



A COMPARATIVE STUDY OF SUB TENON'S ANESTHESIA AND SUB-CONJUNCTIVAL ANESTHESIA IN MANUAL SMALL INCISION CATARACT SURGERY

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Abstract:

Objective: - To compare patient and surgeon comfort during SICS under sub tenon's anesthesia (STA) and under anterior subconjunctival anesthesia (ASCA).

Material and method: - A prospective, longitudinal study was conducted from 1st January 2023 to 31st July 2023 in the patients attending Ophthalmology OPD. Patients undergoing small incision Cataract surgery were randomly divided into two groups- anterior subconjunctival anesthesia (ASCA) group and sub tenon's anesthesia (STA) group. Ocular motility, duration of surgery, pain experienced by patient and surgeon's discomfort during surgery was recorded.

Result: - A total of 130 patients were included in the study out of which 65 underwent SICS under ASCA and 65 underwent SICS under STA. 68(52%) were females and 62(48%) males. All patients in ASCA group had total ocular motility while in STA group 39 patients had no ocular motility, 12 each had grade 1 and grade 2 motility and 3 had grade 3 motility($p=0.001$). In ASCA group in 19 cases surgeon had grade 1 discomfort, in 9 cases grade 2 while in 3 cases grade 3 discomfort in performing the surgery. In STA group only in 4 cases surgeon had grade 1 discomfort in performing the surgery with no patient with grade 2 or grade 3 discomfort. In STA group 13 patients had mild pain during the surgery while in ASCA group 35 patient had mild pain. More patients in ASCA group experienced mild pain than STA group ($p<0.001$) but none of the patient in any of the group had pain significant enough to need to convert to other mode of anesthesia administration.

Conclusion: - ASCA is a feasible option in expert hands in SICS cases where patient insists on topical surgery. It obviates the chances of needle related injury during anesthesia.

Introduction

Innovations and advances are the heart of medical science. Cataract surgery has seen major advances in the past few decades from ECCE in 1747 to FLACS in 2008¹. Similarly, there has been major advances in anesthesia for cataract surgery from general anesthesia to local anesthesia. Cataract surgery is now a day care procedure and patients expect to be mobile soon after surgery so there is a lot of focus on sub tenon's, subconjunctival and topical anesthesia. Small Incision Cataract surgery is still a preferable method due to its lower expense, no machine dependency and results being comparable to phacoemulsification.² Thus in developing countries and especially in rural setup SICS has a very important place. Retrobulbar and peribulbar anesthesia had been conventionally used for cataract surgery but are associated with the significant risk of injury to orbital structures. Thus, there

is an increasing trend to use lesser invasive procedures in the form of sub tenon's and subconjunctival anesthesia. With this in mind this study aims to compare patient and surgeon comfort during SICS under sub tenon's anesthesia (STA) and under anterior subconjunctival anesthesia (ASCA).

Material and method:

A prospective, longitudinal study was conducted from 1st January 2023 to 31st July 2023 in the patients attending Ophthalmology OPD at a tertiary care institute of north India. After obtaining ethical approval from Institutional review board patients were recruited into the study.

Sample size:

Sample size was calculated using the formula

$$n = \frac{2([\alpha + b]^2 \sigma^2)}{(\mu_1 - \mu_2)^2}$$

Considering 5% level of significance $\alpha=1.96$ and with Power of test 80% $b= 0.85$, Sample size calculated in each group was 63. So, 65 patients were taken in each group.

Patients undergoing small incision Cataract surgery were divided into two groups- those under anterior subconjunctival anesthesia (ASCA) and sub tenon's anesthesia (STA). Patients were randomly divided into the two groups.

Patients with complicated cataract, traumatic cataract, age >85 years, patients on clopidogrel, patients sensitive to lignocaine were excluded from the study.

Anesthesia was administered by one of the two operating surgeon and same surgeon performed the surgery.

All the patients were given local anesthesia using 2% xylocaine with 1:100,000 adrenaline with hyaluronidase. For hypertensives or cardiac patient plain xylocaine was used.

Technique of Posterior Sub tenon's anesthesia-

Eye was painted with Povidone Iodine (5%) and then a drop of topical anesthetic proparacaine (0.5%) was instilled into the eye. After placing universal wire speculum, patient was asked to look up and out to expose the inferonasal quadrant. A small nick was made in the conjunctiva and sub tenon's 5-6 mm from limbus using Wescott's scissor. After blunt dissection, 3 ml of anesthetic was injected into the sub tenon's space using a blunt curved cannula. Ocular massage was given for 3 minutes.

