

EVALUATION OF OCULOCARDIAC REFLEX IN NON-ATROPINIZED PATIENTS DURING CATARACT SURGERY UNDER LOCAL ANAESTHESIA

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Abstract

Oculocardiac reflex (OCR) is an event seen during the cataract operation revealed as bradycardia. The situation is triggered by pulling or stitching of external ocular muscles. Anesthesiologists used atropine for controlling this reflex if ensues.

This study aimed to estimate the incidence of the oculocardiac reflex during cataract surgery under local anesthesia (LA) and to assess the need for atropine to avoid this event.

This study included eighty patients aged 45-80 years with class I or II ASA physical status listed for elective cataract extraction and intraocular lens (IOL) implantation under peribulbar block. The past medical history, drugs history, investigations and baseline vital signs were all observed and recorded. The observer continuously monitors heart rate readings. Oxygen was given to all patients through nasal cannula while spontaneously breathing.

The results showed a significant drop in the heart rate following superior rectus muscle grasp and stitching (5.69%). This finding was observed following sedation (6.19%) and after removing of the stitch (6.22%), which indicates triggering of OCR. This slowing in heart rate did not require the use of atropine as bradycardia did not reach a serious level.

In conclusion, the alterations in heart rate during cataract surgery observed mainly at handling of the extra-ocular muscles and following sedation. Atropine is not essential as a routine premedication in cataract surgery, particularly in geriatric populations in order to avoid the major side effects of atropine such as: tachyarrhythmias, central nervous system toxicity and urine retention, however, it should be accessible for administration if bradycardia ensues.

Introduction

Bradycardia is a known event seen in association with ocular manipulation. It is mediated by Trigeminal-Vagal reflex and expressed as OCR¹⁻³. The reflex is caused by pulling or compression of ocular muscles. The severity depends on the strength & duration of the stimulus⁴. Khurana et al⁵ studied the graded mechanical stimulation necessary to provoke OCR. The response is exacerbated by hypercapnia (PaCO₂ >40mmHg), hypoxemia (PaO₂ <60mmHg), light level of anesthetic depth, narcotic agents, β adrenergic blocking agents and calcium channel antagonists⁶⁻⁸. It is more obvious in young age population especially children

as they have increased resting vagal response. The OCR is ascertained when at least a 10-20% decrease in heart rate below the base line occurred or when there is a development of dysrhythmia while handling the ocular structures. Critical OCR was considered as reduction of HR to forty beats per minute or less at any time during surgery^{9,10}.

The reflex is usually resolves spontaneously because of it's fatigability, however the anesthesiologists can overcome this response by avoiding the predisposing factors, administering preoperative anticholinergic agent¹¹ or by retro-bulbar anesthesia¹². These policies significantly reduced the risk of OCR

during ophthalmic procedures. Moreover the modification of surgical stimulus and the use of modern long-acting local anesthetic agents with administration of intravenous sedation became a known practice for most ocular procedures¹³.

Local anesthesia remains safe with many advantages such as reduced incidence of post operative nausea & vomiting, hemodynamic stability, early mobilization & discharge, and longer postoperative analgesia. The disadvantages of LA for eye surgery are: eye movement, coughing which can lead to transitory or enduring severe undesirable outcomes¹⁴⁻¹⁷.

This study endeavors to estimate the prevalence of the OCR during cataract extraction under local anesthesia and to assess the requirement for atropine to prevent this reflex.

Patients and Methods

This prospective study carried out on patients planned for elective unilateral cataract extraction and IOL implantation under local anesthesia. Eighty patients were involved in this study. All patients signed a written consent.

Patients were assessed before surgery by the anesthesiologist. The included patients were class I and II according to ASA

classification. The exclusion criteria involve those who are on chronic medication that affects causes bradycardia or tachycardia. Patients with conduction block or postural hypotension were also excluded.

An intravenous line was positioned for administration of fluid, sedation and analgesia, and for resuscitation in critical situations.

Oxygen was given for all patients through nasal cannula with spontaneous breathing. Cases were monitored using a pulse oximeter CSI-CRITICARE.

Data recorded by the anesthesiologist in this sequence: Preoperative, 2min., after local anesthesia infiltration, at the superior rectus muscle stitch, 2min., after sedation, and at removing of the stitch. The statistical analysis was achieved by applying paired sample T-test to compare between the variables (using SPSS version 20) considering a p-value less than 0.05 statistically significant.

Results

In this study eighty patients were involved. Their mean age was 63.59 ± 7.81 . The majority of patients, 37 (46.25%) aged 60–70 years, 20(25%) were females, and 17(21.25%) were males as demonstrated in table I.

Table I: Age & gender of patients participating in this study.

