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Manual Small Incision Cataract Surgery Under Topical Anaesthesia: Pain Evaluation

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ABSTRACT
A The present study aims to evaluate patient level of comfort, pain perception, safety profile apart from surgeon's experience and surgical outcome with the use of topical anaesthesia in patients undergoing manual small incision cataract surgery. This was a Prospective, Cross sectional, timebound study done during October 2022 to September 2023 at a tertiary care hospital. A total of 50 patients were included in the study for manual small incision cataract surgery(msics) under topical anaesthesia after conducting preoperative evaluation and investigations. A pain survey questionnaire having visual analog scale for pain evaluation or Wong scale for simplified version of pain evaluation was done. Surgeon's experience of level of comfort was also documented. Right eye was involved in 35 eyes and left eye in 15 patients. Based on Nucleus density 28 patients had grade 2 and 22 patients had grade 3 nucleus. 2 cases were supplemented by subtenon's anaesthesia as one of the patient was over anxious and another patient was not cooperating adequately. Mild pain was appreciated in 7 steps at different time of surgery among 18 patients. Moderate pain was seen in 12 steps among 2 patients. No pain was appreciated in 29 patients and overall patients were comfortable. Topical anaesthesia is a safer alternative to the peribulbar injection anaesthesia for manual small incision cataract surgery done by experienced surgeons in cooperative patients.

INTRODUCTION

Phacoemulsification and Manual small incision cataract surgery are the most common procedures performed for the treatment of cataract. Phacoemulsification cataract surgery recently is being performed most of the times under topical anaesthesia[1] and only a few cases require the necessity of either subtenon or peribulbar anaesthesia. On the contrary manual small incision cataract surgery is frequently performed under peribulbar or subtenon anaesthesia. Compared to topical anaesthesia, injectable anaesthesia is associated with serious complications though rare such as hemorrhage, globe perforation, optic nerve damage, neurological and cardiac problems[2] and is also associated with fear and apprehension and resentment to needle prick by patients.

Manual small incision cataract surgery can also be performed under topical anaesthesia[3,4] with certain modifications. The topical anaesthesia is well tolerated by patients and accepted by surgeons[5-7]. The present study aims to evaluate patient level of comfort, pain perception, safety profile apart from surgeon's experience and surgical outcome with the use of topical anaesthesia in patients undergoing manual small incision cataract surgery.

MATERIALS AND METHODS

This was a Prospective, Cross sectional, timebound study done during October 2022 to September 2023 at a tertiary care hospital. Approval for the study was obtained from the Institutional Ethics Committee. Informed consent was taken from all the patients included for the study.

Inclusion Criteria:

- Willingness to participate.
- Patients aged 40 years and above with mature cataract who were admitted for cataract surgery in Department of Ophthalmology without any systemic comorbidity.

Exclusion Criteria:

- Uncooperative and unwilling patients.
- History of Previous intraocular surgery or trauma.
- Hypersensitivity to lignocaine.
- Small undilating pupil, nucleus >grade IV, glaucoma, decrease endothelial cell count.
- Deaf, inability to understand verbal commands.

Sample size was calculated by using confidence level of 95%, confidence interval of 10 and population size of 1000 (Total number of cataract surgery at the hospital) gave us a sample size of 50 patients. A total of 50 patients were included in the study after conducting preoperative evaluation and investigations like HIV and HBsAg (Microbiology Department) and Random blood sugar for fitness for cataract surgery under local anaesthesia were done. Cataract was classified and nucleus grading done over a slit lamp and preoperative counseling for undergoing topical msics was done.

At the start of surgery, the patients were instructed to hold the hand of the paramedical staff and were asked to squeeze the hand whenever pain was felt. The patients were explained and counseled as to what they meant for mild, moderate or severe pain. If patients felt mild pain, they were asked to squeeze the hand once. If felt moderate pain squeeze twice and if severe then squeeze multiple times and also verbally. A pulse oximeter was attached to the patient for recording any changes in heart rate and pulse rate during pain perception. All the findings were recorded during the surgery by a paramedic designated for that particular patient on a proforma sheet noting down the particular step of msics when the pain was felt and also severity of pain was noted down step wise. Any difficulty in performing the particular step of msics was documented and also complication associated with it. All the cataract surgeries included in the study were done by the same surgeon.

