International Journal Dental and Medical Sciences Research
Volume 2, Issue 6, pp: 77-82 www.ijdmsrjournal.com ISSN: 2582-6018

Comparison of Peribulbaranaesthesia versus Topical anesthesia in Manual Small Incision Cataract Surgery

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Date of Submission: 05-11-2020 Date of Acceptance: 18-11-2020

ABSTRACT: Purpose: To compare safety and efficacy of peribulbar anesthesia with topical anesthesia with 0.5% of proparacaine eye drops in routine uncomplicated manual small incision cataract surgery (MSICS) **Method:** 200 eyes of 200 patients were allocated to peribulbar (series-I) and topical (series-II) groups based on preset criteria after proper informed consent. All surgeries were performed by two surgeons. Neither intracameral anesthesia nor any kind of oral or intravenous sedation was used.
Outcome measure: Pain and discomfort during surgery and up to 6 hours after surgery experienced by the patient was graded and compared for both techniques. The surgeons also scored for surgical ease/discomfort in terms of unwanted ocular movements, patient cooperation and anterior chamber stability, time taken for surgery. Both patient and doctor were given a preset oral questionnaire for the assessment. Results: All the surgeries except two in group II and one in group I were complication free in terms of posterior capsular rent. The difference in complication rate was not statistically significant. The duration of surgery was similar in both groups (10±5 minutes). Pain during administration of anesthesia was significantly more in group I than group II, Intraoperative and postoperative pain were more in group II (mean pain score=1.88) than in group I (mean pain score=1.83). However, the difference was not statistically significant. When inquired about choice of anesthesia for another similar operation in group II, patients (86%) preferred similar anaesthesia especially due to early visual recovery (average of 15±10 minutes) and to avoid periocular injection.
Conclusion: MSICS under Topical anesthesia is safe, patient friendly and as effective as Peribulbar Anesthesia.

Keywords: Topical anesthesia, proparacaine eye drop, cataract surgery

I. INTRODUCTION

Cataract is defined as the loss of transparency of the natural lens of the eye, usually due to the ageing process. It can also be found in younger people secondary to congenital, drug induced, inflammatory or traumatic etiologies. Age-related cataract is the most common type and causes gradual progressive loss of vision leading to blindness. Cataract is the greatest cause of blindness worldwide; approximately 20 million people are thought to be blind from cataracts [1]. WHO/NPCB (National Program for Control of Blindness) survey has shown that there is a backlog of 22 million blind eyes (12 million blind people) in India and 80.1% are blind due to cataract[2]. Compared with other developed countries cataract occurs at a much earlier age in India [3]. A vast majority of Indian population lives below the poverty line and is not able to afford the cost many of the premium intra ocular lenses available in western settings[4,5]. Also scaling and training of surgeons and making available phacoemulsification or the more recent femtosecond laser assisted cataract surgery(FLACS) procedure highly improbable due to high cost.The manual small incision cataract surgery (MSICS) which was pioneered in the U.S. by Kansas and in Israel under Michael Blumenthal bloomed in Nepal and India due to its wide applicability and flexibility in community eye health care. In developing nations like India with large cataract surgical backlog, besides phacoemulsification, MSICS has become the surgery of choice [6,7]The MSICS has been conventionally performed under peribulbar or retro-bulbar anesthesia. However, there are some

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reports of the procedure being performed under sub-tenonand sub-conjunctival anesthesia[8,9]

Our study differs from that in using only 0.5%proparacine eye drops to achieve topical anesthesia. This not only obviates the risks associated with injectable retro-bulbar or peribulbar anesthesia with lignocaine but also decreases the time especially in high volume set-up. We have performed a pain evaluation survey on patients who underwent this procedure. This technique of MSICS under topical anesthesia with 0.5% proparacaine eye drop without any supplementary anesthesia has not been described in literature yet.

