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A COMPARATIVE STUDY OF TOPICAL ANAESTHESIA WITH LOCAL INFILTRATION VERSUS PERIBULBAR ANAESTHESIA IN MANUAL SMALL INCISION CATARACT SURGERY

Ophthalomology

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ABSTRACT

OBJECTIVE: To compare the safety and efficacy in terms of pain, surgeon's satisfaction and anaesthesia related complications of topical anaesthesia with local infiltration versus peribulbar anaesthesia for Manual Small Incision Cataract Surgery (MSICS) with posterior chamber intra ocular lens (PCIOL) implantation. **MATERIALS & METHODS:** A Non-randomized clinical trial was conducted on 102 patients with senile cataract undergoing MSICS + PCIOL surgery where they are allotted into two groups of 51 patients each. Group I received peribulbar block & group II received topical anaesthesia with local subconjunctival infiltration. Safety and efficacy in terms of pain, surgeon's satisfaction and anaesthesia related complications were compared between the groups. **RESULTS:** In our study, the analgesia obtained during surgery was comparable & statistically insignificant between the two groups. Chemosis, subconjunctival haemorrhage & pain during administration of anaesthesia was more in group I. However, anaesthesia related intraoperative difficulties as judged by the surgeon were more in group II.
CONCLUSION: Topical anaesthesia with subconjunctival infiltration is an effective alternative to peribulbar anaesthesia for MSICS + PCIOL implantation

KEYWORDS

Topical Anaesthesia, Peribulbar Anaesthesia, Manual Small Incision Cataract Surgery

INTRODUCTION

Cataract is the biggest cause of curable blindness in India & worldwide. Surgical removal of opaque lens with implantation of IOL is the only treatment option available.The strategies used to achieve optimal anaesthesia in cataract surgery vary from retrobulbar, peribulbar, sub-tenon, intracameral and subconjunctival to topical techniques. But the blind insertion of needle with infiltration anaesthesia has never been completely free from sight and life threatening complications like brainstem anaesthesia, globe perforation, optic nerve injury, etc. In order to avoid these complications, needle free procedure such as topical anaesthesia was developed.Various studies have assessed patient satisfaction with topical versus peribulbar anaesthesia with conflicting results.This study is conducted to see to what extent the topical anaesthesia with local subconjunctival infiltration is safe and better. The findings from this study will give an evidence based insight that could influence a paradigm shift to a more patient & surgeon friendly anaesthetic technique in the surgical treatment of cataract patients.

OBJECTIVE

To compare the safety and efficacy in terms of pain, surgeon's satisfaction and anaesthesia related complications of topical anaesthesia with local infiltration versus peribulbar anaesthesia for manual small incision cataract surgery (MSICS) with posterior chamber intraocular lens (PCIOL) implantation

METHODS AND METHODOLOGY

A non randomized clinical trial was conducted in the department of ophthalmology in a tertiary institute for a period of 24 months from September 2018 to august 2020.A total of 102 patients with senile cataract attending eye OPD were included in the study. Patients who were sensitive to xylocaine, inability to understand and comply with verbal commands (eg. those with deafness, dementia or aphasia), patients with present or past history of uveitis and other ocular inflammation or diseases other than cataract, patients with past history of significant eye trauma and any patients having complicated cataract, traumatic cataract were excluded from the study.

A complete medical history was taken from each patient identified as having cataract to obtain information regarding any previous surgery, allergy to any medication. Any other known systemic diseases and detailed ocular history were also obtained from all patients. Informed consent from each and every patient included in the study was taken. Detailed pre-operative examination including slit-lamp examination, fundus evaluation, keratometry, biometry and intraocular pressure by non-contact tonometer/Schiotz tonometer were done. Prior to surgery, patients were equally allotted into two groups. Group I underwent manual small incision cataract surgery with posterior chamber lens implantation under peribulbar anaesthesia and Group II under topical anaesthesia with local subconjunctival infiltration. Pre-operative regime consisted of-Xylocaine sensitivity testing, topical antibiotic and NSAID i.e. Moxifloxacin plus ketorolac combination was started in QID dose 24 hours prior to surgery, one dose of Tablet Acetazolamide 250mg was given on the morning of surgery and pupil dilatation was achieved by using Tropicamide and Phenylephrine hydrochloride ophthalmic solution.

