

## Clinical outcomes, surgeon and patient satisfaction following peribulbar versus topical anesthesia for phacoemulsification surgery and intraocular lens implantation- A comparative study

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### Abstract

**Introduction:** Phacoemulsification technique for cataract using either peribulbar anesthesia (PA) or topical anesthesia (TA) has evolved in last decade. Only few studies has compared between two anesthetic procedures for phacoemulsification. We compared patient and surgeon satisfaction, clinical outcome between two anesthetic procedures.

**Materials and Methods:** The Study was conducted during February 2017 to July 2017. Patients after being randomly assigned to group PA and TA were underwent phacoemulsification. Corneal condition, postoperative complication at day 1, best corrected visual acuity at day 40 were compared. Both patients and surgeons were asked questions on degree of analgesia and level of comfort respectively. Data was analyzed using appropriate test of significance.

**Results:** 50 patients were taken into study in each group. No significant difference was noted between two groups pre-operatively. Patients in PA group felt statistically significantly less pain compared to TA group ( $\chi^2 = 11.78$ ,  $df = 2$ ,  $P = 0.0027$ ). Satisfaction of surgeons was more with PA than compared with TA. [Relative Risk=1.49, (95% CI: 1.02-2.17)]. On day 1 postoperative complications were greater in TA group (76%) than compared to PA group (64%). Complications associated with anesthetic procedure were more in PA group than compared with TA group.

**Conclusions:** Patient's satisfaction was statistically significantly greater in PA group compared to TA group. Surgeon's satisfaction was also not different from patient's satisfaction and found to be more with peribulbar block than compared to topical anesthesia. Clinical outcome remains unaffected by either of anesthetic technique.

**Keywords:** Peribulbar Anesthesia, Phacoemulsification, Topical Anesthesia.

### Introduction

There is huge evolution for cataract surgery and anesthetic procedure used for it. From very basic intracapsular cataract extraction to femtosecond laser assisted phacoemulsification surgical technology has evolved periodically. In the same way anesthetic procedure's journey from retrobulbar along with facial nerve block,<sup>1,2</sup> Peribulbar,<sup>3-5</sup> subconjunctival,<sup>6</sup> sub-Tenon<sup>7</sup> and finally to the topical<sup>6,8</sup> has emerged great benefit to surgeon as well as patients. Topical anesthesia can definitely be a better alternative method to previous local anesthesia injection, because potentially serious complications are highly associated with retrobulbar or peribulbar anesthesia. Some studies reported significant pain reduction only with topical anesthesia method during cataract surgery.<sup>6,8</sup> In current study after phacoemulsification and intraocular lens implantation parameter like clinical outcomes, patient and surgeon satisfaction (qualitatively) were compared within TA and PA groups.

### Materials and Methods

The study conducted only after the institutional Ethical and Research Board approval was given. Study duration was six months between February 2017 to July 2017. Study was conducted at rural tertiary care centre. Patients who have given written informed consent were

only included in study. Patient presented to outdoor patient department of our institute were taken into study on the basis of history and comprehensive clinical ophthalmological evaluation. Only adult patient having immature senile cataract and nuclear sclerosis grade 2 and 3 were included in study. Patients having age between 50 to 75 years without any other ocular comorbidity like pseudoexfoliation syndrome, glaucoma, corneal opacity, pterygium, optic atrophy, diabetic retinopathy and hypertensive retinopathy, uveitis, nystagmus, high myopia and hypermetropia were underwent phacoemulsification and IOL implantation.

All surgeries were performed by two experienced surgeons of this institute. 100 patients were operated 50 in each group PA and TA. Sealed envelope method is used to assign patient randomly to each group at Operation Theater. PA was given by operating surgeon while TA was instilled by assistant surgeon before 30 minute of surgery. Additional anesthesia was given only when required and noted. Patients and surgeons both were ignorant about group assignment until 15 minute before surgery.

