

Can We Predict Patients' Cooperation During Phacoemulsification Surgery Under Topical Anesthesia?

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Abstract- Topical anesthesia (TA) may accompany more discomfort for some patients during cataract surgery. We aimed to evaluate the potential factors that can be used for predicting patient's cooperation during phacoemulsification surgery under TA. One hundred sixty consecutive cases that were candidate for phacoemulsification surgery were enrolled in this prospective study. Patients' sex, age, place of residence (urban or rural), education level (literate and illiterate) and physical examination variables (visual acuity, reaction to eye drop, cooperation during tonometry, and reaction to press on the lacrimal sac before surgery) evaluated. Patients' cooperation during surgery was classified as successful (good and satisfactory) or failed (weak) groups. In this study, 103(64.4%) cases showed good or satisfactory cooperation, and others had weak cooperation. There was no correlation between patients' cooperation during surgery and sex ($P=0.2$), age ($P=0.7$), place of residency ($P=0.3$), and education level ($P=0.3$). The successful group showed a higher rate of non-reaction to eye drop ($P=0.0001$), good cooperation during tonometry ($P=0.0001$), non-reaction to press on lacrimal sac ($P=0.0001$), and lower visual acuity ($P=0.045$). In the multi-logistic regression, non-reaction to eye drop (OR=66.4), good cooperation during tonometry (OR=21.2, good vs. bad and OR=7.2, satisfactory vs. bad), lower visual acuity (OR=7, <0.1 vs. 0.1-0.4 d) are the significant predictors for the success of TA. This study showed that some ocular examination tests before surgery (visual acuity, reaction to eye drop, cooperation during tonometry, and reaction to press on the lacrimal sac) could predict patients' cooperation during phacoemulsification surgery under TA.

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Introduction

Cataract is the major cause of visual impairment and blindness specially in undeveloped or developing countries (1). Currently, replacement of the affected natural lens with an artificial one is the best treatment of a cataract. Cataract surgery is a common operation in worldwide (2,3).

The best method of anesthesia for cataract surgery is under question and needs more evidence for conclusion. Currently, there are several options and techniques for anesthesia in cataract surgery. Three categories of anesthesia for cataract surgery are topical (TA), regional (RA) and general anesthesia (4,5). The selection of anesthesia methods is dependent on some variables such as the patient's co-morbidities, monocularly, and experience of the surgeon. Generally, TA is the most

accepted among ophthalmologists (6,7). TA which is obtained by anesthetic drops, does not have general anesthesia complications, needing same as in RA; TA for patients with anticoagulant therapy in order to less chance of hemorrhage is excellent; vice versa, remaining eye movements, the possibility of incomplete analgesia, and poor reception of the patient are of the possible limitations of TA (6).

According to our knowledge, there have been limited published studies about the potential factors that can predict the success of TA during cataract surgery. The purpose of this prospective study was to evaluate the patients' cooperation under phacoemulsification surgery and its related factors.

Materials and Methods

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Patients' assessment

This prospective cross-sectional study was conducted on 160 cases of the cataract in Amir-Almomenin hospital, Rasht, Iran, 2016-2017. They all provided informed consent, and the institutional Review Board and Health Research Ethics Committee of Guilan University of Medical Science approved the study protocol. The subjects who were candidate for cataract surgery were selected sequentially according to study criteria. The inclusion criteria were age over 18, age-related cataract and patients' written consent. The exclusion criteria were history of underlying disease such as diabetes, mental disorder, communication difficulty, drug abuser, use of narcotics, barbiturates or psychotropic medications at least one week before surgery, history of allergy to lidocaine/tetracaine or its contraindications, visual impairment of the non-operative eye, history of eye surgery, surgery time over than 40 min, and incidence of surgery complications such as posterior capsule rupture during surgery.

Age, sex, residence (urban or rural) and education level (literate and illiterate) were received from patients.

