

Topical Anaesthesia For Cataract Surgery: Patient's And Surgeon's Perspective

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Aim: The study aimed to find factors' determining satisfactory experience from patient's as well surgeon's perspective in cataract surgery under topical anesthesia

Methods: In this prospective study, we recruited consecutive patients of senile cataract willing to undergo cataract surgery under topical anesthesia. Using a validated score system, patients comfort and cooperation was quantified. Demographic and ocular factors affecting the comfort level and cooperation were analyzed.

Abstract Results: A total of 530 patients, with mean (\pm SD) age 61 ± 9 (range 41-90), underwent cataract surgery under topical anesthesia between September and November 2019. Of all the participants, 429 (81%; 95% Confidence Interval (CI): 77-84) were not aware about injection less topical anesthesia for cataract surgery. The average comfort and cooperation score were 4.56 ± 0.67 and 4.54 ± 0.73 , respectively. The average duration of surgery was 8.33 ± 3.24 (range: 4-25) minutes.

Conclusion: The acceptance for topical anesthesia for cataract surgery is high, in both patient's and surgeon's perspective. Patient's satisfaction and cooperation depends on several socio-demographic and psychological factors.

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Introduction

Cataract surgery is one of the most commonly done surgical procedures.¹ The technique of surgery has evolved rapidly in the last fifty years. With the advent of the phacoemulsification and availability of foldable intraocular lenses, the surgical procedure is now quick and less invasive. Therefore, the need for local anesthesia has also changed. The retrobulbar and peribulbar anesthesia used to be standard technique for manual cataract surgeries, providing both anesthesia and akinesia. Peribulbar anesthesia was preferred over retrobulbar anesthesia owing to fewer chances of sight threatening complications.^{2,3} However, risk of sight threatening complications is higher with peribulbar injection when compared to newer techniques like sub-Tenon blocks and topical anesthesia.⁴ The topical anesthesia is injection less, safe and free from sight threatening complications, which provides optimum analgesia without akinesia.^{5,6} Therefore, in patients' perspective, surgical procedure needs to be painless for a comfortable and satisfactory surgical experience. On the other hand, from a surgeon's perspective, patient cooperation is desirable. The topical anesthesia is well tolerated by patients and accepted by surgeons.^{7,8,9} However, it likely that socio-psychological and iatrogenic factors may affect comfort and cooperation Therefore; this study was designed to know the determinants of satisfaction of the patients as well the surgeons for topical anesthesia in cataract surgery.

Subjects & Methods

This was a prospective, non-randomized, interventional study, done in department of ophthalmology of a tertiary

care, teaching hospital. The study protocol was approved by the institutional ethical committee and adhered to the tenets of the Declaration of Helsinki.

The methodology is briefed in (figure 1). The study included patients of senile cataract (aged >40 years), who were otherwise healthy. The recruitment was done from among the patients visiting the outpatient department for cataract surgery. The exclusion criteria included corneal opacity, non-dilating pupil (<5mm), pseudo-exfoliation, secondary or complicated cataract, subluxated lens, cataractanigra,

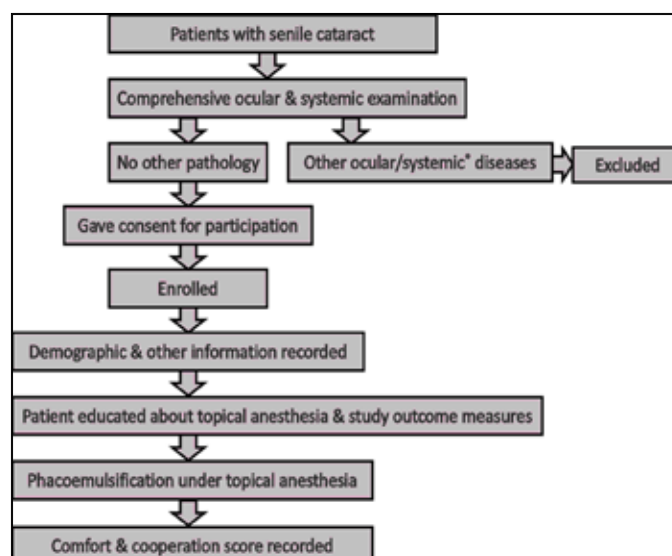


Figure 1: The study included patients of senile cataract (aged >40 years)

uncontrolled glaucoma and history of previous ocular trauma. Patients who were fulfilling the recruitment criteria were invited to participate in the study; and among these who consented to undergo cataract surgery under topical anesthesia, were enrolled for the study.