II. MATERIALS AND METHODS

All the patients opting for cataract surgery with posterior chamber intraocular lens (PCIOL) implantation at Tertiary level eye centre, Kolkata were asked to participate in this trial. The first 200 who agreed to informed consent were allocated to either peribulbar or topical techniques of anesthesia. The surgical procedure complied with the Tenets of the Declaration of Helsinki. The **exclusion criteria** were: 1. Age <30 or >90 years. 2. Known sensitivity to proparacaine eye drop. 3. People who preferred Phacoemulsification. 4. Previous intraocular injury, inflammation or surgery. 5. Pupil <5mm in diameter. 6. Inability to understand the visual analog pain scale. 7. Inability to understand and comply with verbal commands (causes including deafness and aphasia). 8. Patients who had a history of myocardial infarction in the past 3 months, surgeries where general anesthesia was planned 9. Patients who could not provide informed consent (for example, because of dementia).They were operated upon by two surgeons (JD and SC) of reasonably good experience. Informed consent was obtained from all the participating patients.Each patient was randomly assigned a chit on entering the Block (preanesthetic area) Room. 200 patients were included in the study after performing tests and investigations for fitness for cataract surgery under local anesthesia. Cataract was classified according to the morphology and the nuclear density was graded according to the slit-lamp examination and standard photographs. Surgical technique: Technique of peribulbar anesthesia: The peribulbar anesthesia was given by surgeon himself. 5ml of 2% Lignocaine with1: 10,000 adrenalines was injected using a 24G needle at the junction of middle and outer third of lower orbital margin with the needle directed parallel to the floor of orbit. A supplementary injection of 1-2 ml was given at the supraorbital notch with needle directed parallel to the orbital roof, if necessary. The eyelid was closed, and pressure applied for 5 minutes. Technique of topical anesthesia: The topical anesthesia was given by the nurse. Six doses (approximately 40 µl per dose) of proparacaine hydrochloride 0.5% were used in total. They were instilled on the ocular surface (two drops on the cornea, and one each in the superior and inferior conjunctivalcul de sac) 10 min before surgery. Two minutes before surgery two further drops were instilled on the cornea and the eye was padded. The breakthrough pain during surgery allowed an additional 2 doses of 0.5% proparacaine drops. The patients usually reported a initial stinging sensation. After about 1 minute, they were advised to look at the operating microscope light and the surgery was started. Surgery under topical anesthesia: The lids and periocular area were painted with 5 % solution of povidone iodine twice and the patient was draped. Once fully draped, the eye speculum was applied. Superior rectus bridle suture was taken routinely. Sclera was exposed, by making a fornix-based conjunctival flap. The cauterization was not done in most of the cases to avoid pain and intermittent irrigation of cornea during surgery not performed to avoid reflex blinking. Field of incision was made clear of blood with the help of cotton pellet moistened with adrenaline (1:1000) and cornea coated with viscoelastic during surgery. Corneo-scleral tunnel was designed. The incision length varied from 6 to 8 mm depending on the surgeon's assessment of the nucleus size. Then, 2% hydroxy propyl methyl cellulose was injected into the anterior chamber and capsulorrhexis was done. Hydro dissection was performed to separate the cortex from the capsule. Nucleus was prolapsed out of the capsular bag after making sure that the capsulorrhexis was large enough with respect to the nucleus size, otherwise a relaxing incision with a cystitome was made. With the nucleus in the anterior chamber, the chamber was inflated with 2 % hydroxy propyl methyl cellulose adequately to coat the endothelium. The nucleus was extracted out of the tunnel by the vectis with the support of superior rectus bridle suture. The cortex was aspirated using Simcoe cannula, and then, with the chamber filledwith 2 % hydroxy propyl methyl cellulose, an intraocular lens was implanted in the bag. The gel was washed out and the tunnel was inspected for integrity by looking for any leakage. At the end of the surgery, a subconjunctival injection of dexamethasone and gentamycin was given (0.25 ml each) in eye drop form. The eye was patched for about 20– 30 minutes and then the dressing was removed, the eye was examined, and the topical medications were started. The patients were followed on first

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postoperative day, first week and six weeks after surgery. The best corrected visual acuity was noted. Before opening the dressing, each patient was shown a visual analogue pain scale with numerical and descriptive ratings from 0-1 (no pain to slight stinging) to 9-10 (severe pain), as described by Nielsen[10] to rate their pain. Patients were encouraged to use this pain scale to rate the level of maximum pain felt preoperatively (on administration of anesthesia), intraoperatively and up to 6 hours after operation. An independent observer (ophthalmologist) performed the pain score recording in all the patients.

III. RESULTS

103 patients were females, 53(51.45%) in peribulbar group and 50(48.54%) in topical group. Average age in the two groups was 68 and 63 years respectively. There was no statistically significant difference between the two groups with respect to age (p=0.812) and sex (p=0.777). Type of cataract according to morphology was nuclear in 78 (Series I-38 &Series II-40), nuclear and subcapsular in 76 (Series I-42 &Series II-34) and posterior subcapsular in the 46 (Series I-26 &Series II-20. Nuclear density ranged from Grade I to V and correlated with age. There was no statistically significant difference between the two groups with respect to type of cataract (p>0.05). There is a significant difference in pain during administration of anesthesia, between the two groups.**[Figure- 1]** shows the various grades of pain during surgery in both the groups. Average for pain during surgery was 0.56 for peribulbaranaesthesiaand 0.54for topicalanaesthesia in a range of 0-10. Most of the patients felt pain during stretching of the wound while delivering the nucleus and during cortical cleaning by aspiration & irrigation procedure in the topical anesthesia group. Patients who felt increased pain in the peribulbar group had increased positive pressure and duration of surgery were more than average. There was no statistically significant difference between the two groups with respect to pain during surgery (p=0.486)