Technique of Anterior sub-conjunctival anesthesia-

Eye was painted with Povidone Iodine (5%) and then a drop of topical anesthetic proparacaine (0.5%) was instilled into the eye. After placing universal wire speculum, patient was asked to look down and 0.2 ml of anesthetic was injected in the superior conjunctiva at the limbus. No massage was given at the end. Surgical steps after either of the anesthesia were same.

The globe was fixed with superior rectus bridle suture. After conjunctival peritomy 5-7 mm scleral tunnel was fashioned. Side port incision of 0.8mm was created followed by staining of capsule with trypan blue dye. After injecting viscoelastic continuous curvilinear capsulorhexis was done. Tunnel entry was done and extended. After hydro dissection nucleus was prolapsed into anterior chamber and then delivered. After irrigation and aspiration of the cortex PCIOL was implanted in the bag. Remaining viscoelastic was aspirated, side port stromal hydration was done and eye was patched. The time interval between the end of anesthetic administration and beginning of surgery was noted. Duration of surgery was recorded from beginning of conjunctival incision to placement of eye pad.

Ocular motility during surgery was graded from 0-4 as follows-

0 - no movement/twitch only

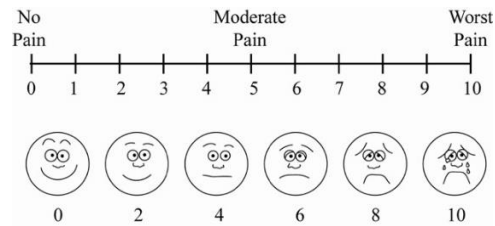
1 - Movement in one direction of gaze

2 - movement in two directions of gaze

3 - movement in three or more directions with some restriction

4 - Full eye movements.

Pain experienced by patient during anesthetic administration and during surgery was documented using Visual Analogue Scale.



Grading of 0 meant no pain; one to three meant mild pain; four to seven was considered moderate pain; eight and above as severe pain.

Discomfort experienced by the surgeon during surgery was graded from 0-4 as follows

0 - No discomfort;

1 - Mild discomfort;

2 - Moderate discomfort;

3 - Severe discomfort;

4 - Surgery not possible to continue without additional anaesthetic administration.

Statistical Analysis:

Data was entered and analyzed using IBM SPSS Statistics for Windows Version 26. Descriptive statistics were analysed using percentages for categorical data and mean and standard deviation for continuous data. For inferential statistics, the Chi-square test (for categorical variables) and *t*-test (for numerical variables, if normally distributed) were used.

Results

A total of 130 patients were included in the study out of which 65 underwent SICS under ASCA and 65 underwent SICS under STA. 68(52%) were females and 62(48%) males. Most of the patients in both the group were within the age range of 50-70 year with the mean age being 59 ±7.8 years (Range 40-82 yrs). (Table 1)

	ASCA	STA
Males	31	31
Females	34	34
Age		
>70	4	7
60-69	20	17
50-59	37	37
40-49	4	4
Eye		
RE	39	29
LE	26	36

Table 1: Demographic Profile

Major anesthesia related complication like globe rupture or damage to the orbital structures was not seen in either of the groups. Chemosis was seen in all the patients in ASCA group and 14 in STA group. Sub conjunctival hemorrhage was seen in 19 patients in ASCA group and 49 patients in STA group.

All patients in ASCA group had total ocular motility while in STA group 39 patients had no ocular motility, 12 each had grade 1 and grade 2 motility and 3 had grade 3 motility. Patients in ASCA group had more ocular motility as compared to in STA group. (Table 2)

Ocular motility	ASCA	STA	P value
Grade 0	0	39	<i>p</i> =0.001
Grade 1	0	12	
Grade 2	0	12	
Grade 3	0	2	
Grade 4	65	0	
Total	65	65	

Table 2: Comparison of ocular motility between the two groups

The difference in motility between the two groups was significant (*p* =0.01)