For the PA group block was prepared by adding 2% lignocaine with 1:10000 adrenaline and hyaluronidase 5 IU/ml. 5ml solution was injected with 24G needle to inferotemporal lower orbital margin and directed parallel to the floor of orbit. 3-5ml of

additional block was given superonasally only when required. Eyelids were properly closed and intermittent pressure was given for 5 minutes. Assessment of PA was done by using simple akinesia score originally described by Crawford.<sup>9</sup> Four direction of gaze inferior, superior, medial, lateral were taken into consideration while assessing eye movement. When eye performed full normal movement it was scored as 2. When there was reduced movement, it scored as 1 and flickering or total akinesia was scored by zero. After 10-12 minutes quality of block was assessed as it is maximum time required for fixation of local anesthetic solution. If there was total akinesia or slight flickering, block was considered as good. For the TA group one drop of proparacaine hydrochloride 0.5 % was instilled in lower conjunctival sac every 5 minutes for 30 minutes. Patients were instructed to remain their eyes closed after instillation of drop. Patients were supine position with eyes open on operating table and asked not to move eyes.

Patient was asked to calm down. After painting and draping, 2.8 mm sized clear corneal incision taken for phacoemulsification probe. Two side port entries of 0.8 mm size also made. After applying trypan blue anterior chamber formed with viscoelastic substance and anterior capsulotomy performed with the help of cystotome. Hydro-dissection and hydro-delineation were performed to separate cortex from capsule. Precaution is taken to use minimal energy for phacoemulsification procedure. All patients underwent phacoemulsification with intra ocular lens implantation in capsular bag. Intra-operative complication were managed meticulously and documented. Any change in surgical technique was noted. Data were collected on phacoemulsification surgery like time required to complete surgery, intra-operative complications and surgeon and patient satisfaction scores.

Patients were asked verbally about pain at the time administration of anesthetic solution, intra-operatively, and 6 hours postoperatively. (Verbal pain score: No pain=0, Mild pain=1, Moderate pain=2, Severe pain=3) After each surgery, surgeons were also asked for their satisfaction and discomfort regarding chemosis, subconjunctival hemorrhage, positive intraocular pressure.

Assessment of patient's satisfaction was done by asking questions about degree of pain by the one of our research assistant who was masked to the technique of anesthesia used. Patients were verbally questioned about degree of pain at various event like administration of drug, intra-operatively and six hours post-operatively.

The data were initially collected on a pretested form. Then data transferred to an Excel® spreadsheet (Microsoft Corp., Redmond, WA, USA). Open Epi software was used for analysis of data with a parametric method. The mean, difference of mean, standard deviation and the 95% confidence intervals (CI) were calculated after analyzing data. Age and other

quantitative variables compared between groups. For qualitative variables like patient and surgeon satisfaction, the relative risk (RR) and 95% CI were calculated. For variables from more than two subgroups, the Chi-square, degrees of freedom and *P* values were calculated.

## Results

100 patients were included in study 50 in each PA and TA group. Profile of participant among group is shown in Table 1. Statistically both groups were equal.

Patient's satisfaction for anesthesia mainly evaluated by pain score among TA and PA group. During administration of anesthesia in TA group no patient had complained pain but in PA group since it is invasive procedure, all patient experienced pain during needle insertion.

Figure-1 shows there was intolerable pain intra-operatively experienced by 15 (30%) patient in TA group while only 6 (12%) cases in PA group. 16 patients were supplemented additional anesthesia. Moderate pain was experienced by 16 (32%) participants in TA group and by 8 (16%) participants in PA group. Intra-operative discomfort or mild pain was noted among 19 (38%) cases in TA group and 36 (72%) cases in PA group respectively. Nonparametric method was used for comparison of pain analog score in TA group and PA group. When the score was compared within TA and PA group intraoperatively, it was found to be statistically significantly high. ( $X^2=11.78, P=0.002$ ).

