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Case Report

Perioperative Posterior Ischemic Optic Neuropathy: A Case Report

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Abstract

Perioperative posterior ischemic optic neuropathy (PION) is a drastic complication for patients when they notice vision loss after recovering from anesthesia and this might have some medicolegal implications.

Here, we report a 51-year-old male with bilateral vision loss due to PION after multiple laparotomies to control intrabdominal bleeding.

Keywords: Optic Nerve; Perioperative; Posterior Ischemic Optic Neuropathy

Abbreviation

PION: Posterior Ischemic Optic Neuropathy; OCT: Optical Coherence Tomography; RNFL: Retinal Nerve Fiber Layer, GCC: Ganglion Cell Layer

Introduction

Perioperative ischemic optic neuropathy is characterized by unilateral or bilateral visual loss following major surgical procedures such as spinal surgery, coronary artery bypass, radical neck dissection, and others. While the pathogenesis has yet to be confidently explained, surgery-related anemia and hypotension have been postulated as possible mechanisms [1]. In this report, we discuss a case of bilateral vision loss due to perioperative PION complicating prolonged intra-abdominal surgery and internal bleeding.

Case Presentation

A 51-year-old Caucasian male presented to the neuro-ophthalmology clinic due to bilateral acute vision loss following multiple exploratory laparotomies to control internal bleeding because of heparin usage. The patient noticed the vision loss immediately after recovering from the surgery. The vision loss was reported to be stable since onset per the patient. The patient had a history of hypertension, hyperlipidemia, asthma, and arthritis. Visual acuity was no light perception in both eyes. Intraocular pressure was 17 mmHg and 18 mmHg in the right and left eyes, respectively. On pupillary exam, dilated fixed pupils of a diameter of 8 mm in dark and light conditions in both eyes were noted. Anterior segment exam was unremarkable. On dilated fundus exam, bilateral optic nerve pallor with peripapillary pigmentations in the left eye (Figure 1).

Optical coherence tomography (OCT) of the optic nerve head showed decreased retinal nerve fiber layer (RNFL) and diffuse ganglion cell complex (GCC) loss in both eyes (Figures 2 and 3). Magnetic resonance imaging (MRI) of the brain and orbits were unremarkable.

The patient was diagnosed with bilateral perioperative PION as a complication of his laparotomies and blood loss. The patient was counseled about the prognosis of his condition.

Figure 1: Fundus photographs of the right eye (A) and left eye (B) show diffuse pallor of both optic nerve heads.

Figure 2: Retinal nerve fiber layer (RNFL) analysis of both optic nerves shows thinning more noticeable superiorly and inferiorly.

Figure 3: Ganglion cell complex (GCC) analysis of both eyes demonstrating diffuse loss of GCC in both eyes.

Discussion

Posterior ischemic optic neuropathy (PION) develops due to ischemia of the retrobulbar portion of the optic nerves. The distinct and separate arterial supplies of the anterior and posterior parts of the optic nerve can lead to ischemia affecting the posterior portion of the nerve only. The anterior part of the optic nerve is supplied by the short posterior ciliary artery and choroidal circulation, while the retrobulbar optic nerve is supplied intraorbitally by a pial plexus arising from the ophthalmic artery, and intracranially by branches of the ipsilateral internal carotid, anterior cerebral, and anterior communicating arteries [2].

PION is a relatively uncommon complication. It is reported to occur in 0.087% of patients after spinal, in 0.08% after neck dissection, and in around 0.018 of patients following cardiopulmonary bypass surgeries [3]. PION can be of arteritic etiology which occurs in around 7% of all giant cell arteritis (GCA) cases. Non-arteritic PION is usually reported in patients with vascular risk factors (e.g: DM, HTN) and this was postulated to represent manifestations of systemic vascular disease [4].

PION can also occur perioperatively especially in spine, radical neck dissections, and cardiac surgeries. Risk factors for perioperative PION include intraoperative hypotension, blood loss, anemia,

prolonged prone position, and orbital or periorbital edema. Longer duration of the surgery is associated with an increased risk of PION (94% of ischemic optic neuropathy had an anesthetic duration of 6 hours or more). Additionally, PION is also reported in patients with acute volume loss, acute hypotension, or vasospasm due to migraine or vasoactive stimulant agents [5].

PION patients are presented with sudden painless vision loss, typically bilateral in perioperative PION. In a study evaluating perioperative PION patients, 40% of the patients had visual acuity of no light perception at the time of presentation part. At early presentation, the optic nerve examinations look normal without edema, but optic nerve atrophy develops within 4-6 weeks after the vascular insult [6].

PION is a diagnosis of exclusion. It is important to exclude giant cell arteritis in PION cases. Suggested criteria to diagnose PION include an acute decrease in visual acuity or visual field defect, relative afferent pupillary defect in unilateral cases or sluggish nonreactive in bilateral cases, normal optic nerve appearance at the onset of disease but eventually, optic pallor and atrophy can be seen in 4-6 weeks, normal electroretinogram and absence of other cases of other causes of retrobulbar optic neuropathy [7]. While the arteritic form of PION should be treated with a large dose of steroids, there is no proven treatment for perioperative and non-arteritic types of PION [7].

Prevention of perioperative PION during surgeries is crucial. Attempts to avoid arterial hypotension, low hematocrit, and Trendelenburg position during surgery decrease the risk of perioperative PION. In high-risk cases with extreme blood loss, it is prudent to use colloids in proportion to crystalloids to prevent hemodilution. Also, staging long procedures to decrease the length of surgery can be help decrease perioperative PION incidence [6].

The prognosis of PION is different based on the etiology. In cases of non-arteritic PION, early treatment with a high dose of steroids was associated with better visual outcomes compared to patients who did not receive steroid therapy. However, the prognosis perioperative PION is usually poor and vision loss is bilateral and permanent. In cases of arteritic PION, aggressive steroid treatment was not associated with improvement in vision [8].

In our patient, the prolonged laparotomies and intraperitoneal bleeding in addition to other vascular risk factors including hypertension, hyperlipidemia, and heparin usage predisposed him to the development of PION.

Conclusion

PION can occur as a postoperative complication in surgeries with prolonged duration and blood loss. The vision loss in perioperative PION is usually severe and irreversible. Proper preoperative work-up of patients at risk and intraoperative measures to maintain sufficient blood flow to the optic nerve are of paramount importance to prevent PION.

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Conflict of Interest

No conflicts of interest exist.

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