Xylocaine gel 2% vs proparacaine 0.5% as topical anaesthesia in phacoemulsification in Bundelkhand: A prospective comparative study

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Abstract
To see the effectiveness of topical anesthesia; topical proparacaine 0.5% versus xylocaine (Lidocaine) gel 2%, during cataract surgery. This Prospective study was carried out in Ophthalmology department, Maharani Laxmi Bai Medical College, Jhansi, Uttar Pradesh, for 6 months from Oct. 2017 to March 2018'to evaluate the patients and surgeon's satisfaction at the end of the procedure. Total 100 number of patients (100 eyes) were included in the study, divided into, Group A receiving Xylocaine Gel 2% as topical anaesthesia and Group B receiving proparacaine 0.5% as topical anaesthesia patients were properly explained about the procedure. All 100 surgeries were conducted by single surgeon and same method of surgery was used in all patients i.e. phacoemulsification with foldable intraocular lens implantation. No patients had severe pain in either group during the procedure; 6% (3 of 50) required use of adjunctive peribulbar anaesthesia in Group B while only 2% (1 of 50) required additional peribulbar block in Group A satisfaction rate for both surgeon and patient were high. There was no eye movement and blepharospasm related problems and no serious complications occurred. Rate of vitreous loss due to posterior capsule tear/rupture was none. Topical anesthesia is a satisfactory and safe alternative to peribulbar block and xylocaine gel 2% has same effectiveness as topical proparacaine 0.5% for cataract surgery by phacoemulsification and IOL implantation.

Keywords: IOL, Phacoemulsification, Peribulbar anesthesia, Topical anesthesia.

Introduction
Cataract surgery is the most commonly performed surgery in eye. The surgery has evolved considerably since the advent of, 'couching' to intracapsular, extracapsular, and nowadays phacoemulsification. Similarly technique for anaesthesia has also changed since past. Few surgeon perform surgery under general anasthesia. Although it is easy for the surgeon, it subjects the patient to all the complications of G.A. In the past, the retrobulbar block anesthesia supplemented with facial nerve block was used routinely for cataract surgery, but had the disadvantages of a "blind injection" and significant risk of causing perforation, hematomas, or central nervous system spread.[1-6] Then there was advent of peribulbar block which avoided requirement of any additional block, and optic nerve damage was minimized, but the disadvantage is same that this is again a blind procedures and two injections given one along the supraorbital notch and the other inferiorly at the junction of two third.[7,8] Topical anesthesia is superior to peribulbar block because it overcomes the disadvantage of injection. Dr. Kelman in 1967 developed phacoemulsification surgery which is presently most widely used cataract surgery.[1] In Ophthalmology the type of anaesthesia depends on whether the patient is co-operative or not, duration and type of surgery are other factors. Anaesthesia in ophthalmology has evolved with time, and topical anaesthesia which was used in the past had made a comeback in recent times. The watershed year for ophthalmic anaesthesia was the year 1887 it was then that Carl Koller first time used cocaine hydrochloride as a topical anaesthetic agent for performing eye surgery and Herman Knapp used cocaine for retrobulbar injection and performed enucleation. Various local anesthetic techniques have developed since then including akinetic (needle-/ cannula-based technique)[7,9] and non-akinetic (which include topical anaesthesia) techniques.[10]

The aim of this prospective control randomized study has been to evaluate the efficacy and safety of topical anesthesia in cataract surgery by phacoemulsification and intraocular lens implantation in the population of Bundelkhand region in parameter of satisfaction of patients and surgeon's easiness in doing surgery and complication rate.

Types of anaesthesias that can be used in ocular surgeries include retrobulbar block, peribulbar block, subtenon's block, topical anaesthesia and intracameral anaesthesia. Anaesthesia is beneficial as it provides analgesia, anaesthesia, akinesia.

Materials and Methods
This prospective, controlled, randomized study included 100 patients scheduled for planned routine cataract surgery, that is, phacoemulsification with intraocular lens (IOL) implantation. These patients met our inclusion and exclusion criteria (given below), were then divided into two groups Group A and Group B, where Group A patients were instilled 2% Xylocaine as the topical anaesthesia while Group B were given topical proparacaine 0.5%. Study was conducted in the department of Ophthalmology, Maharani Laxmi Bai Medical College, Jhansi, Uttar Pradesh, over a period of 6 months from Nov. 2017 to April 2018.

Inclusion Criteria:
All patients who were willing for cataract surgery (Phacoemulsification) in the age group between 20-65 years.

Exclusion Criteria:
1. Patients above 65 years and below 20 years were excluded from the study.

2. Patients who were non cooperative and mentally ill were not included in this study.
3. Patients with complicated cataracts and expected duration more than 20 minutes were also excluded.

The preoperative assessment done and detailed clinical history was taken. All cases underwent routine systemic and then followed by ocular examination which included visual acuity measurement with snellan's chart followed by examination of the adenexa, ocular movements to rule out any paralysis of extraocular muscles, then examining the conjunctiva, cornea, anterior chamber depth, pattern of the iris, pupillary reaction, reflex of the lens to assess the cataract and ultimately the fundal glow via distant direct ophthalmoscopy, anterior segment assessment done, retina visualized with ophthalmoscope to rule out any hypertensive, diabetic or age related degenerations of macula. Random blood sugar (RBS) and NCT was done in special cases. Prior to surgery, biometry done to calculate the power of IOL, pre-operative xylocaine sensitivity done, IOP lowering agent administered since one day prior to surgery, antibiotic coverage, topical pupillary dilator (eye drop tropicamide with phenylephrine) and topical NSAIDs began on the day of surgery prior to surgery.