Pain threshold can be lower for aged person than young patients. So, on the basis of age participants in both the group are further categorized into patients having age less or equal to 65 years and patients having age more than 65 years. Population of patients having age less or equal to 65 years was 13 and 16 in TA and PA group respectively. While number of patients having age more than 65 years were 37 and 34 in TA and PA group respectively. In both groups, there was not statistically significant difference of pain score. ( $P=0.25$ ).

After 6 hours of surgery, mild discomfort and occasional pain was experienced by 1 (2%) and 7 (14%) respectively in TA group. In PA group 2 (4%) patient reported mild discomfort and 13 (26%) patients reported occasional pain.

Satisfaction of surgeon was assessed by level of comfort they felt while performing surgery. Table 2 shows the surgeon's rating of ease of surgery. The surgeon's response to questions related to comfort while performing surgery suggested that 16 (32%) and 8 (16%) cases in TA and PA group respectively, were not comfortable and satisfactory. Surgeons were unsatisfied with overall degree of analgesia and akinesia in TA group compared to PA group. [Relative Risk=1.49, (95% CI:1.02-2.17)]

Table 3 shows the clinical findings observed next day after first 24 hours of surgery. In TA group 38 (76%) eyes had various signs of inflammation while in PA group 32 (64%) eyes had various signs of inflammation.

Fig. 2 shows comparison of best corrected visual acuity (BCVA) between TA and PA group. The difference in BCVA was not statistically significant ( $X^2 = 0.46, df = 3, P = 0.92$ )

**Table 1: Age and clinical features of patients undergoing phacoemulsification under TA and PA**

	Topical anesthesia	Peribulbar Anesthesia	Validation
Age			
Mean (Years)	62	60.5	Difference of mean= -1.5 (95% CI -4.08 to 1.08), P=0.25
SD	6.3	6.7	
Sex distribution among patients (%)			
Gender			
Male	23 (46%)	24 (48%)	
Female	27 (54%)	26 (52%)	
Types of cataract			
	No. of patients (%)		
IMSC + NS grade 2	12	13	$X^2 = 1.432$ df=4 P=0.83
NS grade2	16	11	
IMSC + NS grade 3	13	14	
NS grade3	6	8	
Subcapsular	3	4	
Surgeon			
	No. of patients operated (%)		$X^2 = 1.442$ df=1 P=0.11
1	29	23	
2	21	27	
Preoperative vision			
	No. of patients (%)		$X^2 = 0.2573$ df=3 P=0.96
<FC3M	9	11	
6/60-FC3M	17	16	
6/18-6/36	19	18	
6/9-6/12	5	5	

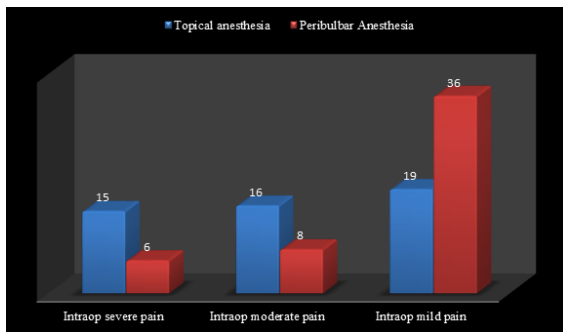
SD: standard of deviation, OR: Odds ratio, df: degree of freedom, CI: confidence interval, IMSC: immature senile cataract, NS: nuclear sclerosis, FC3m= Finger counting 3 meter.

