

Topical anesthesia versus sub-Tenon block for cataract surgery: Surgical conditions and patient satisfaction

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PURPOSE. *To compare the surgical conditions and complications and patient and surgeon satisfaction in cataract surgery by phacoemulsification under topical anesthesia (TA) versus sub-Tenon block (STB).*

METHODS. *Prospective randomized comparative blind study, without placebo control. Patient satisfaction evaluated by the Iowa Satisfaction with Anesthesia Scale (ISAS).*

RESULTS. *The authors prospectively enrolled 59 patients (61% female) in the study, who were randomized into groups: 26 in the TA group and 33 in the STB. There was no statistically significant difference between the groups in terms of age, sex, waiting time for surgery, ASA (American Society of Anesthesiologists) state, eye laterality, cataract density, pupillary dilation, or surgery duration, but patient collaboration was better in the STB group. We found a mean 2.2 mmHg post-anesthetic rise in intraocular pressure in the STB group, with normalization at 24 hours, and no rise in the TA group. Subconjunctival hemorrhage and chemosis were more prevalent in the STB group, and the improvement of visual acuity was similar in both groups. Subjective satisfaction with the anesthetic technique, both for the surgeon and for the patient, was more elevated in the STB group. The final ISAS scores were 1.87 in the TA group and 2.71 in the STB ($p < 0.005$).*

CONCLUSIONS. *The data indicate that more significant anesthesia and analgesia was achieved with the STB, leading to more favorable surgical conditions and enhanced patient and surgeon satisfaction. (Eur J Ophthalmol 2008; 18: 356-60)*

KEY WORDS. *Ophthalmic anesthesia, Cataract surgery, Topical anesthesia, Sub-Tenon block*

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INTRODUCTION

Cataract surgery is the most common elective operation performed worldwide (1, 2). The development of new technologies and new surgical techniques and materials lead to less invasive and day care procedures. This in turn encouraged an evolution on the ophthalmic anesthetic strategies, rendering general anesthesia largely unnecessary, so that local techniques have become preferred for cataract surgery management (3, 4). Recently, topical anesthesia (TA) and sub-Tenon block (STB) are being more frequently used. The first one is the most

economic strategy and is often preferred because of financial and staffing reasons (1, 5), but there is some evidence, despite several reports on its safety and efficacy (6, 7), that it leads to more intraoperative pain and discomfort (8-10).

Patient satisfaction with a given anesthetic strategy is determined by a series of factors, not only by pain management, and the quality of the anesthesia is also measured by the surgical conditions offered to the surgeon. We compare surgical conditions and complications and patient and surgeon satisfaction in cataract surgery performed by phacoemulsification under TA versus STB.

METHODS

We designed a prospective randomized comparative blind study, without placebo control, in which patient satisfaction was assessed by a new scoring system called Iowa Satisfaction with Anesthesia Scale (ISAS). This is a tool developed and tested to be a consistent and valid quantitative measure of patient satisfaction, specifically with anesthesia care.

The study was considered and approved by the hospital's ethics committee. Every patient was given detailed information on the preoperative visit, at least 1 week ahead of the surgery, so that written informed consent could be obtained prior to the surgical session.

The study was conducted in collaboration with the anesthesiology department, and together we devised the exclusion criteria (Tab. I).

We prospectively enrolled 59 eyes of 59 patients in the study, which were randomized into two groups, as they were about to enter the surgical room. Each one of the techniques was performed by the anesthesiology and nursing staff in the anesthetic induction room, without surgeon knowledge. All patients were given a standard intravenous (IV) premedication with midazolam (0.02 mg/kg) and alfentanil (0.005 mg/kg). A venous access was always placed in, and all patients received topical conjunctival anesthesia with a single drop of oxibuprovacaine. Then, in the TA group we instilled further 4 drops of 0.1% ropivacaine each 3 minutes before surgery and in STB group we placed 3 cc of the same 0.1% ropivacaine in the posterior sub-Tenon space of the eye. This technique consists of a small incision of the conjunctiva on its inferonasal quadrant using curved ophthalmic scissors, 7 to 10 mm away from the limbus to avoid the inferior oblique muscle, followed by a blunt dissection through Tenon capsule to the bare sclera (2, 11). Then, a curved blunt 19 gauge Stevens cannula is used to go further along the contour of the eye, in a gentle way, until it lies in the posterior sub-Tenon space, where the anesthetic solution is delivered (12-14). No hyaluronidase was used in this study. It is the anesthesiologists' opinion, and ours also, that patients do very well with the application of the anesthetic solution in the sub-Tenon space.

