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A comparative study of effectiveness of topical with supplemental intracameral lignocaine versus peribulbar anaesthesia for phacoemulsification with foldable intraocular lens implantation

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ABSTRACT

Aims: To assess the quality of analgesia, level of comfort of patients and surgeons and incidence of complications after topical anaesthesia with supplemental intracameral lignocaine as compared to peribulbar block in patients undergoing phacoemulsification.

Materials and Methods: It was a prospective observational study done in 66 patients having uncomplicated senile cataracts who underwent phacoemulsification with foldable IOL implantation of both eyes. One eye of each patient was operated under peribulbar blockand the other eye under topical anaesthesia with supplemental intracameral lignocaine after 2 weeks. In Group T, topical anaesthesia was achieved by instilling proparacaine hydrochloride 0.5% and preservative free 1% lignocaine was used for intracameral analgesia. Peribulbar block was administered with 5-7 ml of 2% lignocaine with 1:10000 adrenaline. Patient comfort, feeling of pressure during block, quality of analgesia intraop and 4 hours postop, and surgeon's comfort were documented.

Results: Group P patients had significantly higher pain score, discomfort and pressure on eye during administration of block compared to Group T. Both groups had comparable pain scores and patient's discomfort. Pressure on eye intraop and postop and intraoperative positive pressure were also similar in both groups. Group P had significantly higher incidence of subconjunctival hemorrhage (80% vs 10%) and chemosis of conjunctiva. (80% vs 0%).

Conclusion: Topical anaesthesia with supplemental intracameral lignocaine can be considered as a superior anaesthetic technique for phacoemulsification than peribulbar block as it is associated with significantly higher patient comfort and lower complications with comparable surgeon's comfort.

1. Introduction

An ideal anesthetic should provide pain free surgery with no ocular or systemic complications and should provide comfort to the patient and the surgeon as well. The gradual and progressive changes in cataract surgery techniques over the years witnessed a change in the anesthetic technique as well, from peribulbar block (PB) to topical anaesthesia (TA). The reasons for the increasing popularity of topical anaesthesia over peribulbar block are ease of administration, lack of injectable anesthetic related complications and early visual recovery. Review of the already published data suggest peribulbar block to be better than topical anesthesia in view of better patient comfort.[1] But we hypothesized that augmenting topical anaesthesia with intracameral lignocaine might improve the quality of analgesia thereby ensuring improved patient and surgeons' comfort.

The present study was aimed to assess quality of intraoperative analgesia, patient and surgeons' comfort and incidence of complications following topical anaesthesia with supplemental intracameral lignocaine versus peribulbar block during phacoemulsification with foldable intraocular lens implantation (IOL).

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2. Materials and Methods

The present study was a prospective observational study conducted at Government Medical College, Kottayam, Kerala, over a period of six months from April 2019 to Sept 2019 after obtaining Institutional Ethical Committee clearance(IRB No 102/2018 dated 21.03.2019) and informed consent from the study subjects.

Based on a previous study by Dole et al.,[1] considering patient satisfaction under peribulbar block versus topical anaesthesia (96.8% versus 84.2%), with 95% confidence interval and 80% power the minimum sample size required to obtain statistically significant result was calculated to be 66 per group. Therefore sixty six patients were recruited into the study. Patients undergoing phacoemulsificationwith foldable IOL implantation of both eyes two weeks apart in the age group of 40-75 years with uncomplicated senile cataracts without a previous history of trauma or surgery were recruited into the study. Patients with history of allergy to local anaesthetic agents, epilepsy, Parkinsonism, cognitive disorders, Alzheimer's disease, claustrophobia, chronic cough, impaired hearing, and those with concurrent presence of ocular comorbidities like uveitis, manifest squint or poor fixation due to nystagmus were excluded from the study.

After recruiting, the patients were randomly allocated into either Group T or Group P before phacoemulsification of the first eye based on computer generated random sequence of numbers. All the study subjects underwent 2.8mm clear corneal phacoemulsification (Infiniti, Alcon) with foldable IOL implantation of one eye under peribulbar block and the other eye under topical anaesthesia with supplemental intracameral lignocaine. Both surgeries were performed two weeks apart and by a single surgeon. No preoperative sedatives were used during the surgical procedure. The microscope light was set at low to medium brightness initially and gradually increased during the procedure.

For the Group T, topical anesthesia was provided soon after dilating the pupil but before the start of the surgery by instilling one drop of proparacaine hydrochloride 0.5%. It was repeated four times every 3 minutes and after each installation of the drug, eyes were kept closed. Patients were asked to fixate towards the microscope light in case of topical procedure and were instructed not to move the eyes especially during making of incisions, capsulorrhexis, and implantation of foldable intraocular lens. Continuous verbal communication was maintained between the surgeon and the study subject throughout the procedure. Unpreserved 1% lignocaine was used for providing intracameral analgesia using a 26 G cannula through the sideport before capsulorrhexis, and implantation of foldable IOL.

