

A Case of Decreased Visual Field after Uneventful Cataract Surgery: Nonarteritic Anterior Ischemic Optic Neuropathy

Hun Lee¹, Chan Yun Kim¹, Gong Je Seong¹, Kyoung Tak Ma²

¹Department of Ophthalmology, Institute of Vision Research, Yonsei University College of Medicine, Seoul, Korea

²Siloam Eye Hospital, Seoul, Korea

The purpose of this article is to report a case of nonarteritic anterior ischemic optic neuropathy (NAION) after uneventful cataract surgery. A 53-year-old Filipina underwent cataract surgery. She had a small optic disc with cup-to-disc ratio of 0.2 in the left eye and 0.3 in the right eye. On the first postoperative day, the uncorrected visual acuity (UCVA) was 20/20, with an intraocular pressure (IOP) of 20 mmHg in the left eye. At one week after operation, the UCVA was 20/20 and the IOP was 15 mmHg. Three weeks later, she underwent cataract surgery in the right eye. On the first postoperative day, her UCVA was 20/20 in both eyes, but she complained of a visual field decrease in the left eye. A relative afferent pupillary defect (RAPD) was noted and the optic disc was pallid and swollen diffusely. A red-free photo showed defect surrounding the optic disc. A visual field test showed tunnel vision sparing the central vision. In this report, the authors hypothesize an association between cataract extraction and delayed NAION. Since the risk of NAION in the fellow eye is 30-50%, visual acuity, visual field, fundus exam and RAPD should be routinely checked.

Key Words: Cataract, Ischemic optic neuropathy

Cataract surgery is now regarded as a common, highly effective and safe ophthalmic surgical procedure; however, the surgery still causes several problems. Among many complications, neuro-ophthalmologic complications from cataract surgery are relatively uncommon and include diplopia, central nervous system toxicity, traumatic optic neuropathy and ischemic optic neuropathy. Case reports and case series suggest that cataract extraction may be associated with an increased incidence of nonarteritic anterior ischemic optic neuropathy (NAION) [1-8]. The risk of NAION after cataract extraction is low, approximately one occurrence in every 2,000 cases [1]. This represents a significantly greater incidence than the general population, which is estimated to be 2.3 to 10.2 per 100,000 people among patients 50 years and older [9, 10]. A history of NAION in the fellow eye may be an additional risk factor [1, 11-13]. A diagnosis is made if the following criteria are met: 1) acute visual acuity loss and/or visual field loss consistent with a defect in the nerve fiber layer; 2) optic

nerve head edema with neural rim pallor or development of optic nerve head pallor after the onset of visual loss; 3) relative afferent pupillary defect; and 4) elimination of all other etiologies. Treatment, including corticosteroids and surgical optic nerve sheath fenestration, has not been demonstrated to be effective [14-16].

Two types of NAION associated with cataract extraction have been reported; an immediate type, occurring within hours to days after surgery [2, 3], and a delayed type, occurring weeks to months after surgery following a period of normal vision [4-8]. Although the immediate type is known to be related to elevated intraocular pressure, there is limited evidence to support intraocular surgery as a cause in delayed cases. The authors of this case study report delayed NAION after uneventful phacoemulsification and intraocular lens implantation.

Case Report

A 53-year-old Asian female (Filipina) received uneventful phacoemulsification and intraocular lens implantation in both eyes, three weeks apart, under topical anesthesia. Both cataract surgeries were uneventful. The patient had no systemic or ocular disease at the preoperative examination

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Reprint requests to Kyoung Tak Ma, Siloam Eye Hospital, #60 Deung Chon-ro, Gangseo-gu, Seoul 157-836, Korea. Tel: 82-2-2650-0881, Fax: 82-2-2650-0895, E-mail: docktma@gmail.com

