



ORIGINAL RESEARCH PAPER

Ophthalmology

COMPARATIVE STUDY OF ANAESTHETIC SAFETY & PUPILLARY DYNAMICS OF INTRACAMERAL TROPICAMIDE + PHENYLEPHRINE+ LIDOCAINE ALONGWITH TOPICAL PROPARACAINE VS TOPICAL TROPICAMIDE+ PHENYLEPHRINE WITH TOPICAL PROPARACAINE IN PHACO SURGERY

KEY WORDS:

Phacoemulsification, Cataract surgery, Anesthetics, Mydriatics, intracameral combination of Phenylephrine, Topical mydriatics.

Dr. Kanavdeep Kapoor*

3rd Year Post Graduate (Batch 2020), Ophthalmology, ASCOMS & Hospital, Sidhra Jammu *Corresponding Author

Dr. Dinesh Malhotra

Professor & HOD Ophthalmology ASCOMS & Hospital, Sidhra Jammu

Dr. Rushali Gupta

Assoc. Prof. Ophthalmology ASCOMS & Hospital, Sidhra Jammu

ABSTRACT

This prospective observational study aimed to evaluate the anaesthetic efficacy and compare the pupillary dilation dynamics of agents used in phacoemulsification. Total of 100 clinically diagnosed patients of cataract attending the Eye Outpatient department were included in the study and divided into two groups. Group A were administered with intracameral (Tropicamide 0.2mg/ml + phenylephrine 3.1mg/ml + lidocaine 10mg/ml) 0.2ml injection & topical proparacaine. Group B were administered with topical proparacaine with topical tropicamide + phenylephrine. The present study observed that group A perceived less pain than group B (P<0.001) as the mean pain score was 0.31±0.147 in group A and 1.8 ±0.857 in group B. The mean pupil diameter remained stable during surgery in group A and decreased in group B. The study concluded that Intracameral modality with topical proparacaine is a good alternative for phacoemulsification as it is having a prompt onset of pupil dilation and stable mydriatic effect. As well as the Intracameral modality combined with topical proparacaine increases patients comfort compared to topical instillation alone.

INTRODUCTION

Cataract is a clouding of the lens of the eye, which impair vision and causes blindness. Phacoemulsification is the surgical technique to treat the cataract,. Cataract surgery is the most common surgery performed in ophthalmology. The cataract surgery requires pupil dilation and stable mydriasis which mitigates the intraoperative complications.^{1,2}

Cataract surgery with the advent of phacoemulsification under topical anesthesia makes quick visual recovery and reduces surgical time. Under topical anesthesia, patients reported some pain during iris manipulation or iris diaphragm movement. Supplementary intracameral anesthesia and intracameral lidocaine may reduce these problems and smoothen the surgery.³

The drawbacks of topical application include the delayed onset or inconsistent mydriasis, limited bioavailability,. Moreover, multiple doses of eye drops such as tropicamide, phenylephrine, and topical anesthetics (eg, oxybuprocaine or tetracaine) can result in damage to the ocular surface and, possibly, toxic keratopathy which may hinder visualization during surgery.⁴

Recently, an intracameral combination of 2 mydriatics and 1 anesthetic (lidocaine, phenylephrine, and tropicamide) has come in use which is quite safe and the approved combination drug is produced according to good Manufacturing Practice standards to ensure safety.⁴

AIMS & OBJECTIVES

- 1) To study anaesthetic efficacy of intracameral tropicamide + phenylephrine + Lidocaine alongwith topical proparacaine vs topical tropicamide+phenylephrine with topical proparacaine.
- 2) To compare pupillary dynamics of intracameral tropicamide + phenylephrine + Lidocaine with topical proparacaine vs topical tropicamide, phenylephrine with topical proparacaine

MATERIAL AND METHODS

This prospective observational study was conducted in the department of Ophthalmology at **Acharya Shri Chander College of Medical Sciences and Hospital, Jammu**, during

the period **January 2022 to April 2022** after obtaining approval from the institute ethical committee.

A total of **100** clinically diagnosed patients of cataract attending the Eye Outpatient department were involved after obtaining the informed consent from all the patients.

Inclusion Criteria

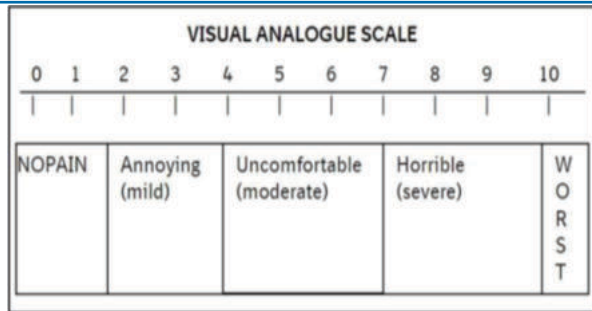
- The patients presenting in OPD with cataract regardless of visual acuity

Exclusion Criteria

- Mydriasis with topical phenylephrine < 6.0mm in OPD.
- History of ocular trauma
- Intraoperative complications related to surgery.
- Mentally retarded & Apprehensive patients.
- Patients with undilating pupils such as:
- Patients with Pseudoexfoliation.
- Patients with diabetes mellitus.
- Above 90 years of age.
- Prolonged Miotic therapy.
- Chronic smokers.
- Known cases of chronic uveitis.

