topical anaesthesia and patients undergoing cataract surgery with peribulbaranaesthesia did not vary in terms of subjective pain score and other parameters measuring intraoperative pain, efficacy of anaesthesia and feasibility of surgery. This suggests that cataract surgery can be performed with topical anaesthesia without compromising the safety of the procedure.

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