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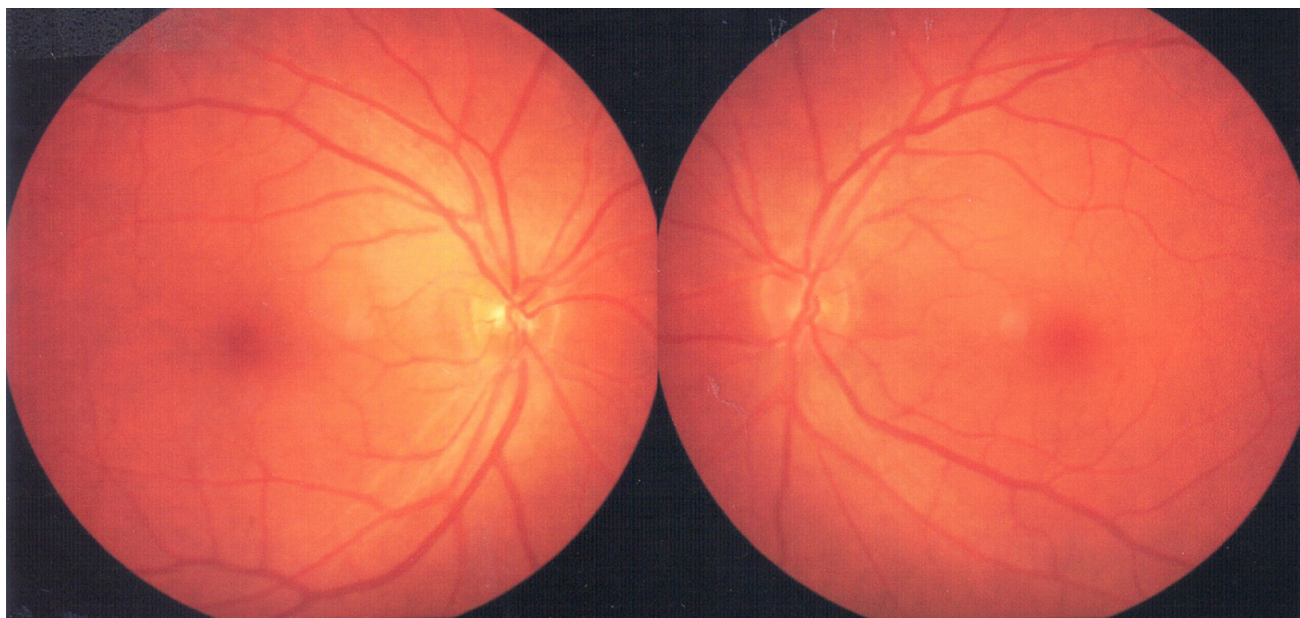


Fig. 1. Preoperative fundus photograph: relatively small bilateral optic disc with a cup-to-disc ratio of 0.2 in the left eye and 0.3 in the right eye.



Fig. 2. Fundus photograph of the left eye on postoperative day 1 showing optic disc pallor and swelling.

other than a relatively small bilateral optic disc with a cup-to-disc ratio of 0.2 in the left eye and 0.3 in the right eye (Fig. 1).

On the first postoperative day, the patient's uncorrected visual acuity was 20/20 in the operated eye, with slight corneal edema and an intraocular pressure of 18 mmHg. Topical antimicrobial drug levofloxacin (Cravit®; Santen, Osaka, Japan) and rimexolone (Vexol®; Alcon, Forth Worth, TX, USA) were used every 2 hours. At one week after operation, the patient presented without any ocular complaints, and the uncorrected visual acuity was 20/20.

Intraocular pressure in the operated eye was 15 mmHg by Goldmann applanation tonometer.

Three weeks later, the patient underwent cataract extraction under topical anesthesia in the right eye. On the first postoperative day, the patient's uncorrected vision was 20/20 in both eyes but complained of a visual field decrease in the left eye. The intraocular pressures were 15 and 14 mmHg by Goldmann applanation tonometer, respectively. The patient did not complain of any headaches, scalp tenderness, jaw claudication or neurologic symptoms. On neuro-ophthalmic examination, a relative afferent pupillary defect was observed, and the left optic disc was pallid and swollen (Fig. 2). An optical coherence tomography was obtained, confirming the findings (Fig. 3). The patient's color vision was normal. A red-free photo showed a nerve fiber layer defect surrounding the optic disc (Fig. 4). The Humphrey and Goldmann visual field of the left eye showed tunnel vision sparing the central vision (Figs. 5 and 6). Carefully timed fluorescein angiography was performed and revealed no definite filling defect at the early stage but hyperfluorescence of the disc at the late stage (Fig. 7). An MRI of the brain and orbit showed only age-related changes (Fig. 8). The patient underwent a complete laboratorial evaluation including erythrocyte sedimentation rate and C-reactive protein measurements, and the results were all within normal limits. The patient had no symptoms suggestive of temporal arteritis, and the laboratory workup was negative. One week after symptom onset, visual acuity was 20/20, with an afferent pupillary defect still remaining in the affected eye. Aspirin was prescribed to prevent NAION in the fellow eye.