In ASCA group, in 19 cases surgeon had grade 1 discomfort, in 9 cases grade 2 while in 3 cases grade 3 discomfort in performing the surgery. In STA group only in 4 cases surgeon had grade 1 discomfort in performing the surgery with no patient with grade 2 or grade 3 discomfort. In neither of the group surgeon had grade 4 discomfort i.e surgery not possible without additional anesthesia. The cause for the discomfort were mainly deep set eyes, excessive eye movement or un co-operative patient. (Table 3)

Discomfort By Surgeon	ASCA			Total	STA			Total	P value
	Reason For Discomfort				Reason For Discomfort				
	Deep Set Eyes	Excessive Eye Movement	Patient Not Cooperative		Deep Set Eyes	Excessive Eye Movement	Patient Not Cooperative		
Mild	1	18	0	19	1	1	2	4	<i>p</i> =0.001
Moderate	0	8	1	9	0	0	0	0	<i>p</i> =0.001
Severe	0	2	1	3	0	0	0	0	
Surgery not possible without additional anesthesia	0	0	0		0	0	0	0	

Table 3: Causes of discomfort experienced by surgeon during the surgery

There was no significant difference in the duration of the surgery between the two groups with the mean time being 13.83 min in ASCA group and 13.78 min in STA group (*p*=0.40).

In STA group 13 patients had mild pain during the surgery while in ASCA group 35 patient had mild pain. More patients in ASCA group experienced mild pain than STA group (*p* <0.001) but none of the patient in any of the group had pain significant enough to need to convert to other mode of anesthesia administration. (Table 4)

Grading of Pain	ASCA	STA	p value
No Pain (0)	30	52	<i>p</i> =0.001
Mild pain (1-3)	35	13	
Moderate pain (4-7)	0	0	
Severe pain (8-10)	0	0	
Total	65	65	

Table 4: Pain experienced by patient during surgery

1 patient in STA group and 1 patient in ASCA group had PCR with vitreous loss. In both the cases anterior vitrectomy was done and IOL was placed in sulcus.

Discussion

Advancement in the medical science has raised the benchmark of expectation of both the patients and the surgeons. Ophthalmologists today aim to give the best possible vision soon after cataract surgery. This has been possible because of advancement in cataract surgery and also because of newer modalities of anesthesia like topical and subconjunctival anesthesia which do not require eye to be patched post cataract surgery. Phacoemulsification is now frequently done under topical anesthesia^{4,5} as it requires no conjunctival and iris handling. Expertise in SICS still is a necessary skill as it comes handy in difficult situations during phacoemulsification and is also needed in developed countries as it is a cheaper surgery and not machine dependent.^{6,7} Since SICS requires conjunctival peritomy, scleral incision and iris manipulation especially during prolapsing and delivering the nucleus so sub tenon's block is preferred by many surgeons. Subconjunctival anesthesia will provide a faster recovery so we compared the patients and surgeons comfort during surgery performed under the two types of anesthesia.

No major anesthesia related complication like globe perforation, retrobulbar hemorrhage etc were seen, as STA was given using blunt cannula and during ASCA needle is always under direct visualization. This is similar to study done by K.Ajay et al.⁸

In the study, surgical time for both the groups was similar with no statistically significant difference. This was similar to study done by Sebastian N.N Nwosu.⁹ Thus, surgery under ASCA does not take a longer time. Another advantage of Anterior subconjunctival anesthesia is that the block is quicker as no massage is needed after the block. There was complete ocular motility during the surgery under ASCA and surgeon's discomfort was more while performing surgery under ASCA as compared to STA thus it should be attempted once surgeon has adequate expertise in SICS. More number of patients in ASCA group had pain but it was only mild pain and didn't add to surgeon's discomfort or need for additional or another mode of anesthesia.

ASCA also has a benefit that it does not require post-operative patching and thus patient can be sent back home earlier. It is also quicker as no massage is needed post block.

Conclusion

The surgical time under both types of anesthesia was similar. More patients experienced mild pain under ASCA as compared to STA but it was not significant enough to require additional different types of anesthesia. Also, surgeon's discomfort was more with ASCA as compared to STA but surgeon could complete the surgery in all the cases. Thus, ASCA is a feasible option in expert hands in SICS cases where patient insists on topical surgery. It also obviates the chances of needle related injury during anesthesia.

Limitations

It was a single center study with surgery performed by only 2 surgeons. We suggest a larger multi centric study with many operating surgeons.

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