Basic information was collected from enrolled patients, which included demographic details, awareness about anesthesia techniques for cataract surgery and types of anaesthesia received during previous cataract surgery; if any. Demographic details including gender, residential address (urban/rural), education level (illiterate, below secondary and above secondary) and vocation or profession were entered in study proforma. All patients underwent comprehensive ocular examination. The cataract was classified based on slit-lamp examination into cortical, nuclear, posterior capsular/polar and mixed types.¹⁰ Mixed type had co-existing morphological characteristics of more than one type, e.g. nuclear sclerosis and posterior subcapsular changes.

On the day of surgery, patients were briefed about anaesthesia technique, supplementation anesthesia, surgical procedure and surgery evaluation score system. Surgery was done under topical anaesthesia only and intracameral lignocaine was not used. Topical anesthesia was achieved by instilling proparacaine 0.5% (Paracain, Sunways India Pvt. Ltd.) eye drop. One drop was put every five minute, thrice, starting 15 minutes before taking the patient to operative table. If patients complained of intolerable pain during surgery, supplementation with inferior sub-Tenon block was provisioned. Supplement was given only when, either

patient complained of unbearable pain and opted for block, or surgeon felt need to facilitate surgery smoothly.

All surgeries were performed by one of three surgeons (PR, AS, PC), each having more than 1-year experience of doing cataract surgery under topical anesthesia. Phacoemulsification was done through superior or supero-temporal clear cornea and foldable intraocular lens (IOL) was implanted. After surgery, patient were given protective clear glasses and shifted to postoperative recovery room. The surgical time was taken as time duration between insertion and removal of speculum; and was calculated using digital second unit clock by an independent observer.

The surgeon's and patient's experience were noted immediately after surgery using a pre-validated score system. Patients were made aware about the score system before surgery. The patients experience of surgical procedure, mainly in terms of pain and/or discomfort was used to calculate comfort score. The cooperation score was derived from the surgeon's experience of patient's cooperation during surgery (Table 1). Comfort score of 2 or below was considered as uncomfortable experience. Similarly, cooperation score of ≤ 2 was considered as non-cooperation. To study the correlation between outcome measures and surgeon's experience of doing cataract surgery under topical anesthesia, it was arbitrarily categorized into three classes-Surgeon-I: < 5years, Surgeon-II: 2-5years and Surgeon-III: < 2 years.

The data was collected using a proforma. On completion of study, whole data was entered into Excel® spreadsheet (Microsoft Corp., Redmond, WA, USA). The descriptive and analytic statistics were done using SPSS software (SPSS Version 20.0; IBM Corp., Chicago, USA). The dependent variables included comfort score and cooperation score, and independent variables included age, gender, demographics, type of cataract, previous cataract surgery, and type of anesthesia in previous cataract surgery, duration of surgery and surgeons experience of topical surgery. The significance level was taken as $p < 0.05$ for comparison of average and 0.01 for Pearson's correlation coefficient.

Results

When given the option for injection-less topical anesthesia, 524(99%; 95%CI: 98-100) opted for it, and another 6 (1%; 95%CI: 0.4-2) agreed after counseling. Hence, a total of 530 patients, including 274(52%) men and 256(48%) women, consented to undergo cataract surgery under topical anesthesia between September and November 2019. The mean (\pm SD) age was 61 \pm 9 (range 41-90) years. Majority of the patients had a rural background (85%); and were illiterate (65%). Most of the women (79%) were home-makers whereas men (56%) were agriculturists.

Of all the participants, 429 (81%; 95% Confidence Interval (CI): 77-84) were not aware about injection less topical anesthesia for cataract surgery. From among 101 aware patients, 30 (6%; 95% CI: 4-8) demanded for topical anesthesia, while the rest 71 (13%; 95% CI: 11-17) patients did not demand.

