

# The effect of long term treatment with betablockers in increasing the incidence of bradycardia in patients undergoing posterior segment eye surgeries

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## ABSTRACT

**Background:** The oculocardiac reflex (OCR) is of importance to both ophthalmologists and anaesthetists because it may lead to serious bradycardia during ophthalmic surgery. **Methods:** Sixty adult patients, of both sexes, with the age range of between 18-70 years, were scheduled for the elective or urgent posterior segment eye surgery under general anesthesia. This was a prospective observational study in a patients' group under the chronic use of beta blocker who were screened for the development of OCR. OCR has been defined as a significant bradycardia (40% below the preoperative heart rate for 10 minutes), dysrhythmias (recorded by ECG intraoperatively) with or without hypotension defined as a decrease in the systolic blood pressure more than 30%. OCR was managed by the cessation of the surgical stimulus either alone or by IV administration of 0.5 mg atropine in increment with a maximum 2mg.

**Results:** Only two patients developed OCR that was defined as a significant bradycardia (40% below preoperative heart rate for 10 minutes), dysrhythmias (recorded by ECG intraoperatively). The patients developed only one episode throughout the operation, and they were managed by the cessation of surgical stimulus by iv atropine (0.5 mg) twice [total 1 mg], and recovered. **Conclusion:** This study showed that patients on long term uses of beta blockers had no increased risk for the occurrence of oculocardiac Reflex.

**Keywords:** Long term, betablockers, bradycardia, posterior, segment, eye, surgeries.

## Introduction

The oculo-cardiac reflex (OCR), a variant of trigemino-cardiac reflex TCR, which can be identified as a very rapid commencement of the sympathetic hypotension, parasympathetic dysrhythmia, or stomach hypermotility during the stimulation of any of the sensory branches of the trigeminal nerve, apnea, the sensory nerve endings of the trigeminal nerve impulse neuronal signs through the Gasserian ganglion to the sensory nucleus of the trigeminal nerve, leading to developing

the afferent pathway of the reflex arc.<sup>[1]</sup>

During surgical operation induced in the area of ocular and periocular structures, and stimulating the ophthalmic branch of the trigeminal nerve during manipulation, this will lead to OCR. The risk factors which play a role in elevating the frequency of OCR comprise of : hypoxemia; light general anesthesia; hypercapnia; age (more marked in infants ); the condition or state of the frustrating stimulus (strength and duration of stimuli);and types of drugs: potent narcotic drugs (alfentanil and sufentanil); calcium channel blockers and beta adrenergic blockers <sup>[2]</sup>.

Beta adrenergic blockers are widely used drugs that are recommended to therapy variable kinds of disorders, such as angina, heart attack (myocardial infarction), some abnormal heart rhythms, migraine, hypertension, anxiety, hyperthyroidism and glaucoma. In addition, Beta adrenergic blockers have an effect on the autonomic nervous system where there were decreased heartbeat, declined strength of heart muscles contractility, and diminished blood vessel contraction in the brain, heart, in addition to the rest of the body.<sup>[3]</sup>

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## Patients and Methods:

Sixty adult patients, of both sexes, in the age group of 18-70 years, scheduled for elective or urgent posterior segment eye surgery under general anesthesia, were admitted to the ophthalmology operating theatre and enrolled in a Prospective observational study.

This was a prospective cohort study in a group of patients under chronic use of beta blocker. The prospective cohort design was used to identify the incidence of OCR. The participants were screened for the development of OCR. Then, the comparison was done between the groups of patients with and without chronic beta blocker users who would develop OCR.

### Inclusion criteria:

- Patients undergoing posterior segment eye surgeries.
- Age (18-70) years.

### Exclusion criteria:

- Age (less than 18 and more than 70).
- Other drugs that cause bradycardia or predispose to OCR e.g. Calcium channel blockers, digoxine, amiodarone and opiates.

### Preoperative:

#### ❖ HISTORY:

- Duration of beta blockers use.
- Presence of any problems with treatment .
- Previous operations and if any intraoperative complications which occurred.
- Medications : calcium channel blockers, Digoxine, amiodarone, opiates, and L-thyroxin.

#### ❖ VITAL SIGNS:

- Heart rate "our target ".
- blood pressure.

### Intraoperative:

#### ❖ Monitoring

Full intraoperative monitoring including: 5 leads of ECG , blood pressure and Oxygen saturation.

#### ❖ Anesthetic plan

General anaesthesia was induced with thiopental( mg/kg), fentanyl (1 µg/kg) and atracurium (0.5 mg/kg) EET were inserted after the adequate muscle relaxation. Anesthesia was maintained by Isoflurane (1.5-3%). Ventilation of the lungs was controlled and adjusted to maintain normocapnia.