For Group P, peribulbar block was given with a 24G needle. The local anaesthetic agent used was 2% lignocaine with 1:10000 adrenaline (5-7 ml) and the needle puncture was made at the junction of middle and outer third of the lower orbital margin with the needle tip directed towards the orbital floor. The eyes of the patients were massaged to normalise the intraocular pressure (IOP).

Patient comfort was assessed using Numeric Pain Rating Scale (NPRS) by a postgraduate resident doctor who was not aware of the technique of analgesia provided. Patients were elaborated about the use of this pain scale before surgery. The 11-point numeric scale ranges from 0("no pain") to 10 representing "pain as bad as you can imagine" or "worst pain imaginable".[2] Four hours after surgery, patients were asked to rate the pain they experienced while receiving allocated anaesthetic technique, during the surgical procedure, immediately following the surgical procedure and 4 hours postoperatively (Table 1). The presence or absence of discomfort and whether experienced a feeling of pressure in the eye during administration of block, during surgical procedure and 4 hours post-operatively were also documented (No = 0, Yes = 1).

After the procedure, the surgeon's comfort was assessed and scored taking into account the intraoperative positive intraocular pressure, development of chemosis, and subconjunctival hemorrhage. The overall comfort of the surgeon was noted based on Table 1. Other parameters recorded were need of change in surgical technique, requirement of supplemental anaesthesia and development of intraoperative complications.

Statistical analysis was done with Paired t-test to compare the various parameters at different time points using SPSS version 20.0 for Windows (IBM Corporation, ARMONK, NY, USA).

3. Results

Out of the 66 subjects recruited, 42 patients were females (63.64%) and the mean age was 63.3±7.2 years. The type of cataract was comparable in both the groups which included nuclear sclerosis grade 2-3 (n=35), cortical opacities (n=18), posterior subcapsular opacities (n=9) and mixed opacities (n=5). It was seen that Group P patients had significantly higher NPRS score compared to Group T (6 vs 0, $p < 0.001$) during administration of block. However, the NRPS scores documented intraoperatively, in the immediate postoperative period and 4h postoperatively were comparable in both groups ($p < 0.05$, Table 2). Three patients under peribulbar anaesthesia required additional topical lignocaine due to inadequate analgesic effect. Surgeon's comfort in both the groups did not show any statistically significant difference (p 0.480).

The incidence of discomfort and complaint of pressure on the eye while performing the block was significantly higher in Group P compared to Group T ($p < 0.001$). Though patients in the T group were more aware of the intraocular pressure fluctuations especially during insertion

Table 1: Assessment of patient's and surgeon's comfort

Patient's comfort	
NPRS - 0	No pain
1 – 2	Slight stinging
3 – 4	Mild pain
5 – 8	Moderate pain
9 – 10	Severe pain
Surgeon's comfort	
Grade 0	Not difficult (Patient comfortable)
Grade 1	Slightly difficult (Patient uneasy)
Grade 2	Moderately difficult (Patient repeatedly squeezing eyes)
Grade 3	Extremely difficult requiring additional analgesia (Patient has unbearable pain)

Table 2: Patient pain as assessed with numerical rating scale and surgeon's comfort

Variables	Group P Median (Min-Max)	Group T Median (Min-Max)	P value
NRS at block	6.00 (2.0–8.0)	0.00 (0.0–1.0)	<0.001
NRS intraop	1.00 (0.0–3.0)	1.00 (0.0–2.0)	0.209
NRS immediate postop	0 (0-0)	0 (0-0)	1.000
NRS 4h postop	1.00 (0.0–2.0)	1.00 (0.0–1.0)	0.316
Surgeon's comfort grade	0 (0-3)	0 (0-1)	0.480

Table 3: Patient's discomfort and pressure on eye

Time		Group P n (%)	Group Tn (%)	P value
During block	No	-	66 (100.0)	<0.001
	Yes	66 (100.0)	-	
Intraoperatively	No	56 (85.0)	46 (70.0)	0.451
	Yes	10 (15.0)	20 (30.0)	
4h post operatively	No	59 (90.0)	53 (80.0)	0.661
	Yes	7 (10.0)	13 (20.0)	

Table 4: Incidence of complications

Variables		Group P n (%)	Group T n (%)	P value
Positive pressure	High	13 (20.0)	7 (10.0)	0.661
	Normal	53 (80.0)	59 (90.0)	
Subconjunctival hemorrhage	No	13 (20.0)	59 (90.0)	<0.001
	Yes	53 (80.0)	7 (10.0)	
Chemosis	No	13 (20.0)	66(100.0)	<0.001
	Yes	53 (80.0)	-	

of the foldable IOL compared to the other group, the results were not significantly different (p=0.451). The 4h postoperative results also showed a similar trend (p=0.661, $).

