

Transient retinal artery occlusion after phacoemulsification under local anesthetic block

Oclusão arterial retiniana transitória após facoemulsificação sob bloqueio anestésico

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ABSTRACT

We here in report the case of a patient subjected to cataract surgery through phacoemulsification under local anesthetic block, without intra-operative complications. The patient presented important visual impairment in the first post-operative day. Fundoscopy showed pallor resembling cherry-red spots at the macula. Fluorescein angiography did not depict signs of vascular occlusion and the spectral-domain optical coherence tomography showed increased reflectivity in the inner layers of the retina, thus suggesting local thickening and edema. The current case led to the diagnostic hypothesis of transient retinal arterial occlusion.

Keywords: Retinal artery occlusion; Cataract extraction; Phacoemulsification; Cataract/surgery.

RESUMO

Relatamos um caso de um paciente submetido a facectomia por facoemulsificação sob bloqueio anestésico peribulbar, sem intercorrências per-operatória, que apresentou no primeiro dia de pós-operatório baixa visual significativa. À fundoscopia observou-se palidez em aspecto de mácula em cereja. A angiofluoresceinografia não demonstrou sinais de oclusão vascular e a tomografia de coerência óptica mostrou aumento da refletividade das camadas internas da retina, sugerindo espessamento e edema local. No caso descrito foi aventada hipótese diagnóstica de oclusão arterial retiniana transitória.

Descritores: Oclusão da artéria retiniana; Extração de catarata; Facoemulsificação; Catarata/cirurgia.

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The authors declare no conflicts of interests..

Received for publication 02/01/2018 - Accepted for publication 08/03/2019.

INTRODUCTION

Senile cataract is considered a public health issue due to its large incidence. The number of recorded cases grows in a yearly basis and the affected people demand surgical treatment. Cataract surgery is the most cost-effective intervention for vision recovery, besides representing great impact on society.^(1,2)

Patients' expectations about cataract surgery increased after the introduction of new tools and enhanced techniques in the surgical methods. Most surgeries end up with excellent results; patients, as well as surgeons, do not tolerate eventual complications.⁽³⁾

Anesthesia in cataract surgery has evolved from general to local block (retrobulbar, peribulbar, subconjunctival or sub-Tenon anesthesia) and, subsequently, to topical anesthesia. With regard to local anesthesia, peribulbar blocking is the safest alternative in comparison to the retrobulbar one, since the needle used in it is shorter and its tip stays out of the retrobulbar space. Possible complications due to the retrobulbar anesthesia include retrobulbar bleeding, eyeball penetration, direct injury in the optic nerve, drug toxicity and mechanical compression due to the anesthetic volume.^(4,5)

Retinal artery occlusion is a rare complication in cataract surgeries conducted through phacoemulsification; however, it is potentially devastating. Transient retinal artery occlusion (TRAO) is a challenge; moreover, diagnostic delay can cover fundoscopic and fluorescein angiographic abnormalities, which are only visible in the acute stage of the disease. Spectral domain optical coherence tomography (SD-OCT) is the only imaging modality capable of providing objective TRAOC evidences in the late stages of the disease.⁽⁶⁾

CASE REPORT

The case regards a 71-year-old, white, male, smoker (smoking load of 40 packs year) patient with history of systemic arterial hypertension (under irregular treatment). He presented to a medical screening in the cataract sector of Piedade Municipal Hospital. The visual acuity measurement recorded 0.2 with the best correction and 1.0 in the super pin hole in both eyes. Biomicroscopy presented transparent corneas, wide anterior chamber with no reaction, trophic irises, isochoric and photoreagent pupils, nuclear III/VI and subcapsular posterior III/V cataract in both eyes according to the LOCS III classification⁽⁷⁾. Goldmann applanation tonometry showed intraocular pressure (IOP) of 15 / 16 mmHg. Biomicroscopy of the posterior segment only depicted typical alterations of hypertensive retinopathy: the presence of pathological arteriovenous junctions and the narrowing of the arteriolar caliber.