Table 1: Criteria and values for scoring scales (n=530)

| Description | Satisfaction level | Score | Number (%) |
|---|--------------------|-------|------------|
| Comfort score scale | | | |
| •Pain/discomfort all the time | Not at all OK | 1 | 3(0.5) |
| •Pain/discomfort many times | It was OK | 2 | 4(0.7) |
| •Occasional pain but tolerable | Happy | 3 | 26(5) |
| •Occasional discomfort but no pain | Very Happy | 4 | 154(29) |
| •No/pain discomfort | Extremely Happy | 5 | 343(65) |
| Cooperation score scale# | | | |
| •Repetitive instruction for fixation required[>5] | Poor | 1 | 1(0.1) |
| •Often has to instruct[3-5] | Average | 2 | 10(2) |
| •Few time instruction needed[2] | Good | 3 | 42(8) |
| •Very less often needed instruction[1] | Very Good | 4 | 125(24) |
| •No instruction required after starting surgery[0] | Excellent | 5 | 352(66) |
| *Total percentage may be above hundred rounded off to nearest value; #Cooperation score scale shows in parenthesis the number of times surgeon had to repeat instruction during surgery | | | |

The most common morphological type of cataract was mixed, seen in 359 (68%) patients. The fellow eye was pseudophakic or aphakic in 181(34%) patients. Of these, 124 (69%) had undergone cataract surgery under injection (peribulbar anesthesia), 46(25%) under drops (topical) and 8(5%) patients could not recall.

The average comfort and cooperation score were 4.56 ± 0.67 and 4.54 ± 0.73 , respectively. The average duration of surgery was 8.33 ± 3.24 (range: 4-25) minutes. The comfort score was significantly lower for rural and illiterate patients. Cooperation score was also significantly lower for illiterate patients as well among the Non-skilled workers (Table 2). Those who had awareness about topical anesthesia remained more comfortable and scored better. Neither the comfort score nor the cooperation score, was affected significantly by type of cataract, previous surgery exposure and type of anesthesia during previous surgery (Table 3).

The comfort score and cooperation score were significantly higher and the surgical duration was significantly shorter with longer surgical experience of the operating surgeon (Table 4) Though differences were significant statistically but Pearson's correlation between surgical duration and comfort score (-.164) and cooperation score (-.264) were weak.

Table 2: Demographic details and distribution of scores

| Demographic | Number Score (mean \pm SD) & validation | | | | |
|---------------------|---|-----------------|---------|-----------------|---------|
| | (%) | Comfort | p value | Co operation | p value |
| Gender | | | | | |
| •Men | 274(52) | 4.59 \pm 0.61 | 0.57 | 4.51 \pm 0.75 | 0.40 |
| •Women | 256(48) | 4.53 \pm 0.73 | | 4.57 \pm 0.71 | |
| Address | | | | | |
| •Rural | 454(85) | 4.53 \pm 0.69 | 0.04 | 4.51 \pm 0.75 | 0.11 |
| •Urban | 76(15) | 4.72 \pm 0.55 | | 4.69 \pm 0.58 | |
| Education status | | | | | |
| •Illiterate | 347 (65) | 4.50 \pm 0.74 | 0.02 | 4.47 \pm 0.79 | 0.02 |
| •Upto secondary | 164 (31) | 4.66 \pm 0.52 | | 4.64 \pm 0.58 | |
| •Above secondary | 19 (4) | 4.84 \pm 0.37 | | 4.78 \pm 0.71 | |
| Profession | | | | | |
| •Agriculture | 196(37) | 4.57 \pm 0.63 | 0.36 | 4.47 \pm 0.80 | 0.04 |
| •Non-skilled worker | 63(12) | 4.45 \pm 0.82 | | 4.35 \pm 0.85 | |
| •Skilled worker | 36(7) | 4.55 \pm 0.55 | | 4.52 \pm 0.65 | |
| •House maker* | 202(38) | 4.56 \pm 0.68 | | 4.62 \pm 0.65 | |
| •Service/retired | 34(6) | 4.73 \pm 0.61 | | 4.73 \pm 0.51 | |

Pain was perceived (comfort score ≤ 3) by 33 (6.23%; 95% CI: 4.47-8.62) patients. For 7 (1.3%; 95%CI: 0.5-2.7) patients the surgical experience under topical anesthesia was uncomfortable (Average score: 1.57 ± 0.5). The average surgical duration for this group of patients was longer (10.7 ± 3 minutes) but the difference was not statically significant (p 0.05) in post hoc test analysis. The cooperation was significantly lower for these patients (Table 5).