Clinical assessment

Patients examined by another ophthalmologist for the;

- 1- Visual acuity (<0.1, 0.1-0.4 or >0.4).
- 2- Reaction to eye drop (squeezing during eye drop instillation, yes or no).
- 3- Cooperation during tonometry (good, satisfactory, or bad).
- 4- Reaction to press on the lacrimal sac (patient's response to pressure on the lacrimal sac by the applicator, yes or no) during one week before surgery.

Anesthesia and surgical technique

Tropicamide, 2% drop, was used to create mydriasis three times with 5 minutes intervals, one hour before surgery. In operating room, tetracaine hydrochloride 0.5% drop was dropped into the patient's eye 20 and five minutes before surgery. Thereafter, fentanyl 1 µg/kg was infused for sedation. Then by insertion of the sculptural speculum, the conjunctiva sac was washed by betadine 5%. Surgeries were performed by the same expert surgeon using the Stop and Chop phacoemulsification method with temporal 2.75 mm incision and two lateral incisions. The surgeon tried to perform operation with TA. If the patient could not tolerate surgery under TA, an RA was used.

Immediately after the surgery, the patient's cooperation was scored by the surgeon in the following

order. 1) Good cooperation: the patient did not shake his/her head and eyes, he/she fully obeyed the instructions of the surgeon during the operation, 2) Satisfactory cooperation: the patient occasionally moved his/her eyes or head, he/she obeyed the instructions of the surgeon during the operation partially and 3) Weak cooperation: the patient constantly shakes his/her head or eyes and did not obey the instructions of the surgeon during the operation.

Ultimately, the patients were divided into two groups of success (patients with good or satisfactory cooperation) and the failure group (patients who had weak cooperation or underwent RA).

Statistical analysis

The data was analyzed by SPSS version 19 Software. *Chi-square*, fisher's exact test, and multi-logistic regression were used for analysis. Finding with $P < 0.05$ were considered significant.

Results

One hundred sixty eligible cases enrolled in the study. The mean age of all patients was 67.2 ± 9.3 years. 84(52.5%) patients were female, and the rest were male. 103 (64.4%) and 57(35.7%) cases showed success and failure responses, respectively. Age, sex, residency, education level and examination result of two groups were demonstrated in table 1. The two groups were well matched for age, sex, residency, and education level ($P > 0.05$). In other words, these variables were not related to response to TA. In contrast, there was a significant difference between the amounts of reaction to eye drop, cooperation during tonometry, reaction to press on the lacrimal sac, visual acuity, and patients' cooperation during surgery ($P < 0.05$). The success group had good or satisfactory cooperation during tonometry, lower reaction to lacrimal sac compression and eye drop, and lower visual acuity in comparison with failure group (Table 1).

Table 2 shows the result of multi-logistic regression of the related factors. Squeezing in response to drop installation with Odds ratio of 66.4 (95% CI, 7.15-610.88) increased the chance of weak cooperation during surgery. Poor cooperation in tonometry with Odds ratio of 21.2 (95% CI, 2.962-151.965) increased the chance of cooperation during surgery. Visual acuity less than 0.1 with the odds ratio of 7 (95% CI, 1.194-41.553) increased the chance of cooperation during surgery.

Table 1. Basic information and result of physical examination in two groups of study (n=160)

		Group		P
		Success (n=103)	Failure (n=57)	
Age (mean ± SD)		66.8±9.2	67.5±9.9	0.66
Sex no.(%)	Female	51(49.5)	33(57.9)	0.2
	Male	52(50.5)	24(42.1)	
Residency no.(%)	Urban	57(55.3)	28(49.1)	0.28
	Rural	46(44.7)	29(50.9)	
Education no.(%)	Literate	78(75.7)	46(80.7)	0.3
	Illiterate	21(24.3)	11(19.3)	
Reaction to eye drop no.(%)	Yes	1(1)	27(47.4)	0.0001
	No	102(99)	30(52.6)	
Cooperation during tonometry no.(%)	Good	36(35)	4(7)	0.0001
	Satisfactory	64(62.1)	29(50.9)	
Reaction to press on lacrimal sac no.(%)	Bad	3(2.9)	24(42.1)	0.0001
	Yes	12(11.7)	25(43.9)	
Visual acuity no.(%)	No	91(88.3)	32(56.1)	0.0001
	<0.1	22(21.4)	4(7)	
	0.1-0.4	48(46.6)	33(57.9)	0.045
	>0.4	33(32)	20(35.1)	