The patient underwent uneventful cataract surgery through phacoemulsification and intraocular lens implantation in the right eye. The procedure was conducted under peribulbar anesthetic blocking, which was performed by anesthetist, by using 2% lidocaine solution without vasoconstrictor, 0.5% bupivacaine and hyaluronidase.

The patient presented visual acuity of hand movement in the operated eye in the first post-operative day, besides no other complains or symptoms. The biomicroscopic exam (Figure 1) depicted diffuse subconjunctival bleeding, transparent cornea with edema (1+/4+), wide anterior chamber with no reaction, photoreagent pupil, trophic iris, topical intraocular lens and IOP

of 18 mmHg. The posterior segment presented pallor macular region with edema of cherry-red spot aspect, thus suggesting occlusion of the central retinal artery. Fluorescein angiography did not evidence signs of arterial or venous flow obstruction or any other significant changes (Figure 2), whereas SD-OCT showed thickening of and edema in the inner layers of the retina (Figure 3); both exams were performed 24 hours after the surgical procedure. The patient was subjected to carotid transthoracic echocardiogram and Eco Doppler, that presented changes compatible to his age.

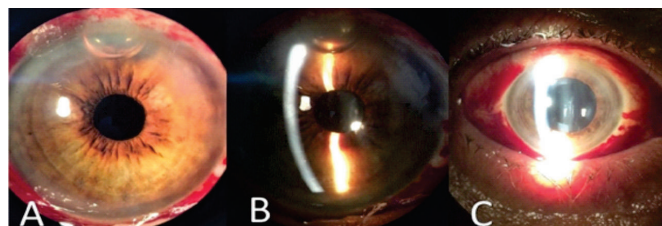


Figure 1: First postoperative day. A. Diffuse direct lighting biomicroscopy; B. Optical cut lighting evidencing corneal edema (1 + / 4 +); C. Optical section illumination under mydriasis showing intraocular lens implanted inside the capsular bag;

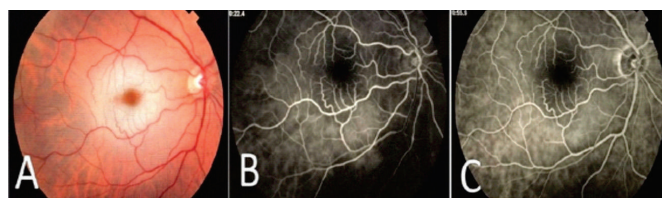


Figure 2: A. Color retinography showing macular ischemia image (macula in cherry); B. Arteriovenous fluorescein angiography; C. Fluorescein angiography, venous phase;

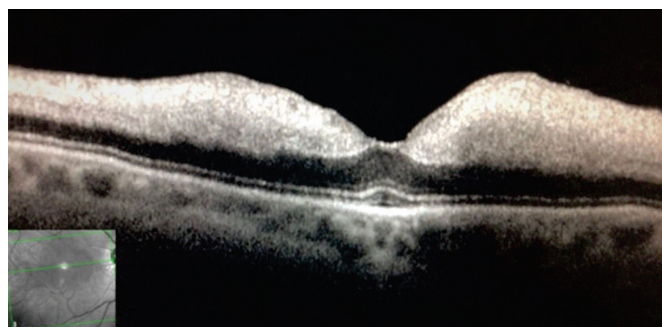


Figure 3: OCT-SD recording the increase in macular thickness

The patient had partial visual acuity improvement 72 hours after the surgery, with central positive scotoma and visual acuity of counting fingers at one meter in the temporal peripheral vision field, without any improvement in the super pin hole. He attended regular follow-ups for 90 days, but he did not show evolutive visual acuity improvement. Based on the current frame, the patient was posteriorly underwent to cataract phacoemulsification in the left eye performed by an expert surgeon, under topical anesthesia (1% lidocaine, 1ml solution in anterior chamber), without complications either throughout surgery or in post-operative stages. The patient reached vision 1.0 with no optical correction.