Age group (years)	Males	Percentage	Females	Percentage	Total	percentage
45-50	1	1.25%	4	5%	5	6.25%
50-60	14	17.5%	12	15%	26	32.5%
60-70	17	21.25%	20	25%	37	46.25%
70-80	6	7.5%	6	7.5%	12	15%
Total	38	47.5%	42	52.5%	80	100%

The mean baseline pulse rate was 84 ± 15.29 . After LA infiltration, it was 84.56 ± 15.79 . Intraoperatively the figures fluctuate as follow: 79.28 ± 14.40 , 78.86 ± 13.75 , 78.83 ± 12.68 at superior rectus muscle stitch, 2min. after sedation, at removal of the stitch respectively as shown in Table II.

Table II: Heart rate changes during different stages of the study

Heart rate readings(beats/min)	Minimal H.R.	Maximal H.R.	Mean \pm SD	P-value
Baseline (pre-op)	54	114	84.06 ± 15.29	
After L.A. infiltration	60	120	84.56 ± 15.79	0.338
At superior rectus muscle pinch & stitching	50	119	79.28 ± 14.40	<0.05
After sedation	54	117	78.86 ± 13.75	<0.05
At removal of the stitch	58	112	78.83 ± 12.68	<0.05

Also, table II shows the degree of HR change after each step during the procedure. At superior rectus muscle pinch & stitching, there was a significant fall in heart rate ($P < 0.05$). The same significant changes were noticed after sedation and at removal of the stitch ($P < 0.05$), this indicates that the removal of the stitch also triggers the vagal response.

Discussion

Cataract surgery is the most widespread procedure in which most ophthalmologists use phacoemulsification technique and intraocular lens implantation^{18,19}.

Recently, ophthalmologists do cataract surgery using LA or topical anesthesia²⁰, nevertheless general anesthesia has its role in cases where local or topical anesthesia cannot be used.

It is well established that the manipulation of the eye muscles during cataract surgery induces reflex bradycardia (OCR). Arnold et al²¹ found a difference in heart rate response when ocular muscles were stretched and/or compressed. Intense bradycardia during ophthalmic surgery is not uncommon and is potentially serious incident that usually occurs during manipulation of ocular muscles particularly in squint surgery¹¹.

This study reveals no statistically significant differences in regard to the

relation of heart rate changes with age and gender variables (Table I).

The use of peri-bulbar anesthesia in this study is made clear by its safety and efficiency²²⁻²⁵.

Following L.A. infiltration, in the form of peri-bulbar anaesthesia, no oculocardiac reflex observed P -value > 0.05 , (Table II).

Most manipulations that trigger the reflex occurred during superior rectus muscle pinching and stitching that lead to heart rate changes (79.28 ± 14.40) (P -value < 0.05), so OCR didn't occur as it is less than 10% change in heart rate, and no atropine was needed.

The majority of the patients in this study were geriatric people with cataract who differ from pediatric cases with squint surgery. The later cases have the most intense vagal response to stimulation^{11,24}. Despite this difference, Safavi²⁶ demonstrated in a study on young age group that no patients needed atropine while OCR settled down within 20 seconds by releasing of traction.

After sedation, HR was (78.86 ± 13.75), P -value < 0.05 , OCR didn't occur and atropine was not needed as the change of H.R. was less than 10%. This may be explained by hemodynamic stability with the administration of sedation, however a study by Paciuc et al²⁷ showed occurrence of OCR more frequently in patients who

were sedated than those without sedation for laser in situ keratomileusis.

At removal of the superior rectus muscle stitch, HR was 78.83 ± 12.68 , with P-value < 0.05 , so OCR didn't happen, and atropine was not administered.

The changes in heart rate in this work did not exceed 10% from the base line record that does not go with others²⁸⁻³⁴. The method used in the anesthetic management of patients included in this study explained the minimal effect on the heart rate. This may be due to the use of peri-bulbar block with diazepam and fentanyl and the gentle manipulation by the surgeon.

Atropine³⁵ is neither given routinely preoperatively as premedication nor intraoperatively to avoid extreme dryness of mouth and airways, worrying tachycardia and raised intraocular pressure due to pupillary dilation which may block the angle of anterior chamber of the eye in glaucoma prone patients.

Conclusion

Routine premedication with atropine is not ordered before cataract extraction under L.A. particularly in geriatric to avoid side effects of atropine such as: tachyarrhythmias, central nervous system toxicity and urine retention, however it should be accessible for administration if significant bradycardia occurred.

Recommendations

1. Gentle eye handling, especially with extra-ocular muscles during ocular surgery to avoid the triggering of the vagus nerve.
2. Pulse rate monitoring should be obligatory for all patients throughout ophthalmic procedures done under local anaesthesia so abnormal heart rate can be detected early.
3. A vagolytic (anticholinergic) agent such as atropine, should be available in the theatre for immediate use if OCR occurs.

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