



Original Article

Predictors of Patient Cooperation during Phacoemulsification Surgery under Topical Anesthesia

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ABSTRACT

Background: Topical anesthesia (TA) may accompany with 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.

Methods: One hundred sixty consecutive cases that were candidate for phacoemulsification surgery enrolled in this prospective study. Patient characteristics including sex, age, place of residence (urban or rural), education level (literate and illiterate) and physical examination variables including visual acuity in logarithm of minimum angle of resolution (LogMAR), reaction to eye drop, and cooperation during tonometry before surgery were evaluated. Patient cooperation during surgery was classified into successful (good and satisfactory) or failed (weak) cooperation. The two groups were compared in terms of baseline and clinical examination variables.

Results: In this study, 103(64.4%) cases showed a good or satisfactory cooperation, and others had a weak cooperation. There was no association between patient cooperation during surgery and sex (P-value = 0.2), age (P-value = 0.7), place of residence (P-value = 0.3) and education level (P-value = 0.3). The successful group showed a higher rate of non-reaction to eye drop (P-value = 0.0001), good cooperation during tonometry (P-value = 0.0001), non-reaction to press on lacrimal sac (P-value = 0.0001), and lower visual acuity (P-value = 0.045). In the multivariate logistic regression model, non-reaction to eye drop (OR = 66.4), good and satisfactory cooperation during tonometry (OR = 21.2, OR = 7.2, respectively) compared to weak cooperation, lower LogMAR of visual acuity (OR = 7) were significantly associated with the success of TA.

Conclusion: This study showed that some ocular examination tests before surgery including visual acuity, reaction to eye drop, cooperation during tonometry and reaction to press on the lacrimal sac can predict patient cooperation during phacoemulsification surgery under TA.

Keywords: Cataract, Phacoemulsification, Patient cooperation, Topical Anesthesia

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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 cataract. Cataract surgery is a common operation worldwide (2,3).

The best method of anesthesia for a 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 method is

dependent on some variables such as the patient comorbidities, monocularly, and experience of the surgeon. Generally, TA is the most acceptance among ophthalmologists (6,7). TA which is obtained by anesthetic drops, does not have general anesthesia complications, needling same as in RA; TA for patients with anti-coagulant therapy in order to fewer 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 has been limited published studies about the potential factors that can predict the success of TA during cataract surgery. The purpose of this study was to evaluate the patient cooperation under phacoemulsification surgery and its related factors.

Methods

Study population

This cross-sectional study was conducted on 160 cases of the cataract in Amir-almomenin hospital, Rasht, Iran during 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 diagnostic criteria for the cataract were according to slit-lamp examination of the patients and the presence of significant lens opacity in their examination. The subjects who were candidate for cataract surgery were selected sequentially according to study inclusion criteria. The inclusion criteria were age over than 50 years-old, age related cataract and providing written consent. The exclusion criteria were having chronic 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 duration more than 40 min, and incidence of surgery complications such as posterior capsule rupture during surgery.

Anesthesia and surgical technique

Tropicamide 2% drop was used to create a midriasis 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 a 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, a RA was used.

Clinical assessment

Visual acuity were assessed according to the snellen chart assessment that converted to logarithm of minimum angle of resolution (LogMAR) for statistical analysis. The visual acuity were classified to < 0.1, .0.1-0.4 or > 0.4 LogMAR. The lower values indicate higher visual acuity. Reaction to eye drop were defined as squeezing during eye drop

instillation. Cooperation during tonometry were defined according to blinking during examination as good (no blink), satisfactory (slightly blink) or bad (very blink). Reaction to press on the lacrimal sac (patient' response to pressure on the lacrimal sac by the applicator, yes or no) during one week before surgery.

Immediately after the surgery, the patient cooperation was scored by the surgeon in the following order; Good cooperation: the patient did not shake his/her head and eyes, he/she fully obeyed the instructions of the surgeon during the operation, Satisfactory cooperation: the patient occasionally moved his/her eyes or head, he/she obeyed the instructions of the surgeon during the operation partially and 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 as the patients with good or satisfactory cooperation and the failure group as the patients who had weak cooperation or underwent RA.