DISCUSSION

The introduction of new surgical techniques in phacoemulsification, such as the use of small incisions, was followed by changes in the choice of the anesthetic technique. The akinetic blocks performed with needles, such as the retrobulbar and peribulbar blockings, have been slowly replaced by methods that do not use needles, such as the topical anesthesia, which leads to good results and to low complication levels, because it is less invasive.⁽⁸⁾

TRAO is a potentially sub-diagnosed cause of acute post-operative vision loss in patients subjected to cataract surgery through phacoemulsification under local anesthesia (sub-Tenon, peribulbar and retrobulbar).⁽⁶⁾

There are different levels of visual complications depending on the extension and duration of the vascular occlusion or spasm.^(9, 10) Privation with anoxia for longer than 97 minutes is already enough to cause irreversible cell damage; after 4 hours there is massive irreversible retinal damage.⁽¹¹⁾ Accordingly, short-duration TRAO may not produce visual symptoms; therefore, it may not be diagnosed.^(11, 12)

Morgan et al.⁽¹³⁾ and Sullivan et al.⁽¹⁴⁾ described the adverse effects of retrobulbar anesthesia such as retrobulbar bleeding, central retinal artery occlusion (CRAO) and complication with potential risk of vision loss.

Behera et al.⁽¹⁵⁾ reported two retinal artery occlusion cases deriving from direct injuries in the optic nerve during the anesthetic procedure. The accidental insertion of a needle in the optic nerve may have disastrous consequences, which include bleeding in the optic nerve sheath, retrobulbar bleeding and anesthesia of the brainstem. The retinal vascular occlusion and the Purtscher's retinopathy are the other possible vascular complications. The pathophysiology has been in many ways attributed to the direct penetration of the needle in the optic nerve, to drug toxicity, to mechanical compressions or to vasospasm due to an adjuvant vasoconstriction agent.

TRAO and CRAO reports after phacoemulsification are only found in small series of cases and in all the reports procedures were performed under local anesthetic block.^(5, 6, 12, 16, 17) There are no publications on TRAO and CRAO after phacoemulsification with topical anesthesia, thus suggesting a possible mechanical effect caused by the anesthetic volume injected in the orbital region.⁽¹⁶⁾ Local anesthesia is adopted worldwide in cataract surgeries and in other procedures; however, there are growing evidences that these anesthetic techniques are associated with IOP increase and with reduced ocular blood flow right after the administration of the anesthetic volume.⁽¹⁸⁻²⁴⁾

Swamy et al.⁽¹⁷⁾ suggested that the anesthetic fluid (sub-Tenon or peribulbar) can be withheld in the periocular connective tissue and cause focal mechanical compression of the central retinal artery. Compression is caused by fluid flow into the intraconal connective tissue or by its extraconal permanence in the sub-Tenon space after the peribulbar and sub-Tenon anesthesia, respectively. The pre-operative, post-anesthesia mechanical compression with the Honan balloon facilitates the flow passing, besides contributing to flow reduction in the central retinal artery.

Creese et al.⁽¹⁶⁾ suggest that the transitory spasm or occlusion of the central retinal artery causes arterial hypofunction and subsequent ischemia or retinal infarction, with permanent vision loss. Thus, the clinical presentations of CRAO and TRAO can be seen as a spectrum of the same entity of the disease. The entire retina is affected when the ocular perfusion pressure through

the central retinal artery is significantly reduced; it gets clinically pallor and the macular region gets cherry-red spots typical of CRAO. If hypoxia is transitory, the clinical aspect of TRAO is not apparent, since the ischemia would be more limited to the internal nuclear layer of adjacent layers. It is possible that the eyes with pre-existing low retinal perfusion are more susceptible to transitory compression or spasm in the central retinal artery due to an underlying vasculopathy, just as in the presented case. The patient in the current study presented risk factors such as systemic arterial hypertension (under irregular treatment) and smoking.

With regard to the here in presented case, and based on the patient's risk factors for vascular diseases, it is worth taking into account the hypothesis that the presence of underlying arterial disease with pre-existing tissue hypoperfusion was made worst by increased intraorbital pressure, which was caused by the anesthetic injection. The compression caused by the anesthetic fluid may have led to increased IOP and to temporary reduction of the retinal artery flow. Thus, as TRAO can be a devastating condition, topical anesthesia must be the option of choice, since it is a safer anesthetic administration method, mainly in patients with known vascular disease.

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