Average for maximum pain within first 6 hours after surgery was 1.83 for peribulbar and 1.88 for topical in a range of 0-10. Most of the patients felt pain within first 2 hours in group II while in group I pain generally initiated after 3 hours in postoperative period. But there was no statistically significant difference between the two groups with respect to maximum pain within first 6 hours after surgery (p=0.405). In fact, high order pain was more in group I compared to group II.There was no significant difference in both groups with regards to uncorrected and corrected visual acuity postoperatively.92/100(92%) patients in peribulbar group and 89/100(89%) patients of topical group had BCVA >6/9. The average time taken for surgery from insertion of speculum to taking off the speculum after subconjunctival injection was similar (10±5minutes) in both the group. But visual recovery time is significantly less in case of topical anesthesia. When inquired about choice of anesthesia for another similar operation in group II, patients (86%) preferred similar anesthesia especially due to early visual recovery (average of 15±10 minutes) and to avoid periocular injection. Surgeon's opinion was also preferable to avoid peribulbar injection, a time-consuming blind procedure with associated risk of various complications.The patients felt mild pain during fashioning conjunctival flap (4 patients) and during irrigation aspiration procedure (6 patients). The **visual analog scale or the Wong scale** was used to evaluate the mean pain score. Only seven patients (5.4 %) out of the whole series experienced pain who rated more than three on the visual analog scale of 10. The pain scores more than three has been accepted to represent moderate pain. (**Collins et al, 1995; Lee et al, 2000**)[11]. Thus, rest of the patients can be assumed to have mild pain. There were 121 patients (94.6 %) who had a mean pain score of three or less. Seventy-one patients (55.4 %) had a pain score of zero, that is, no pain.

Table 1: Pain during surgery: pain score and number of patients in each series

Pain score	Series I	Series II
0	68	63
1	21	26
2	4	8
3	4	1
4	2	1
5	1	1
6	0	0

International Journal Dental and Medical Sciences Research
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7	0	0
8	0	0
9	0	0
10	0	0

Figure 1

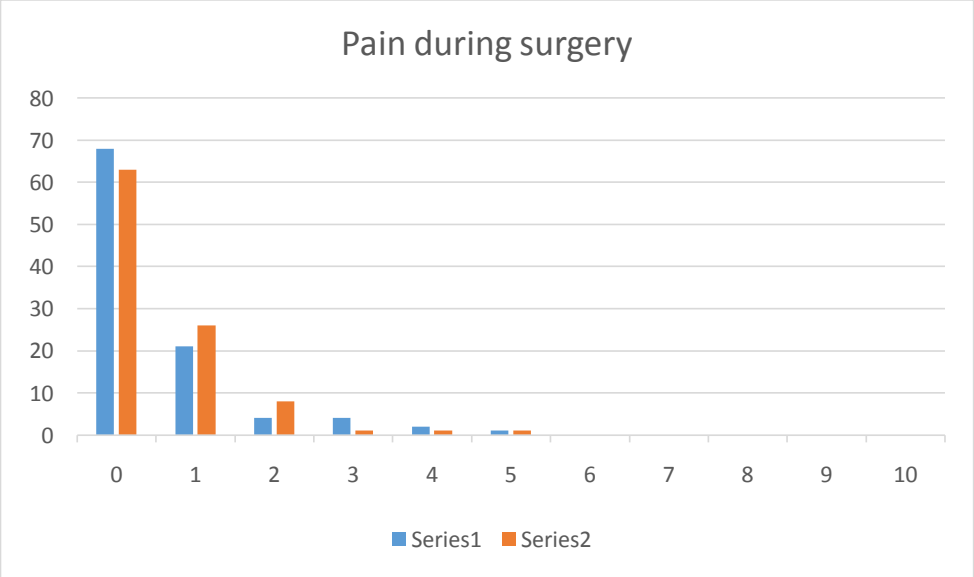

Table 2: Pain score and number of patients in each series 6 hrs after surgery

Pain score	Series I	Series II
0	23	20
1	21	19
2	31	29
3	12	23
4	6	5
5	3	2
6	3	2
7	1	0
8	0	0
9	0	0
10	0	0