Proparacaine 0.5% drops was instilled twice in a gap of 5 minutes before starting the surgical procedure and painting and draping done. 3rd drop was instilled before placing eye speculum and surgery was started by placing a wick soaked in proparacaine over desired corneoscleral incision site and a limbal point for fixing the globe by toothed forceps. Then after placing sideport incision trypan blue dye, intracameral injection of diluted 2% lignocaine solution either commercially available preservative free or regular 2% lignocaine injection diluted to 0.5% with ringer's lactate solution was used. This concentration is safe for the corneal endothelium and provides adequate anaesthesia to uveal tissue for painfree surgery[8,9] and then viscoelastic used for making capsulorrhexis. Hydroprocedure done and carefully nucleus prolapsed into anterior chamber. Topical proparacaine was used as and when felt needed by surgeon. Nucleus was delivered using wire vectis or viscoexpression and thorough cortical clean up was done and rigid pciol placed. Care was taken that all the viscoelastic was completely removed to avoid spike in intraocular pressure postoperatively and Patients were given acetazolamide 250mg orally in the immediate post operative period to avoid the same. A proforma was given to paramedic to assist in documenting pain perception during surgical procedure and were also informed to note down preoperative and postoperative pain perception along with documentation of pulse rate and heart rate.

A pain survey questionnaire having visual analog scale for pain evaluation or Wong scale for simplified version of pain evaluation was done. Surgeon's experience of level of comfort was also documented. Data analysis was performed on the statistical package for social science version 18(SPSS Inc). Descriptive statistics in

the form of percentage, frequencies, Chi Square test for categorical variables and student t test for continuous variables were used. For all comparisons, significance level was at P<0.05. Table 1.

Fig. 1: Paracaine Drop

RESULTS AND DISCUSSIONS

There were 50 patients enrolled in the study after fulfilling inclusion and exclusion criteria. There were 20 males and 30 females. Patient's age ranged from 45-68 years. Right eye was involved in 35 eyes and left eye in 15 patients. Based on Nucleus density 28 patients had grade 2 and 22 patients had grade 3 nucleus. The pain experience during the surgical procedure was recorded by the patient response of squeezing the hand on the Operation table of paramedical staff. The following results were tabulated.

2 cases were supplemented by subtenon's anaesthesia as one of the patient was over anxious and another patient was not cooperating adequately.

Mild pain was appreciated in 7 steps at different time of surgery among 18 patients. Moderate pain was seen in 12 steps among 2 patients. No pain was appreciated in 29 patients and overall patients were comfortable. Table 2.

The visual analog scale or the Wong scale was used to evaluate the mean pain score.

2 number of Patients needed additional anesthesia and average surgical time was 11.5 minutes. Table 3.

Topical anaesthesia for cataract surgery was first described by Smith[10]. Use of topical anaesthesia is on the rise due to patients demand[11]. Topical anaesthetics like paracaine when applied to the eye, act directly on the epithelium and stroma of cornea and some amount of drug penetrates into the anterior chamber and act on iris and ciliary body. The intraocular muscles are affected while extraocular muscles are no way affected and have no effect on akinesia of the eyeball. The duration of topical anaesthetic effect depends on the properties of the drug used, usually lasts upto few minutes for routine drugs and the eyedrop instillation or intracameral irrigation can be repeated at intervals during the surgery. The sensitive nerve endings of 5th cranial nerve are concentrated in the cornea and ciliary body and these fibres are nonmyelinated able to transmit the sensation of pain, temperature and touch and are blocked by lower concentration of drugs in comparison with motor fibres. Thus the ciliary body or zonular stretch during surgery can irritate the ciliary nerves and produce discomfort. To prevent this, intracameral anaesthetics 0.5ml of 1% LIGNOCAINE is injected in anterior chamber after sideport entry. This produces sensory blockage of iris and ciliary body and relieves from the discomfort during delivery of nucleus and IOL placement. Topical anaesthetic act by inhibition of sodium channels at nerve endings or receptors and thus block the production (and not transmission) of nerve impulses.

The Advantages of Topical Anaesthesia Over Periocular Injection are:

- Higher safety profile and no needle related complications.
- No effect on intraocular pressure.
- Better consistency of analgesia during surgery.
- Return of sensitivity soon after surgery allows prompt discovery of any unexpected ocular pain suggesting any complication.
- No pain from anaesthetic application through injection.
- No need to discontinue systemic anticoagulants or Aspirin
- Immediate visual recovery.

Disadvantages of Topical Anaesthesia Include:

- All patients cannot be good candidate for topical. Anxious patients, communication problems and miotic pupils are excluded.
- Surgeon's competency and level of comfortability matters.
- Main disadvantage is absence of akinesia.

Performing msics under topical anaesthesia would make the surgeon feel apprehensive and create a sense of uncertainty mainly due to akinesia and fear of producing pain sensation during intraocular manipulation. This procedure involves strict instructions to patient to look at microscope light throughout the procedure, hence fixation of eye by nontraumatic toothed forceps held at limbus is important. Use of coaxial illumination, intracameral anaesthesia, patching of the eye helps in better post operative results.

In the present study msics under topical anaesthesia was comfortable for over 29 patients and nearly 48 patients were cooperative during procedure. Surgeon comfort and satisfaction was seen in 48 patients.