All 100 cases were divided into two groups

1. Group A- Phacoemulsification with topical Xylocaine jelly 2% ($N_{A=}50$)
2. Group B- Phacoemulsification with topical Proparacaine 0.5% (N_B=50)

All 100 cases were done by the same surgeon in the operation theatre. Group A patients operated after instilling Xylocaine jelly 2% and group B patients operated with putting topical Proparacaine 0.5%. Xylocaine jelly 2% was instilled once 10 minutes prior to surgery and then on table once at the time of surgery in Group A while Proparacaine 0.5% was instilled one drop every 5 to 10 minutes for 5 to 6 doses in Group B. all patients in both group studied for Intra-operative and Post-operative side effects of topical anaesthesia and classified according to various parameters.

Results

Demography of patients shown in Table 1 and table 2.

Table 1: Showing age distribution in Group A and Group B

Age in years	Group A		Group B	
	No. of Patients	Percentage	No. of Patients	Percentage
21-30 years	1	2%	2	4%
31-40 years	6	12%	8	16%
41-50 years	18	36%	16	32%
51-65 years	25	50%	24	48%
Total	50	100%	50	100%

Both groups from the above table shows almost similar age distribution and maximum number of patients lie in the age group 51 to 65 years (Group A- 50%, Group B 48%).

Table 2: Showing sex distribution in both groups

Gender	Group A		Group B	
	Patients number	Percent	Patients number	Percent
Male	28	56%	26	52%
Female	22	44%	24	48%
Total	50	100%	50	100%

In above table as we can see that there is no predilection of either sex in either group.

Table 3: Showing intra-operative pain and other side effects in Group A and Group B

Intra – Op manifestations	Group A		Group B	
	Patients number	Percent	Patients number	Percent
Pain	2 (mild discomfort)	4%	3 (mild discomfort)	6%
Eye movement	0	0%	0	0%
Subconjunctival haemorhage	3	6%	3	6%
Adjunctive peribulbar anaesthesia	1	2%	3	6%
PCR/ Vitreous loss	0	0%	0	0%
Frequency of instillation anaesthetic agent	3	6%	8	16%

Table 3 showing that in either groups the intra operative complications were not significant, as in both group experienced only mild pain, no patient experienced intraoperatively severe pain, there was nor any case associated with posterior capsule rent (PCR) neither vitreous loss occurred and no group experienced eye movements but more frequent instillation of 0.5% proparacaine were observed in Group B as compared to Group A.

Table 4: Showing post -operative outcome in all patients of group A and group B

Post operative complaints	Group A		Group B	
	Patients number	Percent	Patients number	Percent
Corneal Edema/ Exposure Keratitis	5	10%	4	8%
Pain	0	0%	1	2%
Watering and Grittiness	0	0%	0	0%
Anterior chamber haze	0	0%	0	0%
Redness and congestion	3	6%	3	6%

Both Table 4 showing that post operatively 5 (10%) patients in Group A suffered with corneal edema / exposure keratitis as compared to 4 patients in Group B (8%). As both the groups suffered with some amount of corneal edema or exposure keratitis which may be due to incomplete closure of the operating eye prior to surgery or frequent instillation of antibiotic drops following surgery the reason requires detail study. While redness and postoperative congestion were more frequent in Group B (6%).

There was no significant difference recorded in the time duration of surgery in both groups.

Discussion

In this prospective randomized control study done in M.L.B Medical college, we took a total number of 100 patients subdivided into two groups of 50 each. Age wise both groups had maximum patients in the age group of 51 to 65 years, which is usually the most common age to be affected by cataract.

In both the groups the duration of surgery showed no difference this was consistent with study done by Irle S. et al[11] where no significant difference in duration of surgical intervention observed as well.

In our study no patient experienced severe pain or discomfort in either group the results were found consistent with study done by Baraquet et al[12] who reached to the conclusion that lidocaine 2% was equivalent to tetracaine 0.5% eye drops in terms of corneal anaesthesia. Ameil et al[13] also showed that effects of both the drugs were similar. While Irle et al[11] observed in their study that tetracaine 0.5% better than lidocaine 2% regarding pain perception by patients.

In our study we found that there was no significant difference between the two groups regarding intra operative complications such vitreous loss and posterior capsule rent (0%) in either of the group which was consistent with a study done by Waheeb S.[14] which showed topical anaesthesia in clear corneal phacoemulsification as safe with PCR in 1% cases well within a range as mentioned in literature.

In our study post operatively as well patients only had corneal edema pertaining to exposure (due to non closure of eyes after instilling the gel) and may be due to toxicity to Xylocaine gel 2% as the corneal edema was more in group A (10%) which has also been documented in previous studies done by Guzey M et al[15] which stated that lidocaine and bupivacaine were found to cause significant corneal thickening and corneal opacification observed in rabbits when two agents were injected intracamerally.

We in this study compared efficacy of xylocaine gel 2% versus proparacaine 0.5%, in other studies with which we are comparing with have used topical tetracaine in studies done before study done by Grant RL et al[16] have shown that both tetracaine and proparacaine are equally effective anaesthetic agent and tetracaine was found to be more toxic as suggested in this study.

Conflict of Interest: None.

Conclusion

Topical anaesthesia in phacoemulsification cataract extraction has emerged as a safe and effective modality of anaesthesia which has been considered surgeon friendly for experienced surgeons and also intra operatively and post operatively associated with minimum complications with provision of good anaesthetic effect. It is a safe alternative to peribulbar anaesthesia, as it is less time consuming and cost effective.

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How to cite this article: Kumar J, Sharma J. Xylocaine gel 2% vs proparacaine 0.5% as topical anaesthesia in phacoemulsification in Bundelkhand: A prospective comparative study. *Indian J Clin Exp Ophthalmol* 2019;5(1):44-47.