Surgeries were performed by four different surgeons, but with equal surgical experience, and using the same phaco technique. No intracameral anesthetics were used in any patient and no subconjunctival antibiotics or corticosteroids were administrated at the end of the surgery (only

intracameral cefuroxime). Neither the patient nor the surgeon knew which anesthetic technique was performed in each case, although we did not administer sub-Tenon sham injections in the TA group. The ISAS questionnaire was applied in the afternoon by an anesthesiology resident not present in the surgical session.

RESULTS

A total of 61% of our 59 patients were female. The randomization resulted in 26 patients being allocated to the TA group and 33 to the STB group. We found no statistically significant differences in baseline demographic characteristics of the patients in either group, such as age ($p=0.7$), sex ($p=0.2$), waiting time for surgery ($p=0.6$), or eye laterality ($p=0.5$), as well as with baseline clinical characteristics, like preoperative ASA state ($p=0.6$), cataract density ($p=0.3$), percentage of second eyes being operated in each group ($p=0.27$), or pupillary dilation ($p=0.8$) (Tab. II).

The first relevant difference we found between the groups was the patient collaboration as surgery was being performed, with a better result in the STB group ($p=0.01$). Mean surgery duration was similar in both groups (TA: 17.1 minutes; STB: 18.4 minutes). Improvement in best-corrected visual acuity (BCVA) at the first month, as we excluded eyes with posterior segment pathology, was very good, and without statistically significant differences between both groups (TA: 0.32 to 0.92; STB: 0.26 to 0.91) (decimal scale).

One of the main goals was to find out if there are elevations of intraocular pressure (IOP) following anesthesia.

TABLE I - EXCLUSION CRITERIA

Patient related	Eye/cataract related
Age <18 years	History of ocular trauma
ASA state IV or V	High myopia
Bad patient collaboration	Posterior staphyloma
Inability to lie flat	Nystagmus/fixation instability
Allergy to topical anesthetics	Severe photophobia
Hypocoagulation	Previous ocular surgery
	Posterior segment pathology
	Bad pupillary dilation
	Pseudoexfoliation
	Need for extracapsular surgery

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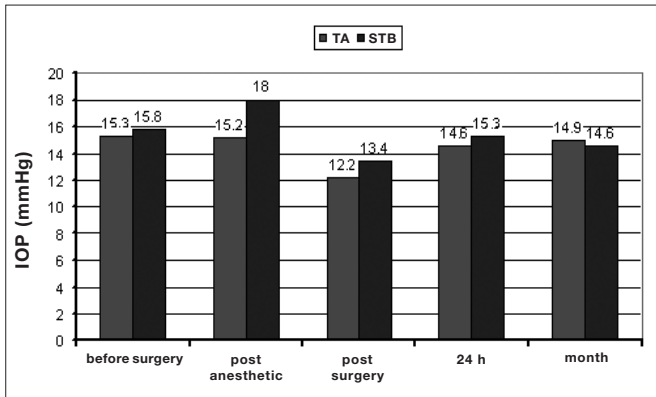


Fig. 1 - IOP evaluation: means on each group at 5 different moments.

We verified a mean 2.2 mmHg rise in the STB group from preoperative to postanesthetic evaluations and no rise in the TA group (Fig. 1). However, 24 hours after surgery IOP presented similar values to preoperative measurement, without any specific medication.

Some of the STB group patients showed mild to moderate chemosis and subconjunctival hemorrhage after anesthesia. Even after surgery and at first day, chemosis and subconjunctival hemorrhage were always more prevalent and more marked in the STB group.

Corneal edema, once more, was more frequent at 24 hours in the STB group patients; however, at the first month, all corneas were clear.

In terms of surgical complications, there were no posterior capsule tears or vitreous loss in these 59 surgeries (Tab. III). Curiously, we saw more cases of vitreous tension and iris prolapse in the patients submitted to TA, with statistical significance.

Finally, we found that 85% of the surgeons were very satisfied and 15% were satisfied with the anesthetic technique in the STB group. Only 46% were very satisfied, 31% were satisfied, and 23% were not satisfied in the TA group. So, in terms of surgeon satisfaction, there was a statistically significant difference ($p=0.001$) between the strategies, and STB seems to be a much more desirable technique for the surgeons. When we talk about patient satisfaction, the results were very similar: in the STB group 82% of the patients were very satisfied after surgery, 12% satisfied, and only 6% not satisfied, while in the TA group, only 46% of the patients were very satisfied, 35% were satisfied, and 19% were not satisfied with the anesthetic technique; once again, this difference reached statistical significance ($p=0.01$).