#### ❖ Observation of the occurrence of OCR :

OCR was observed throughout the operation. OCR has been defined as significant bradycardia (40% below preoperative heart rate for 10 minutes), dysrhythmias (recorded by ECG intraoperatively) with or without hypotension has been defined

as systolic blood pressure is decreased more than 30%. OCR would be managed by the cessation of the surgical stimulus either alone or IV administration of 0.5 mg atropine in the increment with a maximum of 2mg.

### Postoperative:

The patient was transported to the recovery room with the routine monitoring to the heart rate and non invasive arterial blood pressure.

### Statistical analysis:

Categorical variables were analyzed using the chi-squared or Fisher's exact tests as appropriate. For continuous variables, data was presented as the median (range) and were analyzed using the Mann–Whitney *U* test. Risk factors independently associated with OCR were identified by the univariate analysis. The differences were considered statistically significant when the p-value was < 0.10. All variables significant in univariate analysis were analyzed using a multiple logistic regression model. A forward stepwise logistic strategy was applied, and the variables were included in the model if their log-likelihood ratio was significant. SPSS version 15.0 for Windows (SPSS, Inc., Chicago, IL, USA) was used for the statistical analyses.

### Results:

Sixty adult patients, of both sexes, in the age group of 18-70 years, scheduled for elective or urgent posterior segment eye surgery under general anesthesia, were admitted to the ophthalmology operating theatre and enrolled in a prospective observational study.

**Table 1: Demographic data of patients included in the study data expressed as mean ± (SD) except for gender data presented by the number of patients.**

	Mean ± (SD)	P- value
Age (years)	55.317 ±7.423	0.53
Surgical time (minutes)	168.67±22.81	0.62
Duration of B-blocker (year)	5.517±1.961	0.32
Gender (male)	33	0.13
(female)	27	

P value > 0.05.

Table (1) shows no statistically significant difference regarding age, gender, surgical time and duration of beta blocker intake.

**Table (2): Perioperative Mean Arterial Blood Pressure (mmHg). Data represented as [mean±SD]**

Value	Mean±SD
Preoperative	92.00±11.4
30 minutes	92.91±11.5
60 minutes	93.41±11.4
90 minutes	93.08±11.6
120 minutes	93.08± 1.1
150minutes	93.38±11.8
180minutes	94.13±12.3
Postoperatively	97.33±11.9

Table (2) shows no statistically significant difference regarding the mean of arterial blood pressure.

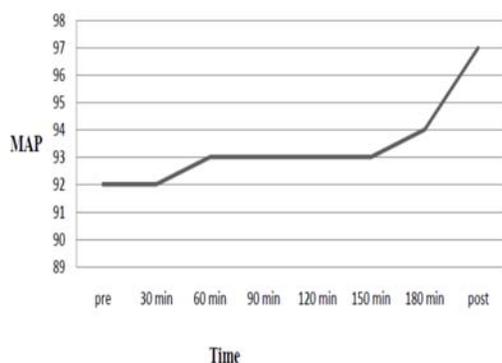


Figure 1. The perioperative monitoring of MABP showing no statistically significant difference regarding the mean of blood pressure.

Value	Mean±SD
Preoperative	83.50±12.70
30minutes	83.38±14.56
60 minutes	86.33±13.60
90 minutes	86.75±14.10
120 minutes	87.97±14.94
150 minutes	87.97±14.95
180 minutes	88.16±13.54
Postoperatively	92.33±13.70

Table (3) shows no statistically significant difference regarding heart rate.

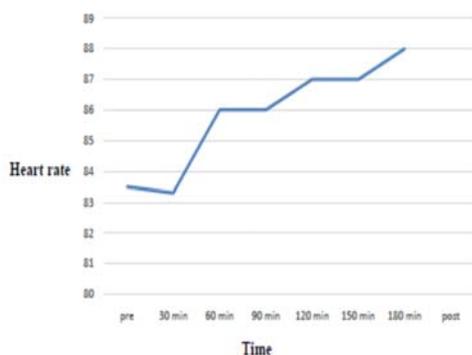


Figure (2) The perioperative monitoring of heart rate showing no statistically significant difference regarding the heart rate.

	No. of patients	p-value
Occurance	2	0.07
No of episodes	1	
Total dose atropine	1mg	

P value > 0.05.

Table (4) shows that among 60 patients in the study, only two patients developed OCR that could be defined as significant bradycardia (40% below the preoperative heart rate for 10 minutes), dysrhythmias (recorded by ECG intraoperatively). Patients developed only one episode throughout the operation, and patients were managed by the cessation of the surgical stimulus and iv atropine (0.5 mg) twice [total 1 mg], and recovered.