No: Number

Table 2. Multi-logistic regression of significant factors , which predict patients' good cooperation (n=160)

Factor		Logistic regression	Standard. Error	P	Odds Ratio	95% C.I. Lower	95% C.I. Upper
Response to drop instillation	No vs. yes	4.2	1.3	0.000	66.4	7.2	610.9
Cooperation in tonometry	Good vs. bad	3.1	1	0.002	21.2	3	152
	Satisfactory vs. bad	2	0.9	0.02	7.2	1.4	38
Visual acuity	< 0.1 vs. > 0.4	2	0.9	0.031	7	1.2	41.6

Discussion

There is a controversy about difficulty of TA for the patient and ophthalmologist against peribulbar and retrobulbar block for cataract surgery. In a meta-analysis, although TA showed more patient preference and lower complications rate than RA, but accompanied by more ocular movement and needs of supplementary anesthesia (5). Choosing a better anesthesia option may be under influence of patient characteristics' that can predict the success of anesthesia. The present study aimed to determine the effects of some potential factors, which affect patient's cooperation during phacoemulsification surgery with TA. The results showed that there is no correlation between patients' cooperation during surgery and sex, age, residency, and education level. In contrast, no reaction to eye drop and lacrimal sac compression, good cooperation during tonometry, and lower visual acuity before surgery may predict a patient's good or satisfactory cooperation

during cataract surgery .

According to our knowledge, there is a few published evidence about potential factors, which influence the selection of a suitable patient for successful TA. First, Fraser *et al.*, reported that A-scan ultrasonography in line with our study, patient's cooperation during tonometry are good predictors of TA tolerance (8). Kang *et al.*, reported higher preoperative intraocular pressure, greater anterior chamber depth, and greater axial length effect on the pain perception during standard phacoemulsification with TA (9). On other hand, these ocular factors may interrupt the patient's cooperation. Patel *et al.*, observed TA and RA accompanied with same excellent and good patient's cooperation during surgery (97.5% and 97.5%). In their results, patients under TA experienced more discomfort and bothered by tissue manipulation significantly (10). Omulecki *et al.*, observed, female gender, better mood before the operation, rural residency and especially the lower pain perception related to better cooperation

during surgery (11). In another study by Figueira *et al.*, a positive Lanindar test (patient comfort, no blepharospasm, and withdrawal against light and digital pressure) may be a strong predictor for the success of TA (12). Akkaya *et al.*, using a sub-Tenon's local anesthesia reported patients who have second eye cataract surgery experienced more pain and had lower cooperation during surgery (13). Also, a combination of sedative agents may bring more patient's cooperation and surgeon satisfaction. For example, midazolam+fentanyl in comparison with dexmedetomidine improved patient's cooperation in both TA and RA (14). In the present study, we used fentanyl for more sedation, which can bring better patient's cooperation. The limitations of this study were the lack of comparison between TA and RA and the sort of the variables' classification. For example, the level of education in more classes could show different results (11).

In conclusion, some factors such as low visual acuity, patients' reaction to eye drop, cooperation during tonometry, and reaction to press on lacrimal sac can be helpful for predicting patients' cooperation during phacoemulsification surgery under TA. On the other hand, some others like good and satisfactory visual acuity, patients' demographic factors and reaction to press on the lacrimal sac cannot be helpful.

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