

Severe Oculocardiac Reflex During Intravitreal Injection

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ABSTRACT

During an intravitreal injection under topical anesthesia, a 67-year-old female patient with senile macular degeneration experienced sudden bradycardia (pulse: 30/min) and hypotension (blood pressure: 60/30 mmHg). When the patient was identified as having symptomatic Oculocardiac Reflex (OCR), she was treated immediately with intravenous atropine and intravenous hydration. After the stabilization of patient, hospitalization and clinic follow-up were performed. Following follow-up in the hospital, the patient was discharged with recovery. Even with intravitreal injections, life-threatening OCR can occur, and the patients vital functions can be restored to normal with prompt diagnosis and treatment.

Keywords: Oculocardiac Reflex, Intravitreal Injection, Atropine.

INTRODUCTION

Oculocardiac reflex, also known as trigeminal-vagal reflex, arises when ophthalmic branch of trigeminal nerve is stimulated and is transmitted to medulla oblongata via ciliary ganglion; then, the impulses are carried to heart via efferent limb. Both heart rate and cardiac contractions are decreased as a result of vagal stimulation. Sinus bradycardia, atrioventricular block, ventricular fibrillation and even asystole may occur.¹

Oculocardiac reflex incidence may vary based on surgical procedure performed. The highest incidence is observed in strabismus surgery; however, it has been reported that oculocardiac reflex incidence is 14-90% in strabismus surgery and that the incidence is decreased by advancing age.^{2,3} Several factors including preoperative anxiety, topical anesthesia, hypoxia, hypercarbia, acidosis, younger age, drugs affecting vagal tone and peri-operative anesthetic agents can play active role in the onset of the reflex during surgery.^{4,5}

In particular, compression on extra-ocular muscle, intra-orbital injections, hematoma, mechanical stimulation, ocular manipulation, pain and other stimuli may trigger OCR.⁶

Unfortunately, there is no gold standard method to prevent OCR. Since the only and definitive treatment is elimination of stimulation, reflex is terminated when compression over globe is abolished. However, it may be difficult to stop stimulation in case of trauma and pharmacological treatment may be needed with close cardiac monitorization.⁷

We aimed to present the case since symptomatic oculocardiac reflex occurrence is a rare and life-threatening condition.

Case Report

A 67-year old woman presented to our clinic with gradual, progressive and painless impairment of vision in right eye over two years. The patient was receiving 10 mg perindopril arginine once daily and 5 mg nebivolol once daily for hypertension over 10 years and 1000 mg metformine for diabetes mellitus over 5 years. In ophthalmological examination, visual acuity was 8/20 in the right eye and 20/20 in the left eye by Snellen charts. In both eyes, intraocular pressure was measured as 15 mmHg by non-contact tonometry. In slit-lamp examination of anterior segment, there was nuclear cataract in the right eye while nuclear sclerosis in the left eye. In posterior segment examination, there were diffuse exudations

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at macula and peri-macular area in the right eye in the fundus image but normal fundus in the left eye. On optical coherence tomography, hyper-reflective foci, intraretinal cystic edema, subretinal fluid and choroidal neovascular membrane was detected in the right eye; again, left eye was normal. On fundus fluorescein angiography (FFA), there was hyper-fluorescence at posterior pole of right eye while left eye was normal. Intravitreal ranibizumab injection therapy was scheduled with diagnosis of exudative macular degeneration in the right eye.

The patient provided written informed consent. At operating room, topical proparacaine was given before injection. Peri-ocular tissues were prepared using 10% povidone iodine while conjunctiva was prepared using 5% povidone iodine. After dressing with sterile eye drape, blepharostat was placed. Superior temporal region was selected as injection site, The patient became irritable immediately after anti-VGEF was given into vitreous at 4 mm posterior



Figure 1: *Hyper-reflective focus, intraretinal edema, subretinal fluid and choroidal neovascular membrane are observed on macular OCT of right eye.*