A total of 11(2%; 95% CI: 1.1-3.6) patients did not cooperate during the surgery. The cooperation score for these patients was low (average score \pm SD 1.90 ± 0.30) and surgical duration

was longer (Table 6). Only one patient had both a low comfort score (1) and cooperation score (2).

There was no complication related to intraoperative motility associated or increased intra-operative pressure. There were two (0.4%) intraoperative complications. In one case, posterior capsule tear (PCR) was noted during cortical clean up stage. The anterior vitrectomy was done without any additional anesthesiasupplementation. In second case, there was PCR with zonulolysis. It was managed using capsular tension ring and anterior vitrectomy. In this case intra-operatively inferior sub-Tenton's (lignocaine 2%) block was given. In both the cases IOL was implanted in beg.

Discussion

The purpose of anesthesia is to provide a pain less, comfortable and satisfactory surgical experience to the patient. The topical anesthesia does not qualify as an ideal anesthetic technique despite having a better safety profile compared to needle or cannula-based techniques. Topical anesthesia demands cooperation from patient to maintain eyes steady during surgery. Both, the comfort and cooperation, are subjective parameters, and one may affect the other.

Table 3: Patient related parameters

| Psycho-physiological | Number Score (mean \pm SD) & validation | | | | |
|--|---|-----------------|---------|-----------------|---------|
| | (%) | Comfort | p value | Co operation | p value |
| Awareness | | | | | |
| •Aware | 101(19) | 4.70 \pm 0.57 | 0.03 | 4.52 \pm 0.76 | 0.94 |
| •Unaware | 429(81) | 4.53 \pm 0.69 | | 4.54 \pm 0.73 | |
| Previous cataract surgery(Fellow eye) | | | | | |
| •No | 349(66) | 4.54 \pm 0.70 | 0.34 | 4.54 \pm 0.70 | 0.71 |
| •Yes | 181(34) | 4.61 \pm 0.61 | | 4.63 \pm 0.80 | |
| Previous anesthesia experience* | | | | | |
| •Topical | 47(27) | 4.70 \pm 0.58 | 0.39 | 4.63 \pm 0.64 | 0.71 |
| •Peribulbar | 125(73) | 4.60 \pm 0.62 | | 4.53 \pm 0.81 | |
| Type of cataract | | | | | |
| •NS I-NSII | 65(12) | 4.60 \pm 0.63 | 0.12 | 4.53 \pm 0.68 | 0.51 |
| •NS III NS | 25(05) | 4.28 \pm 0.73 | | 4.52 \pm 0.71 | |
| •IV | 81(15) | 4.55 \pm 0.68 | | 4.41 \pm 0.87 | |
| •PSC/PPC | 359(68) | 4.58 \pm 0.67 | | 4.57 \pm 0.71 | |
| •Mixed | | | | | |
| *Total cases 172 as 9 cases could not recall previous anesthesia | | | | | |

In this study, cataract surgery under topical anesthesia was comfortable for over 98% patients, and nearly 98% patients were cooperative during procedure. This proportion of comfortable experience is higher than that reported by the previous studies. This could be due to several reasons including, but not limited to, demographic differences, different criteria used to define comfort level, or surgical duration. The reported surgeon's satisfaction with topical anesthesia is above 90%.^{12,13} The criteria for surgeon's satisfaction could be different. It may be patient's cooperation to maintain steady eyes, follow instructions