All the surgeries were performed by a single experienced surgeon. Skin preparation of the eye to be operated upon was done by 10% betadine solution.

- GROUP I patients underwent manual small incision cataract surgery by peribulbar block.
- GROUP II patients underwent manual small incision cataract surgery by topical anaesthesia with local subconjunctival infiltration.

The group 1 received peribulbar injection consisting of Lignocaine 2% with adrenaline 1:200000 and 0.5% Bupivacaine Along with hyaluronidase 1500 IU dissolved in 30 mL of 2% Lignocaine with adrenaline (1:200000) resulting in 50 IU/mL of anaesthetic mixture.

In a 10mL syringe with 24 guage, 2.5cm needle, 6mL of that 50 IU/mL anaesthetic solution and 4mL of 0.5% Bupivacaine was inserted transcutaneously at the junction of the middle two-thirds and lateral one-third of the lower orbital margin with needle directed towards the floor of the orbit for about 2.5cm.Gentle aspiration of the syringe was performed to alleviate possible entry of the needle into a blood vessel and then 4-5 ml of the anaesthetic mixture was injected into the lateral adipose tissue of the orbit. A supplementary injection of 3-4 ml was

given at the supra-orbital notch with needle directed towards the roof of the orbit. The eyelid was closed and pressure was applied to the eyeball intermittently for 3-5 minutes.

Group 2 patients were taken up for surgery after putting 1-2 drops of 0.5% Proparacaine HCl, Lignocaine 2% gel was instilled in the superior and inferior fornices and on the corneal surface twice at 5 minutes interval within 10 minutes prior to surgery allowing the anaesthetic to bathe the cornea. The eye was washed thoroughly by balanced salt solution on the operating table before starting the surgery. Local sub-conjunctival infiltration of 1mL of 2% lignocaine with adrenaline (1:200000) was injected before giving scleral incision under the direct visualisation of operating microscope which is usually in the supero-temporal quadrant.

For both modes of anaesthesia the patient was instructed to look at the operating microscope light and the surgery was started. No superior rectus suture was taken. The sclera was exposed taking a fornix based conjunctival flap and the bleeding vessels were cauterized by a bipolar wet field cautery. The rest of the steps were same as for any small incision cataract surgery with intra-ocular lens implantation.

Postoperative regime were standardized as a course of Tablet Amoxicillin and Clavulanic acid combination (625mg) was given twice a day for 5 days, systemic analgesic with Tablet Diclofenac and Serratiopeptidase combination was given SOS, topical Moxifloxacin with Difluprednate was given in QID dosage for 2 weeks. After each surgery, the surgeon evaluated the experience and the patient was asked to grade the pain felt at the time of administration of anaesthesia & during surgery on a linear scale from 0 (no pain) to 10 (severe pain) using a subjective grade scaling. Descriptive statistical analysis was carriedout using appropriate statistical method and entered in SPSS 21(IBM). Data was analyzed using Fisher Exact Test.

RESULTS

Table No. 1 Shows Age Distribution Of Study Groups (n=102)

Age in years	Group I	Group II	p-value
41-50	4(7.8%)	3(5.9%)	0.385
51-60	12(23.5%)	11(21.6%)	
61-70	19(37.3%)	13(25.5%)	
71-80	11(21.6%)	14(27.5%)	
81-90	4(7.8%)	10(19.6%)	
91-100	1(2%)	0(0%)	

After applying Fisher Exact Test, there is no significant difference between the two groups regarding age of the patients.

In Group I, 26(51%) patients were males and 25(49%) patients were females. In Group II, 24(47%) patients were males and 27(52.9%) patients were females. There is no significant difference between the two groups regarding gender.

Table No. 2 Shows Distribution Of Chemosis Among Study Groups (n=102)

Chemosis Of The Conjunctiva	Group I	Group II	P-value
No Chemosis	41(80.4%)	51(100%)	0.001**
Chemosis Involving One Quadrant	8(15.7%)	0(0%)	
Chemosis Involving Two Quadrant	2(3.9%)	0(0%)	

In Group II, no chemosis was seen in any patient. After applying Fisher Exact Test, there is statistically significant difference between the two groups.