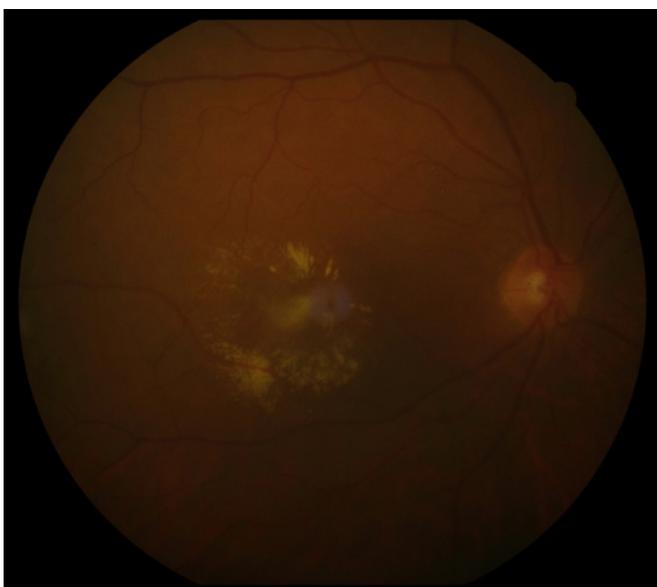


Figure 2: *Diffuse exudation is observed at macula and peri-macular region in fundus image of right eye.*

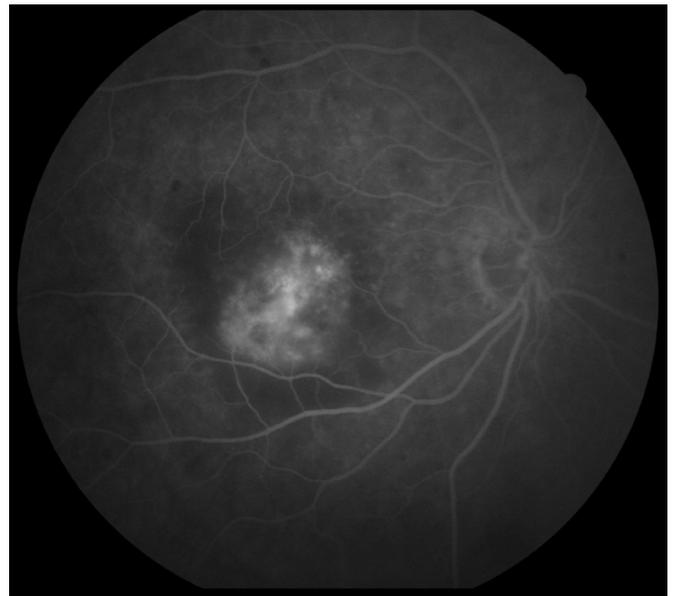


Figure 3: *Drusen hyper-fluorescence and granular, diffuse subretinal neovascularization hyper-fluorescence are seen at posterior pole in FFA image of right eye.*

to limbus using its own injector system; this was followed by slowing in the speech and loss of orientation and cooperation; thereafter, the communication was lost completely. The patient was monitored immediately. Following findings were observed: blood pressure, 60/30 mmHg; SpO₂=98%; blood glucose, 130 mg/dl and sinus bradycardia on ECG. Thus, intravenous (iv) atropine bolus (0.6 mg), iv normal saline infusion (30 ml/kg/min) and supplemental oxygen supplementation (2 l/min) were started immediately. Atropine (0.6 mg, iv) was repeated since vital signs failed to stabilize on minute after first atropine dose. After second dose, heart rate was found to be 75 bpm with blood pressure of 110/70 mmHg. The patient started to re-communicate. After stabilization, the patient was transferred to ophthalmology ward and consulted with cardiology department. The patient was followed by ECG and troponin over 24 hours. No abnormal test or clinical finding were detected and she was discharged by cardiology consultation. The patient was prescribed topical moxifloxacin 5% (4x1) as prophylaxis and control visit was scheduled on postoperative week 1.

DISCUSSION

OCR is the most common cause of sudden bradycardia and hypotension during any ocular surgery.⁸ OCR is more common in children, particularly in strabismus surgery; however, studies showed that OCR can occur in adults.⁹ Özden et al. analyzed changes in cardiac rhythm during cataract and strabismus surgery under retrobulbar