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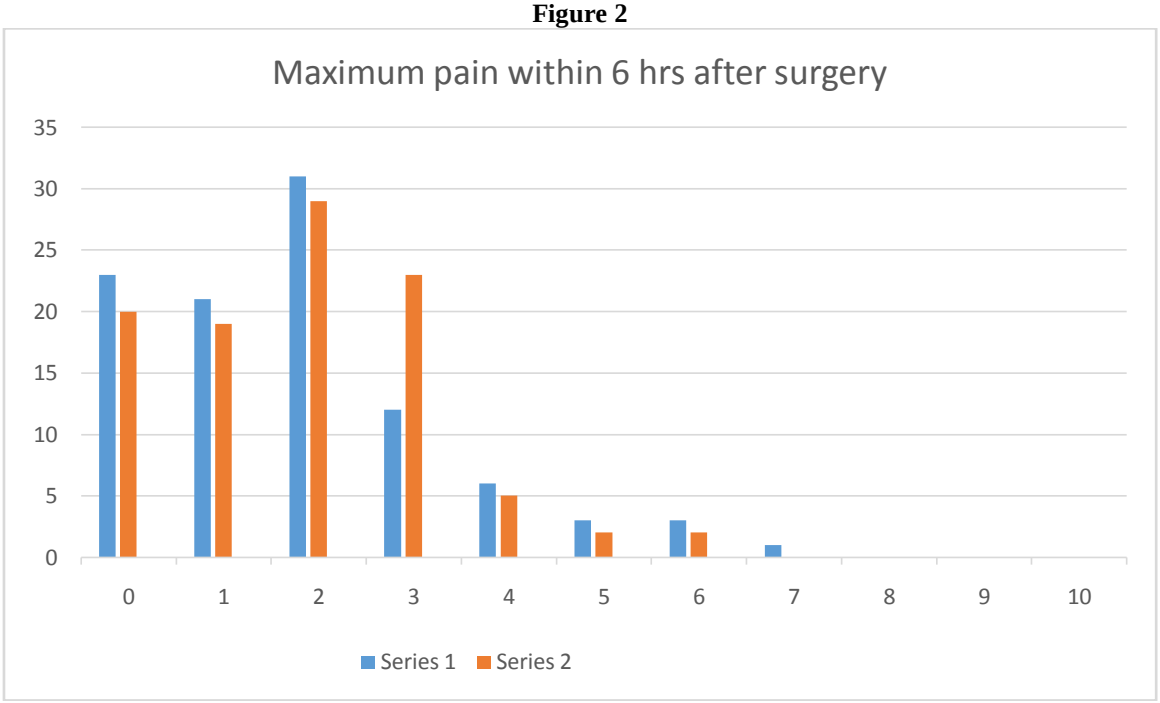
Figure 2



IV. DISCUSSSION

The use of topical anesthesia has been described with the supplemented subconjunctival anesthesia for standard extracapsular cataract extraction with the implantation of IOL by Smith way back in 1990[12]. The described use of topical anesthesia is presently limited to clear corneal phacoemulsification technique. The advantages are numerous, for the patients as well as for the surgeon. Topical anesthesia saves the patients from the risks of globe perforations, optic nerve injury, possibility of life-threatening respiratory arrest, and above all, the pain and fear perceived because of the peribulbar or retrobulbar injections.

Topical anesthesia 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. Various studies regarding the pain perception and patients' acceptability for anesthetic technique have been done and they concluded that the patients' satisfaction for anesthesia is comparable for topical versus other techniques.

Besides the patients' subjective appreciation of pain during surgery, which may be limited by their tolerance and expression, there are studies which have investigated the various physiological and biochemical parameter changes during the surgery under topical anesthesia. Fichman[13] has investigated the blood pressure, pulse rate, and respiration rate of patients during surgery under topical anesthesia and has found no major changes in these parameters. There is no significant change in the plasma cortisol levels during surgery under topical anesthesia, indicating that the procedure is well tolerated and does not pose stress to the patient. Thus, with all the advantages of topical anesthesia, it may be the preferred technique.

In this study, the mean pain score is comparable to the studies done on topical anesthesia use for phacoemulsification.The average verbal pain score during surgery published in a paper by Zeynep et al was 1.4±1.0 (0-3). Reported pain level was not associated with age or gender ($p>0.05$).[14] Similar results have been observed with the use of lignocaine 2% jelly for providing topical anesthesia for phacoemulsification for cataract removal in various other studies. So we conclude that topical anaesthesia with proparacaine is an effective and safe alternative to injectable peribulbaranaesthesia in large volume small incision cataract surgery

Subject in which paper to be included: Ophthalmology

Acknowledgement: We acknowledge the help received from all the staff and faculty of Ophthalmology Department at RIO, Kolkata

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