**Table 2: Surgeon's rating of ease of surgery and use of analgesia in patients operated under TA and PA**

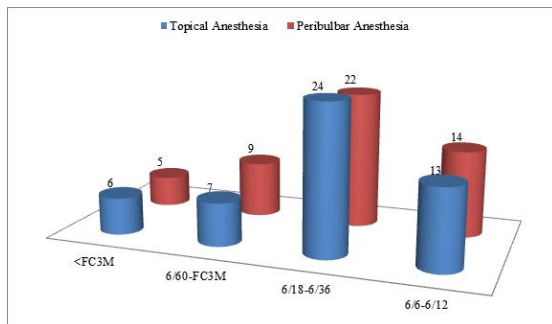
Surgeon's opinion (Ease of procedure)	Topical anesthesia	Peribulbar anesthesia
No difficulty	34	42
Slight difficulty	6	3
Moderate difficulty	10	5
Additional analgesic used	12	4

**Table 3: Status of eye post-op 24 hour phacoemulsification and IOL implantation using topical and Peribulbar anesthesia**

Tissue involved	Signs	No. of patients (%)	
		Topical anesthesia	Peribulbar anesthesia
Eyelid	Swelling	13 (26%)	16 (32%)
Conjunctiva	Congestion/ sub conj hemorrhage	15 (30%)	8 (16%)
Cornea	Edema/haze	10 (20%)	8 (16%)
No signs of inflammation		12 (24%)	18 (36%)



**Fig. 1: Patients reported pain intra-operatively in TA group and PA group**



**Fig. 2: BCVA of patients after 40 days of phacoemulsification using TA and PA**

## Discussion

In this study patients were more anxious and felt more pain when topical anesthesia was used. This resulted in statistically more satisfaction which we measured in terms of pain score with eyes underwent phacoemulsification using PA compared to TA. ( $P=0.0027$ ). This finding is supported by another study Boezaart et al<sup>10</sup> who reported that patients who never experience a needle block may be satisfied with topical anesthesia while those that experienced both techniques clearly preferred the injection. In another study by Tseng H et al<sup>11</sup> also reported that patients under topical anesthesia alone were more likely to experience discomfort during iris manipulation and zonular stretching. However in some study different results have been reported about degree of pain, anxiety, level of discomfort and patient's satisfaction post-operatively. Study by Maclean H et al<sup>12</sup> shows that most patients who given topical anesthesia do not feel severe pain, similar to those patients who operated under peribulbar or retrobulbar anesthesia.

In our study surgeons found to be more comfortable and satisfied with peribulbar block than topical anesthesia while doing phacoemulsification ( $P=0.03$ ). This is also supported by other studies. Feedback from surgeons reported that it is more difficult to operate under topical anesthesia compared to peribulbar anesthesia.<sup>10</sup> Not all but some surgeons felt that phacoemulsification with topical anesthetic resulted in no difficulties or complications.<sup>13</sup>

In our study intra-operative complications were statistically not significant in TA group and PA group. But in another study by Virtanen P et al<sup>14</sup> it was greater among patients undergoing phacoemulsification with topical anesthetic compared to peribulbar anesthetic. After 24 hours of phacoemulsification signs of inflammations were found to be more in TA group compared to PA group. However visual outcome at 40 days post-surgery into both groups was not significantly different.

Our study has several limitations. We evaluated only intraoperative pain. Pain felt during application of anesthetic agent and trepidation from microscope light should be evaluated separately. There is probability that patients could have incorporated pain on injection of anesthetic agent to pain score. In our study two experienced surgeons performed all surgical procedure. A surgical technique, types of corneal and scleral incision and type of IOL depends on surgeon's preference. Individual surgeon's outcomes were not evaluated.

In spite of this our study tried to reduce bias by having single research assistant as interviewer. The most of our patients have no academic education. Those were elderly, visually impaired. Some patients were abandoned by their family and having low self-esteem. In spite of that it was noted that they answered to questions exactly what they felt without indecision. We found no or negligible element of bias while evaluating study.

## Conclusion

Peribulbar anesthesia gives statistically significantly better satisfaction to patients compared to topical anesthesia. Surgeon's satisfaction was also more with peribulbar block than compared to topical anesthesia. Clinical outcome do not get affected by using either of anesthetic technique.

## Acknowledgement

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