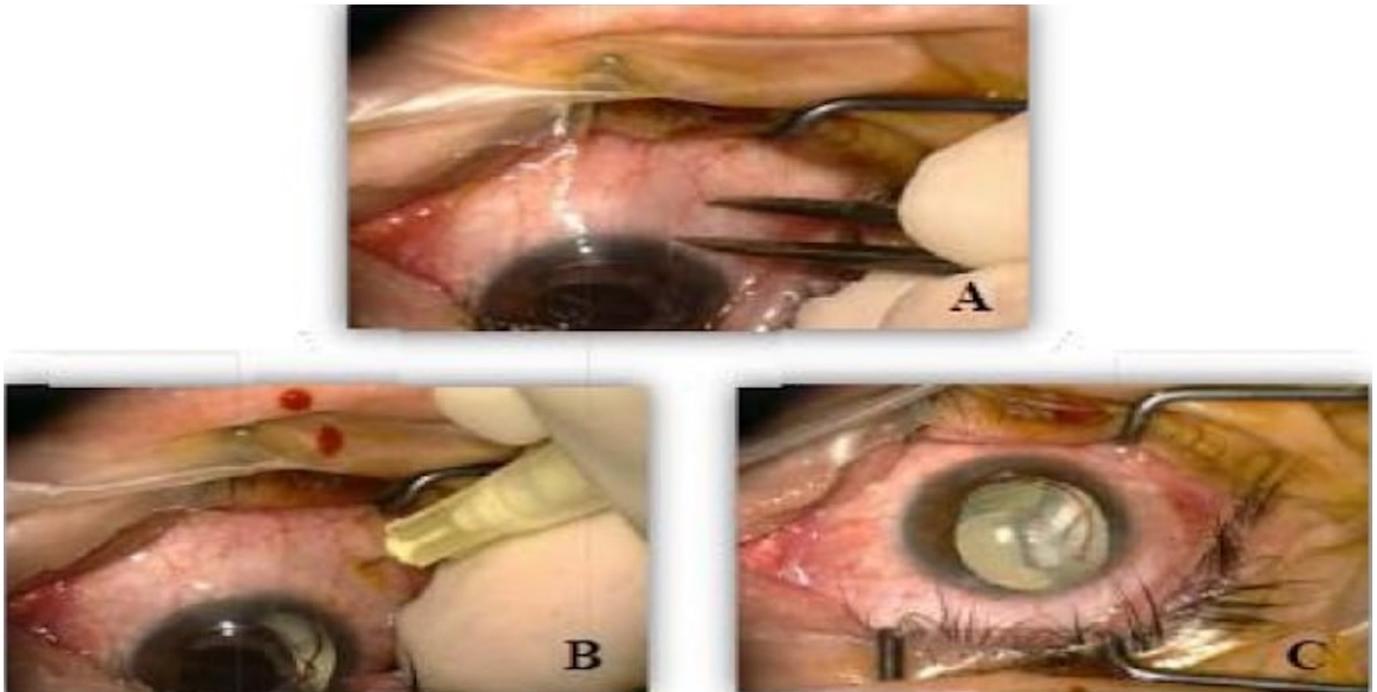


Figure 4: Intraocular injection technique (A) Marking injection site, (B) Performing injection, (C) Post-injection appearance

anesthesia and found that there was bradycardia by 20% during strabismus surgery while arrhythmia in 38-83% of patients underwent cataract surgery.¹⁰ Although Kayıkçıoğlu et al. observed that there might be changes in cardiac rhythm such as bradycardia or supraventricular tachycardia, none was severe or clinically symptomatic requiring emergent intervention.¹¹

The OCR is defined as sudden decrease in heart rate and mean blood pressure by 20% when compared to baseline.⁸ In the study by Paciuc-Beja et al. it was found that OCR rate after intravitreal injection was 3.3%. In the study, authors estimated duration of intravitreal injection and found that intravitreal injection was performed within 10 seconds by experienced ophthalmologist unlike rectus muscle traction (minute) during strabismus. It is thought that the reason for asymptomatic OCR following intravitreal injection is shorter duration of procedure.¹² Again, in the study by Karahan et al., it was predicted that the changes can be risk factor for perioperative cardiovascular and cerebrovascular complications although they do not cause serious consequences requiring treatment.¹³

As similar to other β -blockers, nebivolol reduces heart rate at resting and during exercise. Less bradycardia may contribute better tolerance to nebivolol when compared to other β -blockers.¹⁴ Thus, we think that nebivolol, among drugs that the patient used, might have smaller effect to OCR development.

It is known that refractory hypotension occurs as an adverse of angiotensin converting enzymes given on the day of surgery. Thus, it is recommended to withdraw the drug on day of non-cardiac surgeries in some publications.¹⁵ We think that the prolonged and symptomatic OCR during intravitreal injection in our patient when compared to previous cases might be due to angiotensin converting enzyme inhibitor used on the day of surgery.

CONCLUSION

OCR can occur during intravitreal injection and may be symptomatic in some instances. Thus, any ophthalmic surgery must be performed in the presence of multi-parameter monitoring, emergency intervention equipments and trained anesthesia staff.

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