Table No.3 Shows Distribution Of Subconjunctival Haemorrhage Among Study Groups (n=102)

Subconjunctival Haemorrhage	Group I	Group II	P-value
No SCH	49(96.1%)	51(100%)	0.495
SCH involving one quadrant	2(3.9%)	0(0%)	

In Group II, subconjunctival haemorrhage was not seen in any patient. With Fisher Exact Test, there is no significant difference between the two groups.

Table No.4 Distribution Of Analgesia Intraoperatively Among Study Groups (n=102)

Analgesia Intraoperatively	Group I	Group II	P-value
No pain and no sensation	42(82.4%)	35(68.6%)	P=0.341
Slight sensation or discomfort	7(13.7%)	12(23.5%)	
Mild pain	2(3.9%)	4(7.8%)	

In Group I, 42(82.4%) patients have no pain and no sensation, 7(13.7%) patients have slight sensation or discomfort and 2(3.9%) patients suffered mild pain. In Group II, 35(68.6%) patients have no pain and no sensation, 12(23.5%) patients have slight sensation or discomfort and 4(7.8%) patients suffered mild pain. With Fisher Exact Test, there is no significant difference between the two groups.

Table No.5 Shows Distribution Of Analgesia During Administration Of Anaesthesia Among Study Groups(n=102)

Analgesia During Administration Of Anesthesia	Group I	Group II	P-value
No pain and no sensation	0(0%)	49(96.1%)	P<0.001**
Slight sensation or discomfort	0(0%)	2(3.9%)	
Mild pain	39(76.5%)	0(0%)	
Moderate pain	10(19.6%)	0(0%)	
Severe pain	2(3.9%)	0(0%)	

In Group I, 39(76.5%) patients suffered from mild pain, 10(19.6%) patients suffered from moderate pain and 2(3.9%) patients suffered from severe pain. In Group II, 49(96.1%) patients have no pain and no sensation and 2(3.9%) patients have slight sensation or discomfort. After applying Fisher Exact Test, there is statistically significant difference between the two groups.

Table No. 6: Distribution Of Anaesthetic Related Intraoperative Difficulties As Judged By The Surgeon(n=102)

Anaesthetic related intraoperative difficulties as judged by the surgeon	Group I	Group II	P-Value
Non to slight difficulty	46(90.2%)	5(9.8%)	P<0.001
Moderate difficulty	5(9.8%)	41(80.4%)	
Extreme difficulty	0(0%)	5(9.8%)	

In Group I, 42(82.4%) patients have no pain and no sensation, 7(13.7%) patients have slight sensation or discomfort and 2(3.9%) patients suffered mild pain. In Group II, 35(68.6%) patients have no pain and no sensation, 12(23.5%) patients have slight sensation or discomfort and 4(7.8%) patients suffered mild pain. After applying Fisher Exact Test, there is no significant difference between the two groups.

Table No.7 Shows Distribution Of Akinesia During Surgery Among Study Groups(N=102)

Akinesia during surgery	Group I	Group II	P-value
No movement	43(84.3%)	0(0%)	0.001
Flutter	6(11.8%)	4(7.8%)	
Partial movement	2(3.9%)	36(70.6%)	
Full movement	0(0%)	11(21.6%)	

In Group I, 43(84.3%) patients experienced no movement, 6(11.8%) patients experienced flutter and 2(3.9%) patients experienced partial movement. In Group II, 4(7.8%) patients experienced flutter, 36(70.6%) patients experienced partial movement and 11(21.6%) patients experienced full movement. After applying Fisher Exact Test, there is statistically significant difference between the two groups.

DISCUSSIONS

In the present study, the two groups were compared regarding safety and efficacy in terms of pain, surgeon satisfaction and anaesthesia related complications in manual small incision cataract surgery with posterior chamber intraocular lens implantation. The results obtained were observed and analysed. There were no statistically significant differences in the patient profile between the two study groups.

In our study, pain during administration of anaesthesia in group I was mild in 39(76.5%) patients and moderate in 10(19.6%) patients. In group II 49(96.1%) patients had no pain during administration of anaesthesia. (Table 7) (P<0.001). Bhat MA et al in their study of 280 patients found a significant difference in pain during administration of anaesthesia between the two groups. In their study, they observed that mean pain during administration of peribulbar anaesthesia was 3.57(SD±1.49) and with topical anaesthesia was 2.32(SD±1.19). This finding is consistent with our study.Narayan S et al in their study of 150 patients found that 95% of the patients experienced pain during needle insertion in the peribulbar group while none of the patients in the topical group had pain during administration of anaesthesia which was statistically significant and consistent with our finding.