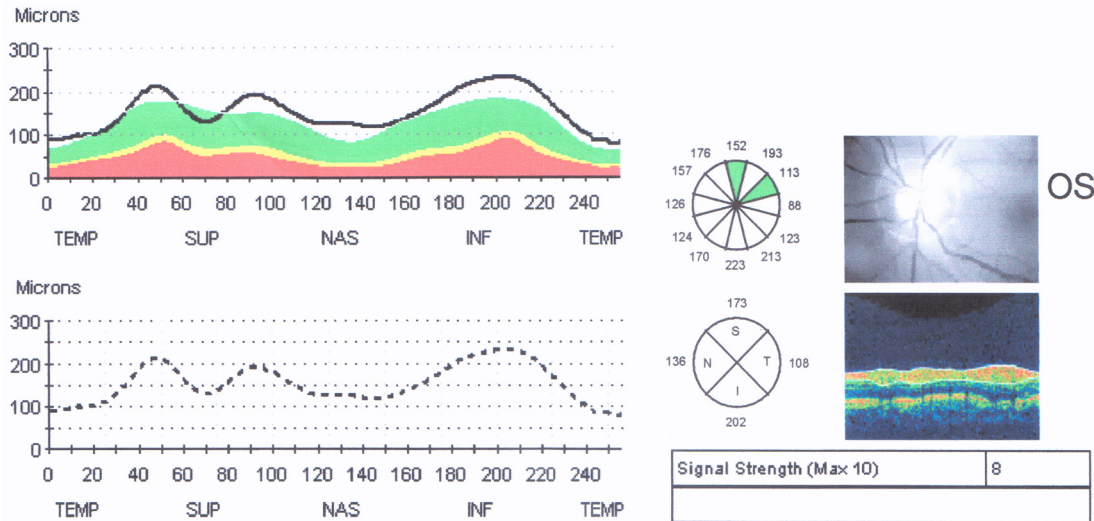


Fig 3. Stratus optical coherence tomography image of the left eye on postoperative day 1 showing an increase in nerve fiber layer thickness due to optic disc swelling. TEMP=Temporal; SUP=Superior; NAS=Nasal; INF=Inferior; OS=Oculus Sinister.

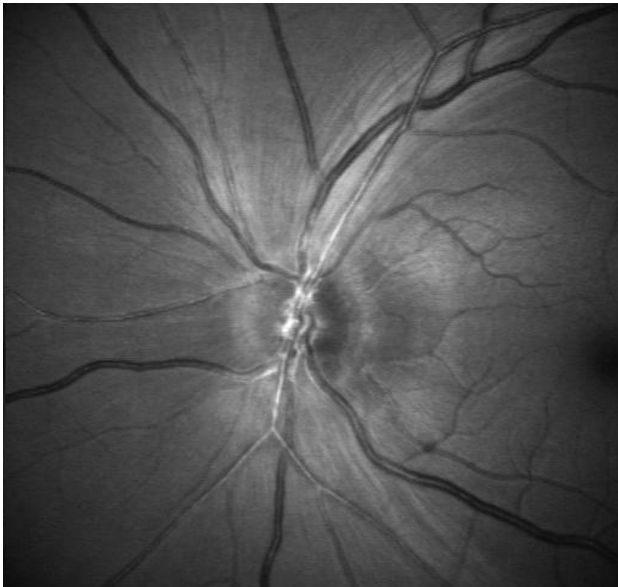


Fig. 4. Red-free photo of the left eye on postoperative day 1 showing a nerve fiber layer defect around the disc.

Discussion

Nonarteritic anterior ischemic optic neuropathy results from inadequate blood supply to the posterior ciliary arteries. Arterial hypertension, diabetes mellitus, hypercholesterolemia, ischemic heart disease, cerebrovascular disease, migraine, sleep apnea syndrome and anterior segment surgeries have been identified as risk factors for NAION.

Patients with a history of NAION are at a high risk of NAION developing in the uninvolved eye. Beri et al. [11] showed that 18% and 35% of patients with unilateral NAION had NAION in the fellow eye at the one-year and five-year follow-ups, respectively. Many reports have shown

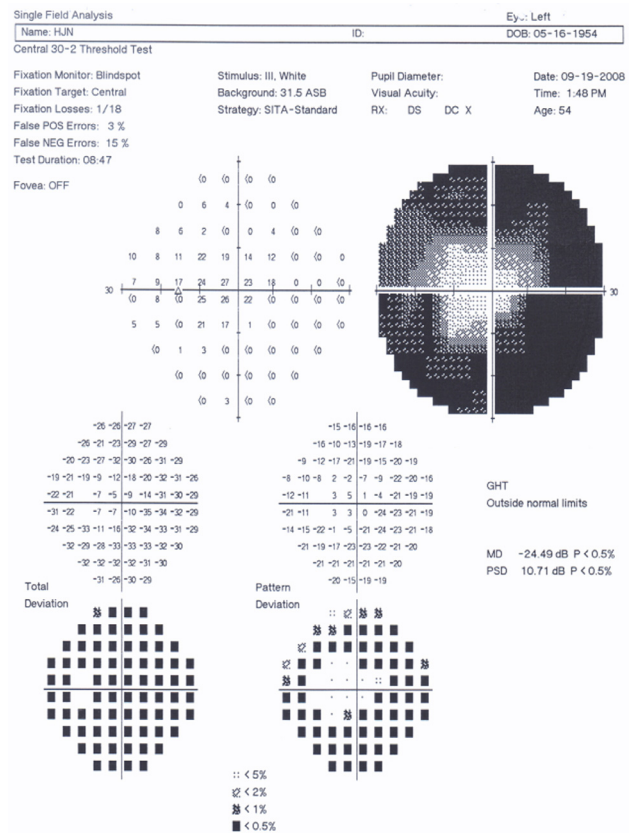


Fig. 5. Visual field test of the left eye with a Humphrey perimeter on postoperative day 1.