A detailed history was collected, ocular examination (lids & adnexia, anterior segment, pupils, lens and fundus examination), was done and tonometry and biometry were performed. The demographic variables age and gender of the patient were recorded. Patients were divided in two groups (group A 50 combined & group B 50 standard regime patients).

Group A were administered with intracameral (Tropicamide 0.2mg/ml + phenylephrine 3.1mg/ml + lidocaine 10mg/ml) 0.2ml injection & topical proparacaine (0.5%) 1 drop 3 times before surgery. Group B were administered with topical proparacaine (0.5%) 1 drop 3 times before surgery with topical tropicamide(0.8%) + phenylephrine(5%) . Phacoemulsification with PCIOL was performed. Pain assessment was done with the help of visual analogue scale and the mean pupil size during various stages of cataract surgery in the group A and group B was measured.



Pupil Diameter was measured on screen capture taken at 3 specific stages

- 1) Before capsulorhexis.
- 2) Before IOL insertion.
- 3) End of surgery.

The measurement of pupil diameters were done as follows

- 1) The real horizontal visible iris diameter (HVID) was measured during the selection visit with a surgical calliper.
- 2) The exact pupil size was obtained using following formula

$$\text{PUPIL SIZE} = \text{pupil size on photograph (SCREEN CAPTURE)} \times \text{CORRECTIVE FACTOR}$$

$$\text{CORRECTIVE FACTOR} = \text{REAL HVID/HVID On Photograph}$$

Data was tabulated, organized, analyzed and interpreted in both descriptive and inferential statistics i.e. frequency and percentage distribution, by using statistical package for social science software (SPSS), version 21. Categorical variables were expressed as number and percentage.

OBSERVATIONS AND RESULTS

In the present study, 100 clinically diagnosed patients of cataract attending the Eye Outpatient Department were included.

In the present study the majority of the patients were in the age group of 61-70 in group A and group B as depicted in table no. 1.

Table 1. Age distribution

Age range	Group A (50)		Group B (50)	
	No. of cases	%age	No. of cases	%age
<50	0	0	0	0
51-60	2	4	1	2
61-70	39	78	36	72
71-80	8	16	13	26
81-90	1	2	0	0
>90	0	0	0	0

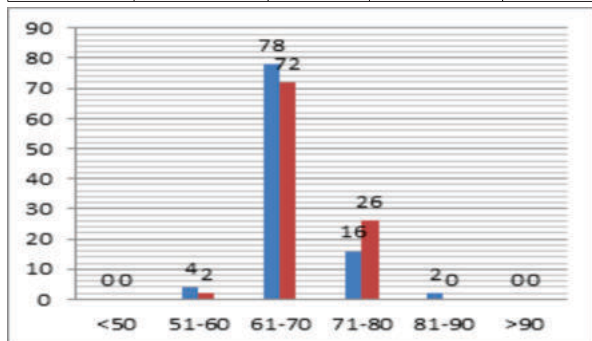


Figure 1. Age distribution

In the present study majority of the cases were males in both study groups as depicted in table no. 2.

Table 2 Gender distribution

Gender	Group A (50)		Group B (50)	
	No. of cases	%age	No. of cases	%age
Male	30	60	33	66
Female	20	40	17	34

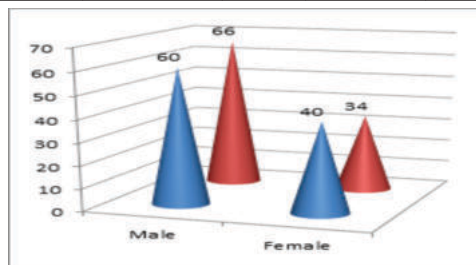


Figure 2. Gender distribution

The present study observed that group A perceived less pain than group B (P<0.001). The mean pain score was 0.31±0.69 in group A and 1.8±1.48 in group B as depicted in table no. 3.