Statistical analysis

The two groups were compared using Chi square and Fisher exact test. Multivariate logistic regression model was used to estimate adjusted odds ratio with 95% confidence interval. A P-value less than 0.05 were considered significant. All data analyses were performed in SPSS version 19.

Results

One hundred sixty eligible cases enrolled in the study. The mean age of all patients was 67.2 years (standard deviation = 9.3). Eighty four patients (52.5%) were female. Of total, 103 patients (64.4%) showed successful and 57 patients (35.7%) had failure response. Age, sex, place of residence, education level and examination result of the two groups are demonstrated in Table 1. There was no significant difference in terms of age, sex, place of residence, and education level in the two groups. In contrast, there was a significant difference between the frequency of reaction to eye drop, cooperation during tonometry, visual acuity, and patients' cooperation during surgery (P-value < 0.05). The success group had a 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 multivariate logistic regression of predictors on patient cooperation during surgery under TA anesthesia with a forward stepwise model. Squeezing in response to drop instillation with Odds ratio of 66.4 (95% CI, 7.15-610.88) was significantly associated with increased 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 poor cooperation during surgery. Visual acuity less than 0.1 compared to > 0.4 LogMAR was significantly associated with the success of patient cooperation.

Discussion

There is a controversy about difficulty of TA for the patient and ophthalmologist against peribulbar and retrobulbar block for cataract surgery.

Table 1. Background and clinical characteristics of the two groups

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

Abbreviation: SD, standard deviation. Values in the parenthesis are percent unless otherwise indicated

In a meta-analysis, although TA showed more patient's preference and lower complications rate than RA, but accompanied with more ocular movement and needs of supplementary anesthesia (5). Choosing a better anesthesia option may be under influence of patient characteristics than can predict the success of an anesthesia. The present study aimed to determine the effects of some potential factors, which effect on patient's cooperation during phacoemulsification surgery with TA. The results of this study showed 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 patient' good or satisfactory cooperation during cataract surgery.

According to our knowledge there was a few published evidence about potential factors, which influence on the selection a suitable patient for successful TA. First, Fraser et al. reported that A-scan ultrasonography and like us, 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 affect on the pain perception during standard phacoemulsification with TA (9). On other hand, these ocular factors may interrupt the patient' cooperation. Patel et al. observed TA and RA accompanied with same excellent and good patient' cooperation during surgery (97.5% and 97.5%). In their result 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 specially 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 a 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' cooperation in both TA and RA (14).

Table 2. Multivariate logistic regression model of clinical predictors with patient cooperation

Predictor variables	Odds Ratio	95% confidence interval		P-value
		Lower limit	Upper limit	
No reaction to drop instillation	66.387	7.215	610.88	0.001
Cooperation during tonometry				
Good vs bad	21.218	2.962	151.965	0.002
Satisfactory vs bad	7.2	1.364	38.007	0.02
Visual acuity				
0.4	Reference			
Less than 0.1	7.044	1.194	41.553	0.031
0.1-0.4	1.493	0.534	4.176	0.445

In the present study, we use fentanyl for more sedation, which can bring a better patient' cooperation. The limitations of this study were the lack of comparison between TA and RA and the sort of the variables classifying. For example, the level of education in more classes could show different result (11).

Conclusion

Some factors such as visual acuity, patients' reaction to eye drop, cooperation during tonometry can be helpful for predicting patients' cooperation during phacoemulsification surgery under topical anesthesia. On the other hand, some other factor such as patients' demographic factors and press to the lacrimal sac cannot be helpful as predicting.

Ethical consideration

The protocol of this study has been approved by Eye Research Center, Research Deputy of Guilan University of Medical Sciences, Rasht, Iran.

Conflicts of interests

Authors declared no conflict of interest.

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