that if ischemic optic neuropathy occurs in one eye after cataract surgery, the risk to the fellow eye is 30-50% with subsequent surgery [1, 11-13]. Aspirin administration has been shown to be effective in reducing the short-term frequency of recurrent event in the contralateral eye [12].

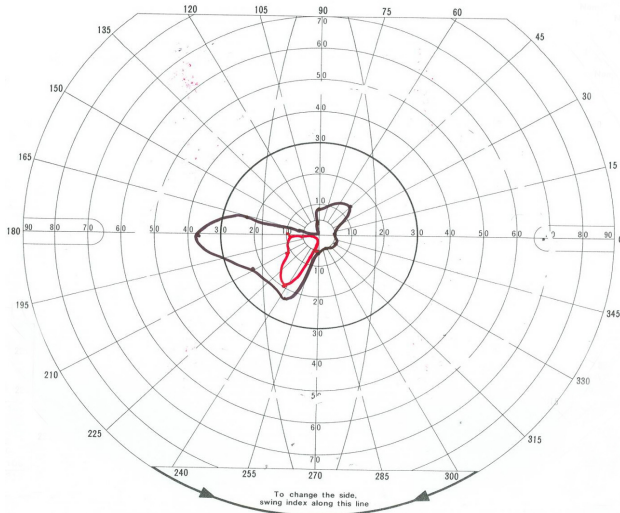


Fig. 6. Visual field test of the left eye with a Goldmann perimeter on postoperative day 3.



Fig. 7. Fluorescein angiography of the left eye on postoperative day 3 showing hyperfluorescence of the disc at the late stage.

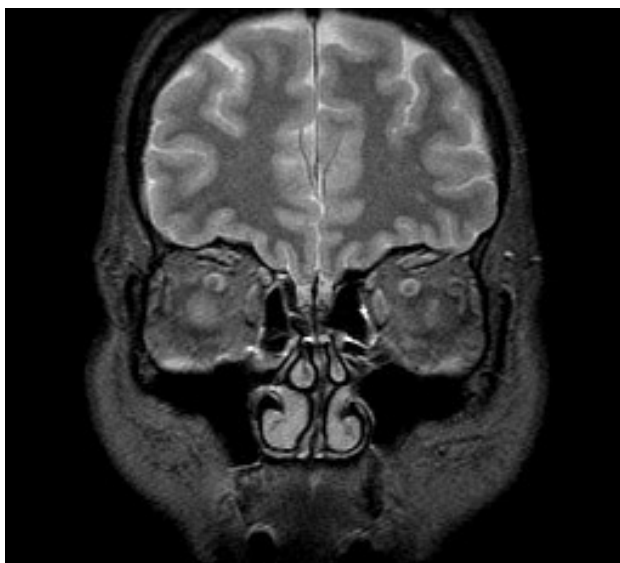


Fig. 8. MRI image of the brain and orbit on postoperative day 10 showing only age-related changes.

Fortunately, the visual acuity of the patient in the present study remained stable. However, since the risk of NAION in the fellow eye is 30-50%, visual acuity, optic disc morphology and visual field should be routinely checked in the fellow eye.

The data presented herein do not prove a direct causal relationship between cataract extraction and delayed NAION. However, an association can be hypothesized between cataract extraction and delayed NAION. McCulley et al. showed that cataract extraction and intraocular lens implantation are associated with an increased incidence of NAION [1, 17] which occurs as a complication of anterior segment surgery including cataract extraction, with an average onset of approximately 35 days, ranging widely from hours to five months postoperatively [17].

Although the risk of NAION after cataract extraction is low, there are currently no preventative measures to avoid the first attack of ischemic optic neuropathy related to cataract surgery other than monitoring intraocular pressure, and no treatment is available. When considering cataract surgery to the fellow eye, surgeons should discuss this possible risk with individuals having experienced a previous episode of NAION. In addition, for patients who have a crowded optic nerve head with a small cup-to-disc ratio or a previous episode of NAION on the fellow eye, prescribing aspirin to avoid NAION may be advisable [12, 14, 18].

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