In group I, 42(82.4%) patients had no pain and 7(13.7%) patients had slight sensation or discomfort during surgery. In group II, 35(68.6%)

patients had no pain and 12(23.5%) patients had slight sensation or discomfort during surgery. (Table 8) (P=0.341)Joseph B et al in their study of 62 patients found out that intraoperatively 15 patients (53.57%) experienced mild pain in topical group compared to 21(61.76%) patients in peribulbar group which was not statistically significant. This is consistent with our study.Bhat MA et al in their study of 280 patients found that 118(84.28%) patients had grade-0 pain during surgery and grade-1 in 18(12.85%) patients in peribulbar group. In topical group, pain during surgery was grade-0 in 120(85.72%) patients and the grade-1 in 14(10%) patients which was not significant. This is consistent with our study.

There was statistical significance between the two groups (Table 5) (P<0.001) regarding chemosis. Subconjunctival haemorrhage was exclusively seen only in group I though it was not significant (Table 6) (P=0.495). This is consistent with the observations of Bhat MA et al and Joseph B et al studies.

There was significant difference between the two groups regarding akinesia during surgery (Table 10) (p<0.001) which is consistent with the finding of Bhat MA et al studies.

In group I, surgeon experienced none to slight difficulty in 46(90.2%) patients and 5(9.8%) patients had moderate difficulty during surgery. In group II, 41(80.4%) patients had moderate difficulty as experienced by the surgeon during surgery. (Table 9) (p<0.001).Narayan S et al in their study of 150 patients found that there was significant difference between the two groups regarding intraoperative difficulties as judged by the surgeon which is consistent with our study.

We choose verbal pain score of 5 levels (0-4): starting form 0=no pain; 1=slight sensation or discomfort; 2=mild pain; 3=moderate pain; 4=severe pain. A visual pain analog scale was difficult to apply for our patients for social reasons and poor vision in all patients. We modified our verbal score in order to enable us to speak to the patient at any time, or to hear them.

Topical anaesthesia administration was significantly less painful than the administration of peribulbar anaesthesia. The aim of peribulbar anaesthesia is good akinesia, which had been considered essential to cataract surgery. Now, most studies of topical anaesthesia for cataract surgery report that eye movement is easily controlled and sometimes these movements are helpful. In our study, eye movements were annoying for the surgeon but no case needed additional regional anaesthesia. We noticed in our study, the most painful step for the patients is the injection of the anaesthetic agent before the start of the surgery.

Topical anaesthesia avoids the risk of globe perforation, retrobulbar haemorrhage, damage to optic nerve, significant conjunctival chemosis, etc and above all the pain and fear perceived because of the peribulbar or retrobulbar injection. Possible disadvantages of topical anaesthesia is the adverse eye movement but it appeared to provide acceptable analgesia during surgery, wears off rapidly after surgery, and thus not interfere with the patients' ability to blink, see or move the eye. Topical anaesthesia has additional benefits like not interfering with visual function, immediate visual recovery, absence of pain due to injection, unlimited ocular motility, and absence of an increase in orbital volume.

Limitations

1. Subjective nature of the pain scale.
2. Surgeries were done by a single experienced surgeon; this arrangement might have omitted differences induced by variations in the surgical techniques and skills.

CONCLUSION

From our study, we concluded that topical anaesthesia in the form of lignocaine drops and jelly with local subconjunctival infiltration is an effective alternative to peribulbar anaesthesia for manual small incision cataract surgery with posterior chamber intraocular lens implantation.

Topical anaesthesia and peribulbar anaesthesia provide adequate analgesia, akinesia during cataract surgery. However, there is slight difference between the two groups in providing akinesia. Topical anaesthesia has some partial residual movements where the surgeon had to operate with incomplete akinesia which can be negotiated with patient cooperation or fixation forceps. In our study, though the residual partial movements did not hamper any steps in cataract surgery, surgeon found it much easier to operate with peribulbar anaesthesia as compared to topical.

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