CASE REPORTS

Silent Post Cataract Bilateral Sequential Nonarteritic Anterior Ischaemic Optic Neuropathy

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ABSTRACT

Nonarteritic anterior ischaemic optic neuropathy (NAION) has been reported as a rare occurrence following cataract surgery. Bilateral sequential NAION following cataract surgery is extremely rare. We report an 83-year-old male who developed bilateral sequential NAION within 5 and 3 weeks of undergoing uneventful cataract surgeries in each eye. A brief review of the literature on this topic is provided. This case serves to add to the ongoing debate about the association between cataract surgery and NAION.

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Introduction

Cataract extraction is one of the most common and safest surgeries performed worldwide. Despite this, rare and devastating complications such as endophthalmitis, haemorrhage, and retinal detachment may occur.¹ Optic neuropathy following uncomplicated cataract surgery was first reported by Vila Coro in 1946.² Post cataract surgery optic neuropathy (PCSON) has been categorized into two types. The immediate type occurs within 24 hours of surgery.³ These have been associated with a rise in intraocular pressure (IOP), peribulbar anaesthesia, intraoperative systemic hypotension, or a combination of the three.⁴ The delayed type describes events that occur within days, weeks, or months of surgery.^{3–5} The causative factors of the delayed type are unknown and hence this remains a topic of debate.

Case report

An 83-year-old male was referred for optic disc oedema in the left eye, which was incidentally noticed during a routine post-operative assessment 5 weeks after an uncomplicated cataract extraction and intraocular lens implantation. The patient was unaware of any vision loss and was in fact quite pleased with the

results of the surgery. His past medical history included a remote history of smoking as well as lower extremity deep vein thrombosis 13 years ago. His only medication was dabigatran. He did not take phosphodiesterase type 5 inhibitors. The patient did not have diabetes, hypertension, dyslipidaemia, or obstructive sleep apnoea. There were no episodes of systemic hypotension or hypovolaemia in the recent past. He denied symptoms of temporal arteritis. ESR (5.0), CRP (1.1), and platelet count (195) were tested by the referring physician and were normal. The patient is not hypermetropic. His visual acuity with correction was 20/30 OD and 20/40 OS. Anterior chamber examination was normal, with cataract OD and intraocular lens OS. There was a grade 1 relative afferent pupillary defect (RAPD) in the left eye. A 24–2 SITA Humphrey visual field was normal in the right eye with a mean deviation (MD) of –1.22. In the left eye, there was a partial inferior arcuate defect with MD of –2.05 (Figure 1). Fundoscopy revealed oedema in the superior and nasal margins of the left disc as well as peripapillary haemorrhages. Incidental drusen of the retina was also noted on examination. Right optic disc was normal, but crowded. There were no superficial drusen on the right optic disc and the disc margin was distinct. Optical coherence tomography was normal OD with average retinal nerve fibre layer

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Figure 1. Humphrey visual field: Central 24-2 threshold test done during initial assessment showed a partial inferior arcuate defect OS and normal OD. MD -1.22 OD and -2.05 OS.

(RNFL) thickness of 99 microns. In the left eye, there was superior and nasal peripapillary RNFL thickening with an average of 150 microns. Temporal arteries were non-tender. The remainder of the neuro-ophthalmic examination was normal. A non-contrast CT scan of the orbits did not reveal any abnormalities in the optic nerves bilaterally and there were no hyperdensities in the optic discs to be suggestive of drusen. The patient was diagnosed with a silent NAION of the left eye.

The patient was reassessed 5 weeks later. In the interim, he had undergone an uncomplicated cataract extraction OD 3 weeks prior to that visit. He did not report any visual symptoms. Corrected visual acuity was 20/25 in the right eye and 20/40 in the left eye. A new grade 1 RAPD was noted in the right eye, opposite to his last visit. Colour vision was 12/13 Ishihara plates in both eyes. A 24-2 SITA Humphrey visual field revealed a new inferior arcuate defect in the right eye with MD of -1.74 . There was mild interval improvement of the inferior defect OS with MD -1.72 (Figure 2).

Funduscopy revealed resolution of the disc oedema and the peripapillary haemorrhages in the left eye with mild pallor in the superior pole and temporally. There were no drusen over the surface of the left optic disc and the disc margin was crisp. The right optic disc showed oedema superiorly and nasally with peripapillary RNFL haemorrhages (Figure 3). Temporal arteries were soft to palpation and were non tender. ESR (12.0), CRP (1.0), and platelet count (160) were repeated and were normal. The remainder of the neuro-ophthalmic exam was normal. The patient underwent a temporal artery biopsy that did not show any evidence of giant cell arteritis.