Our study recorded very few minor intra operative complications unrelated to the technique of ocular anaesthesia. There were no postoperative complications making this technique of ocular anaesthesia safe and patient friendly. Similar results were seen in study of Uche[12].

Table 1: Proforma for Pain Evaluation of Patient and Surgeon Comfort

Sl No	Steps of Msics	Patient Pain Response			Associated Changes in Patient		
		Mild Pain	Moderate Pai n	Severe Pain	Verbal Response	HR	PR
1	Painting and Ping						
2	Wire Speculum Insertion						
3	Conj. Eritomy	5	1		5		
4	Corneoscleral Tunnel	1					
5	Sideport Incision						
6	Airbubble and Dye in AC						
7	washing away dye						
8	Visco Fillup in AC						
9	Capsulorrhexis						
10	Corneoscleral Tunnel Entry						
11	Hydroprocedure						
12	Nucleus tap and Rotation	6	2				
13	Nuclues Prolapse in AC	3			8		
14	Visco Above and Below Nucleus						
15	Nucleus Delivery by Wire Vectis OR Viscoexpression	4	3		9		
16	Cortical Expression						
17	Rigid Pciol Insertion	3					
18	Sideport Seal						
19	Antibioticsteroid INJ.	2			2		
20	Post OP 0 to 1 Hour						
21	Post OP 1 to 6 Hour						
22	Post OP 6 to 24 Hour						
23	After Removing Eye Patch and Immediate Post OP						

Table 2: Pain Sensation in Various Steps of Sics(Total 19 Steps)

	Comfort	Number of patients	Step of surgery	Surgeon's response
1	Pain/discomfort in < 2 steps	44	Conj. peritomy, nucleus prolapsed in AC	Good and comfortable
2	Pain/discomfort in < 4 steps	04	Conj. peritomy, nucleus prolapse in AC, nucleus rotation, rigid pciol insertion	Good and comfortable
3	Pain/discomfort in >4 steps and < 6 steps	02	Conj. peritomy, nucleus prolapse in AC, nucleus rotation, rigid pciol insertion, corneoscleral tunnel, antibioticsteroid inj.	Good

Table 3: Patient Cooperation Scale

	Cooperation	Number of patients	Patient response
1	Instruction given > once	18	Good
2	Instruction given once	22	Good and comfortable
3	No instruction needed	10	Good and comfortable

The mean pain score in our study was 3 which show a favorable pain experience as scores <4 are classified as mild pain. Several studies had reported lower mean pain scores ranging from 0.24-1.4[4,5,13,14].

The pain experienced by the patients during cataract surgery under topical anaesthesia is during the steps when there is stretching of the eye ball. Similar opinion has been expressed by Phillip[15] and Gupta, regarding the cause of pain in topical anaesthesia. Just over 6% of patients felt pain or discomfort of varying severity during surgery in Parween rewri[16]. Didaci[7] in their study of 92 patients operated under proparacaine 0.5% alone reported pain in over 78% of cases. Dole[17] reported intolerable pain in 17(3.4%) of 500 patients who underwent surgery under topical anaesthesia. Rothschild[18] in their study on 283 cases, reported intense to unbearable pain in 16(5.65%) of patients, but only 13(4.59%) were given additional anaesthesia. In our study there were no noticeable changes in pulse rate and heart rate during experience of pain in the course of manual small incision cataract surgery under topical anaesthesia. Fichman's study has investigated the blood pressure, pulse rate and respiration rate of patients during surgery under topical anaesthesia and has found no major changes in these parameters[19]. Nucleus delivery was done by wire vectis or viscoexpression. Gupta etal in their series concluded that the combination of lignocaine gel, sclerocorneal tunnel and use of fishhook is helpful in performing painless msics under topical anaesthesia[12]. Similar to findings in Gupta etal series, surgeon's score outcome was favorable as shown by the fact that patient's cooperation was excellent 48 patients. The use of intracameral preservative free lignocaine improved the anaesthetic effect and good and stable anterior chamber due to better patient cooperation[12].

The study conducted includes a small sample size and non comparative nature are the main limitations of the study. A larger sample size, comparative randomized design would be warranted. Study is very subjective with respect to response of pain given by patient which depends on individual personality, socioeconomic status and various other factors.

CONCLUSION

Patient cooperation and satisfaction and comfort of the patient and operating surgeon depends on several socioeconomic demography and psychological factors. Acceptance for topical anaesthesia is high while preoperative counseling for topical anaesthesia would be utmost important for patient selection.

Topical anaesthesia is a safer alternative to the peribulbar injection anaesthesia for manual small incision cataract surgery. It reduces surgical time and operative cost of the surgery as well.

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