These are the statements that compose the instrument of measuring patient satisfaction with anesthesia that we

TABLE II - BASELINE DEMOGRAPHIC AND CLINICAL CHARACTERISTICS OF THE PATIENTS IN EACH GROUP

	Global	TA	STB	Significance (p)
Age, yr	73 (± 7)	74.5 (± 6)	72 (± 8)	0.7
Sex, %, F/M	61/39	54/46	66/34	0.2
Waiting time for surgery, mo	8.5 (± 3.6)	8.7 (± 3.4)	8.4 (± 3.9)	0.6
Eye laterality, %, R/L	47.5/52.5	46/54	48.5/51.5	0.5
Preoperative ASA state, %, ASA I/II/III	4/57/39	4/54/42	3/60/37	0.6
Cataract density, %, 1+/2+/3+/4+	12/57/24/7	12/61/27/0	12/55/21/12	0.3
Percentage of second eyes	29	34	25	0.27
Pupilar dilation, %, excellent/good/fair	76/14/10	73/16/11	79/12/9	0.8

TA = Topical anesthesia; STB = Sub-Tenon block

TABLE III - SURGICAL COMPLICATIONS IN EACH GROUP

	TA	STB	Significance (p)
Posterior capsule tear	0/26	0/33	
Vitreous loss	0/26	0/33	
Vitreous tension	3/26 (11.5%)	0/33	0.04
Iris prolapse	8/26 (31%)	3/33 (9%)	0.02

TA = Topical anesthesia; STB = Sub-Tenon block

TABLE IV - THE STATEMENTS THAT COMPOSE THE IOWA SATISFACTION WITH ANESTHESIA SCALE QUESTIONNAIRE WE USED

	TA	STB	Significance (p)
Cold/hot	3/26 (12%)	2/33 (6%)	0.3
Itching	1/26 (4%)	1/33 (3%)	0.6
Peroperative pain	10/26 (39%)	2/33 (6%)	0.0009
Postoperative pain	11/26 (42%)	3/33 (9%)	0.001
Safe	26/26 (100%)	33/33 (100%)	
Relaxed	19/26 (73%)	29/33 (88%)	0.1
Nausea/vomiting	2/26 (8%)	1/33 (3%)	0.2
Satisfied with	21/26 (81%)	32/33 (97%)	0.02
Would repeat	18/26 (70%)	32/33 (97%)	0.005

TA = Topical anesthesia; STB = Sub-Tenon block

used, the ISAS (Tab. IV). Very different answers were given on the topics of intraoperative and postoperative pain, with very low p. We can also see that 97% of the STB patients said that they would repeat the anesthetic technique performed, while only 70% of the TA group said so. Final ISAS scores were 1.87 in the TA group versus 2.71 in the STB group, with a maximum of 3, meaning a strong statistically significant difference ($p=0.003$).

DISCUSSION

Patients do very well with sub-Tenon application of anesthetic solution; no procedure had to be stopped, resulted in any main complication, or caused relevant pain or discomfort, when performed under conjunctival anesthesia with oxibuprovacaine. The same seems not to be true with peribulbar or retrobulbar blocks. Besides the concerns on the safety of using sharp needles, Coelho et al (8) found that, without sedation, the pain induced by phacoemulsification under topical anesthesia was milder than the pain induced by peribulbar infiltration itself.

Our main conclusions from this study were that we verified a mean post-anesthetic rise of 2.2 mmHg in the IOP in the STB group, but with normalization, without any specific medication, at 24 hours, and no rise in the TA group. Iatrogenic chemosis and subconjunctival hemorrhage were more prevalent and marked in the STB group. Most corneas were clear at 24 hours in both groups. However, we found slightly more cases of mild corneal edema in the first postoperative day in the STB group, but not to an extent of clinical significance that made us think the anesthetic strategy could have some influence on this by itself.

We found it curious that, as an additional volume of liquid

is placed inside the orbital cavity with the 3 cc of anesthetic solution in the patients operated under STB, which could lead to some posterior pressure (15), there were more cases of vitreous tension and iris prolapse in the patients submitted to TA. Probably this results from more anxiety and awareness caused by higher intraoperative pain levels in the TA patients, leading to higher arterial pressure and because of this to more orbital tension (16). We noticed more significant anesthesia and analgesia with STB, leading to more favorable surgical conditions and elevated patient and surgeon satisfaction. Similar results on the topic of patient satisfaction were published by Rüschen et al (1), based on a randomized controlled trial of STB versus topical anesthesia for cataract surgery ($p<0.0085$). Srinivasan et al (5), in a randomised double-blind clinical trial comparing topical and sub-Tenon anesthesia in routine cataract surgery, found that patients experience more postoperative pain and discomfort when operated under topical conditions. Zafirakis et al (17), Chittenden et al (18), and Manners and Burton (19) reported higher pain scores with topical anesthesia. In conclusion, both topical and sub-Tenon anesthesia proved to be safe and effective for routine cataract surgery, leading to well tolerated procedures; however, they could be less painful under the second strategy.

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