Table 4: Surgeon related factors

| Surgeon | Number (%) | Surgery duration (mean ±SD) | Comfort Score (mean ±SD) | Cooperation Score (mean ±SD) |
|-------------|------------|-----------------------------|--------------------------|------------------------------|
| Surgeon-I | 362(68) | 6.78±1.7 | 4.62±0.65 | 4.64±0.64 |
| Surgeon-II | 56(11) | 10.9±1.94 | 4.51±0.66 | 4.30±0.95 |
| Surgeon-III | 112(21) | 12.0±3.65 | 4.41±0.75 | 4.31±0.81 |
| Total | 530 | 8.33±3.24 | 4.56±0.67 | 4.54±0.73 |
| p value | | <0.0001 | <0.005 | <0.0001 |

or level of anesthesia. Waheebin his study judged ocular movements, similar to our study; whereas Dole et al. used level of anesthesia. Patient's satisfaction (comfort score) as well surgeon's satisfaction (cooperation score) was comparable through ages and gender in our study. Most studies have found no association between pain perception, age and gender.¹⁴ Young age was more sensitive to pain in one study.¹⁵ Women were more sensitive to pain in one study and more tolerant in another study.^{16,17} In present study, education level was associated with low comfort and cooperation score. Previous studies have reported either no or weak association between education level, pain perception and cooperation.¹⁸ We found rural patients more cooperative but at same time also experienced more discomfort. Medghalchi et al. also did not find rural background affecting the cooperation level. Patients, either in service or retired from service were more cooperative in our study. Professional females were more cooperative in study by Omulecki et al.

Just over 6% of the patients felt pain or discomfort of varying severity during surgery. This proportion is markedly less than reported in previous published literature. Didaci et al. in their study of 92 patients, operated under proparacaine 0.5% alone, reported pain in over 78% cases. However, pain during surgery under topical anesthesia was intolerable in only a small proportion of patients. Dole et al. reported intolerable pain in 17 (3.4 %) of 500 patients who underwent surgery under topical anesthesia.¹³ Rothschild et al. 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 anesthesia.¹⁹ In our study, seven patients postoperatively admitted that surgical experience was not comfortable. But none of them opted for any additional anesthesia supplementation. This was probably due to two reasons. One, there might have been a fear of injection, which could have inhibited patients for injection anesthesia. Fear and anxiety associated with injections and needles is common and inhibit persons to undergo procedures involving injections.²⁰ In such patients, intracameral 1% lidocaine supplementation has been found to significantly reduce pain.^{8, 15} Secondly, either perception of pain was not severe enough or tolerance to the pain was good. Perception

Table 5: The patient's perspective: Comparison of determinants of comfort score between uncomfortable and comfortable surgical experience

| | Uncomfortable (n=7) | Comfortable (n=523) | p value |
|-------------------|---------------------|---------------------|---------|
| Score (mean ±SD) | 1.57±0.53 | 4.60±0.58 | <0.0001 |
| Age(mean ±SD) | 62 ±7 | 61 ±9 | 0.7 |
| Gender (M:F) | 6:1 | 1:1 | 0.12 |
| Previous surgery | 0 | 180 | 0.15 |
| Surgery duration | 10.7±3.03 | 8.30±3.23 | 0.05 |
| Cooperation score | 3.57±1.13 | 4.55±0.72 | 0.02 |

Table 6: Surgeon's perspective: Comparison of determinants of cooperation score between uncooperative and cooperative patients

| | Uncooperative patients (n=11) | Cooperative patients (n=519) | p value |
|------------------|-------------------------------|------------------------------|---------|
| Score (mean ±SD) | 1.90±0.30 | 4.59±0.63 | <0.0001 |
| Age | 61±9.9 | 60±9.5 | 0.82 |
| Previous surgery | 06 | 174 | 0.19 |
| Surgery duration | 11.0±2.84 | 8.28±3.22 | 0.004 |
| Comfort score | 3.63±1.02 | 4.58±0.65 | 0.0005 |

of pain is strongly influenced by psychological factors including behavior of caregiver and circumstances.^{21,22} The average surgical time was longer, but not statistically significant, for uncomfortable and uncooperative patients. Surgical duration has been found to be longer in patients with higher pain score.^{9, 19} The mean surgical duration in our study was markedly shorter, and could be reason of higher comfort score compared to previous studies.^{9, 19} In conclusion, the acceptance for topical anesthesia for cataract surgery is high, in both patient's and surgeon's perspective. Patient's satisfaction and cooperation depends on several socio-demographic and psychological factors. It may be worth seeing how pre-operative counseling can make cataract surgery under topical anesthesia as a pleasant surgical experience.

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