### Discussion:

Nobody reported the effectiveness of beta –blocker drugs on the incidence of OCR in patients undergoing posterior segment eye surgeries. So, in the present study, the effect of long term beta blocker and the incidence of OCR in patients undergoing posterior segment eye surgeries were observed.

The importance of this study was to know the relationship between the long term use of beta blockers with the incidence of the occurrence of oculocardiac reflex that cannot be managed by risk factor empathy and amendment, prophylactic processes and giving vagolytic drugs or sympathomimetics.

While OCR is a common and alarming challenge to anaesthetists throughout strabismus operation, there have been very few researches investigating the impact of anaesthetic treatments on the prevalence of the OCR. The frequency of OCR estimated in former researches was from 32% to 90%, contingent on systems of motivation and assessment conditions. [4, 5]

Grover VK1 et al. who conducted a study that was arranged to examine the local and general effects of anaesthesia on the oculocardiac reflex in 30 adult patients during retinal detachment surgery, concluded that local anaesthesia made less bradycardia and ectopic arrhythmias than the general anaesthesia for surgeries in which traction of the extraocular muscles was required [6].

Neils et al. studied the ramifications and incidence of the occulocardiareflex on 104 patients during the orbito-zygomatic approach, no significant variation in the rate of OCR incidence was found in the analysis of the co-varieties of hyperlipidemia, hypertension, hyperthyroidism, diabetes mellitus, calcium channel blocker use, tobacco use or beta-blocker use. In each case, the temporary interruption of the orbital manipulation was enough to return the heart to the normal rate. There was no need for the patients to administer the anticholinergic drugs for the treatment of OCR, and there were no OCR complications which rose after the operation can be detected [7]. Some investigators, like Schaller, reported that the incidence of TCR was ranged from 10-18% of the patients [1]. Other investigators found that the TCR reached to 11% of the operated patients with tumours of the cerebello-pontine angle. Three out of 125 patients in this chain established asystole which persisted from 30-70 seconds [3].

The present study has been the first to observe the effect of long term beta blockers on the occurrence of oculocardiac reflex. Previous studies only demonstrated the effect of general and

local anaesthetic drugs on the OCR, and one study by Neils et al studied beta-blocker, but in different operations during the orbito-zygomatic approach<sup>[7]</sup>.

In the current study, there was no statistically significant difference among the studied patients, regarding the mean arterial blood pressure. OCR occurred only in 2 patients out of 60 adult patients, of both sexes, in the age group of 18-70 years, scheduled for the posterior segment eye surgery under general anaesthesia, which represented about 3 % of the patients managed by the cessation of the surgical stimulus IV administration atropine.

In addition to using OCR as a complications of eye surgery, some researchers, like Schaller took into concern both the heart rate and blood pressure into justification, and considered the TCR as the average arterial blood pressure of 20% less than the baseline and the number of heart beats less than 60/min<sup>[1]</sup>.

In addition, another study was carried out by Schaller and his colleagues, they found that the incidence of TCR during the micro vascular decompression of the trigeminal nerve for trigeminal neuralgia was 18%. TCR was furthermore recorded during trans sphenoidal operation surgery for the anterior pituitary adenoma. The rate of TCR was 10% during the operation procedures of 117 subjects who were subjected for transsphenoidal operation for the anterior pituitary adenoma. In addition, TCR might be caused due to the peripheral stimulation of the naso-pharynx<sup>[8]</sup>.

Safavi et al compared the effects of different anaesthetic regimens on the oculo-cardiac reflex effects of different anaesthetic regimens on the oculo-cardiac reflex in three hundred patients scheduled for the elective strabismus surgery under general anaesthesia, and they found that inducing anaesthesia using ketamine hydrochloride as a short acting non-barbiturates was accompanied with the least changes in the cardiovascular system convinced by OCR along with the strabismus operation<sup>[9]</sup>.

James C. Tsai et al studied OCR and elicited that during the debridement of an empty orbit of an 87 years old male with the history of hypertension, and the right periorbital basal cell carcinoma of skin, and the extension to the ethmoid sinuses, was scheduled for the excision of the recurrent basal cell carcinoma. During the curettage, the patient underwent many episodes of the intense bradycardia or transitory asystole. The study concluded that OCR might also occur during the manipulations of an empty orbit<sup>[10]</sup>.

The current study has been the first to observe the effect of long term beta blockers on the occurrence of oculocardiac reflex in posterior segment operation. Previous studies demonstrated the effect of general and local anaesthetic drugs on the OCR, and one study by Neils et al<sup>[7]</sup> studied beta-blockers but in different operations during the orbito-zygomatic approach.

## Conclusion

This study showed that patients on long term uses of beta blockers had no increased risk for the occurrence of oculocardiacreflex.

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