Intraoperative positive pressure as assessed by the surgeon remained comparable in both groups. The higher incidence of subconjunctival hemorrhage observed in Group P compared to Group T (80% vs. 10%) as well as the incidence of chemosis of the conjunctiva (80% vs. 0%, Table 4) were found to be statistically significant ($p < 0.05$). One patient in the T group had capsolorrhexis run off to the periphery for which additional subconjunctival anesthesia was supplemented.

4. Discussion

Size of incision of cataract surgeries has decreased since its inception. Along with that there was drastic change in the anaesthetic techniques as well from general anesthesia to regional techniques like retrobulbar and peribulbar blocks and now topical anaesthesia is fast gaining popularity among the ophthalmic surgeons.[3] Retrobulbar block is less commonly used for cataract surgery nowadays as it is associated with higher incidence of complications like retrobulbar hemorrhage, central retinal artery occlusion, globe perforation, central spread of local anesthetic and optic nerve injury. Though peribulbar block reduces the risk of optic nerve injury and spread of local anesthetic to brain, the onset of action is slow and provides less akinesia and analgesia intraoperatively compared to retrobulbar block.

The experience of significant pain during peribulbar block in comparison with topical anaesthesia has been suggested as the main reason for the unpopularity of peribulbar technique among patients undergoing cataract surgeries.[4–6]

Advantages of topical anesthesia include lack of injection related complications,[7] rapid visual rehabilitation following surgery,[8] and retention of ocular motility during surgery which is advantageous for the operating surgeon.[9] Topical anaesthesia may be recommended only to co-operative patients who are able to tolerate the light of the microscope even in the presence of a dilated pupil. Topical anaesthesia for cataract surgery is usually achieved by instilling various local anaesthetic agents into the eye like proparacaine (0.5%), lidocaine (0.5 or 1%) or bupivacaine (0.25 or 0.5%) for blocking the afferent nerve fibers from the cornea and conjunctiva. The main drawback of this technique is that the pain sensitivity of iris and ciliary body is not completely eliminated. Therefore, additional analgesia may be frequently required, in the form of supplemental intracameral preservative-free lignocaine, to provide optimal intraoperative analgesia.[10]

As intracameral anaesthesia ensures sensory blockage of the iris and ciliary body, the discomfort experienced by patients during intraocular lens placement can be lessened to a great extent with this simple technique. Since the optic nerve function remains unaffected in patients undergoing cataract extraction under topical anaesthesia, the complaints like seeing light, colours, movement of instruments during surgery are frequent and sometimes even frightening for some.[10,11] A previous comparative study has reported that discomfort from the operating microscope light is more common with topical anaesthesia than other types of regional anaesthesia.[12] Discomfort from the operating microscope light may be lessened by starting the surgery with a low level of brightness which is then increased gradually during the procedure. Pre-operative counseling regarding the common complaints patients will have during cataract extraction and intravenous premedication with anxiolytic drugs like midazolam may be helpful in alleviating the fear caused by intra-operative visual images[13] Use of intravenous dexmedetomidine $1\mu g.kg^{-1}$ as a sedative during cataract surgery under topical anesthesia has shown to result in improved satisfaction of both patients and surgeons without any untoward effects.[14]

In a previous study, in which patient satisfaction was analysed in those who underwent bilateral phacoemulsification under peribulbar block for one eye and topical anaesthesia for the other, had revealed a higher patient satisfaction following peribulbar block.[15] Though the results may look contradictory to our observations there was a major difference in the methodology as there was no additional intracameral use of lignocaine in their study. Study by Dole et al.[1] had also made almost similar observations. Based on these observations we recommend supplementation of topical anaesthesia with intracameral local anaesthetic as a better technique to ensure optimal patient comfort during phacoemulsification. However, a thorough preoperative counseling and good surgeon-patient communication during surgery are essential for a successful surgical outcome.

The strong points of our study were that as same patients formed both the groups and compared comfort with two different techniques of analgesia, subjective variability due to different levels of individual pain sensitivity did not cause any bias. Since all surgeries were performed by same surgeon, the subjective variability due to differing levels of experience and expertise was also eliminated. The major drawback of our study was that as it was an open label study, only the outcome assessor was blinded.

5. Conclusion

Topical anesthesia with supplemental intracameral lignocaine can be considered as a superior anaesthetic technique for phacoemulsification with foldable IOL implantation than peribulbar block as it is associated with significantly higher patient comfort and lower complications with comparable surgeon's comfort.

6. Source of Funding

None.

7. Conflict of Interest

None.

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