Table 3. Pain score

VAS Score	Group A (50)		Group B (50)	
	No. of cases	%age	No. of cases	%age
No pain	47	94	36	72
Mild Pain	3	6	11	22
Moderate Pain	0	0	3	6
Mean Pain score	0.31±0.147		1.8±0.857	

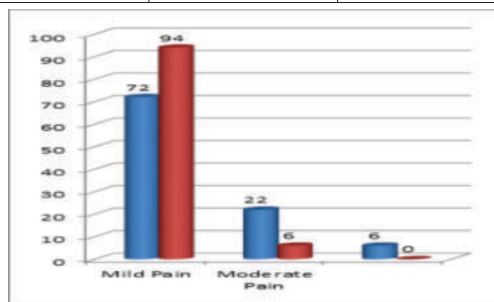


Figure 3. Pain score

The present study revealed that the mean pupil diameter remained stable during surgery in the combination drug group and decreased in the topical group as depicted in table 4.

Table 4. Pupil Dilation

Stages	Group A	Group B
Before capsulorhexis	7.21±0.343mm	8.0±0.381mm
Before IOL insertion	7.18±0.342mm	7.5±0.357mm
End of surgery	7.01±0.334mm	7.2±0.342mm

DISCUSSION

In this study 100 patients (50 patients in each group), who were clinically diagnosed with cataract and required the surgery were included. Detailed examinations and investigations were carried out in all the cases. Data was analyzed and discussed with previous literature.

In the present study the majority of the patients were in the age group of 61-70 in group A and group B. In a similar study conducted by Yu Yong-A, et al. (2016), observed that the mean age of the study subjects was 63.78±3.10 years.⁵ In another study conducted by Karakahya HR (2021), reported that the mean age of the patients was 70.27±10.34.⁶

It was observed that majority of the cases were males in both study groups. In another study conducted by Karakahya HR (2021), observed that majority of the patients were males.⁶ Similarly Labetoulle M, et al. (2020), reported that majority of the study participants were males.⁷

In the present study group A perceived less pain than group B. The mean pain score was 0.31 ± 0.147 in group A and 1.8 ± 0.857 in group B measured with the help of visual analogue scale. In similar study conducted by Shakya Kiran, et al. (2017), reported that patients receiving Intracameral experiences less pain as compared to conventional regime.³ In another study conducted by Labetoulle M, et al. (2020), reported that the patients receiving Intracameral experiences less pain as compared to conventional regime and has more comfort.⁶

The present study revealed that the mean pupil diameter remained stable during surgery in the combination drug group and decreased in the topical group. In similar study conducted by Chiambaretta F, et al. (2018), reported that prompt onset of pupil dilation and the stable mydriasis induced by the drug combination and also improved the intraoperative conditions in comparison with topical group.⁴ In another study conducted by Yu Yong-A, et al. (2016), showed that both groups had a significant mydriatic effect intraoperatively, the onset of mydriatic effect was rapid in intracameral group and the topical group had a larger mydriatic effect than the intracameral group.⁵

CONCLUSION

This prospective observational study concluded that Intracameral modality combined with topical proparacaine is good alternative for phacoemulsification as it is having prompt onset of pupil dilation and stable mydriatic effect. As well as the Intracameral modality combined with topical proparacaine promotes patients comfort as compared to topical regime.

REFERENCES

1. World Health Organization. Blindness and vision impairment prevention: priority eye diseases. Cataract. 2019. <https://www.who.int/blindness/causes/priority/en/index1.html>.
2. Lam D, Rao SK, Ratra V, et al. Cataract. Nat Rev Dis Primers. 2015;1:15014.
3. Kiran Shakya, Sangita Shakya, Ram Prasad Pokhrel, Om Krishna Malla. Topical proparacaine vs combined topical-intracameral lidocaine anesthesia in phacoemulsification surgery with preoperative counseling about intraoperative visual fear. *J AAR*, (2017); eISSN: 2362-1311.
4. Frederic Chiambaretta, Anders Behndig, Pierre-Jean Pisella, Erik Mertens, Antonio Limao, Francesco Fasce, et al. Pupil dilation dynamics with an intracameral fixed combination of mydriatics and anesthetic during cataract surgery. *J Cataract Refract Surg* 2018; 44:341-347.
5. A-Yong Yu, Hua Guo, Qin-Mei Wang, Fang-Jun Bao, and Jing-Hai Huang. Pupil Dilation with Intracameral Epinephrine Hydrochloride during Phacoemulsification and Intraocular Lens Implantation. *J Ophthalmology*. 2016; 49:17659.
6. Karakahya RH. Do Consecutive Phacoemulsification Surgeries Under Topical Anesthesia Differ in Terms of Pain Perception and Cooperation?. *Cureus*. 2021; 13(11): e19915. Published 2021 Nov 26. doi:10.7759/cureus.19915.
7. Labetoulle M., Behndig A., Tassignon MJ, et al. Safety and efficacy of a standardized intracameral combination of mydriatics and anesthetic for cataract surgery in type-2 diabetic patients. *BMC Ophthalmol*, 2020; 20:81.