Discussion

PCSON was first reported in the literature over 70 years ago², but the causal relationship between cataract extraction and NAION has not been clearly established and it remains a topic of debate, particularly when discussing the delayed type.

Figure 2. Repeat visual fields done during the second visit 5 weeks later revealed a new inferior defect in the right eye with MD of -1.74 and an interval improvement in the inferior defect OS with MD of -1.72 .

Figure 3. Fundus photographs taken during the second assessment. Right optic disc showed oedema and haemorrhages superiorly and nasally. Left optic disc revealed pallor in the superior pole and temporally. Incidental retinal drusen in the left eye.

Since then, several case series have been reported.^{5–7} Reports include cases of NAION occurring post intracapsular cataract extraction, extracapsular cataract extraction as well as with the use of phacoemulsification.⁶ Furthermore, cases have been reported with all forms of anaesthesia including topical, peribulbar, and retrobulbar.⁷ McCulley et al.⁸ completed a retrospective analysis of 5787 cases of cataract extraction performed and

concluded that the estimated six-month incidence of delayed type PCSON was 51.8 per 100,000, which is significantly higher than the annual incidence of spontaneous NAION (2.3–10.3 per 100,000 in the general population of people 50 years or older).⁹ Contrary to this, a recent study by Moradi et al.¹⁰ reported that the incidence of PCSON was 10.9 cases per 100,000. Interestingly, this study found no significant

temporal pattern association and hence no causal relationship between modern cataract surgeries and NAION.

In this case report, we present a patient who had bilateral sequential delayed type NAION within 5 weeks after cataract extraction in the left eye and subsequently underwent cataract surgery in the fellow eye developing an NAION in that eye within 3 weeks of the procedure. To our knowledge, there has been only eight cases of this bilateral sequential phenomenon reported previously.^{7,8,11} However, this is the first case of bilateral NAION occurring within such a short interval, 5 and 3 weeks of surgery, respectively. This close temporal proximity is suggestive of a procedure-related mechanism for the development of NAION in both eyes.

Lam et al.¹² performed a retrospective cohort analysis of patients who had prior unilateral spontaneous NAION and determined that the risk for developing NAION in the fellow eye was 3.6-fold greater following cataract surgery. They also reported that the majority of patients who had NAION following cataract surgery developed it within 6 months of the procedure. Furthermore, studies have shown that the prevalence of hypertension, dyslipidaemia, and crowded optic discs were much higher in spontaneous NAION compared to the PCSON.^{6,10} This could suggest that different pathophysiological mechanisms occur in PCSON compared to spontaneous NAION. Our patient, who developed delayed type PCSON, did not have any known systemic vascular risk factors such as hypertension, diabetes, or dyslipidaemia, although he did have crowded optic discs and there was a remote history of smoking. His advanced age is also another risk factor. His cataract surgeries were uneventful and postoperative IOPs were normal. He was asymptomatic from the bilateral PCSON and his visual acuity in the right eye had perhaps improved from 20/30 to 20/25 following cataract extraction as the central vision was preserved. Asymptomatic PCSON has been reported.⁴

The exact mechanism of PCSON remains unclear. One of the proposed hypotheses states that post-surgical inflammation causes a vasculopathy leading to disc oedema and ischaemic damage.¹³ Just as cystoid macular oedema develops post cataract extraction due

to leaking vessels secondary to inflammatory mediators, it is thought that vessels supplying the optic nerve might also be affected by post-surgery inflammatory mediators. This leakage leads to optic nerve oedema which, in a subset of the population with tenuous blood flow to the optic nerve, causes NAION.¹³ This theory would suggest that patients who underwent complicated extraction with post-operative inflammation would be more likely to develop an NAION. McCulley et al.¹³ suggested that as cataract surgery evolves and becomes less invasive, there would be a decrease in post cataract NAION.

Despite the bilateral PCSON, our patient was asymptomatic and fortunately had relative preservation of central vision in both eyes. The optic disc oedema was incidentally diagnosed during routine follow-up visits emphasizing the importance of performing funduscopic exam during postoperative visits.

We believe our case offers some evidence that there could be a causal relationship between cataract extraction and NAION. The temporality of the events, the lack of conventional risk factors, and the bilateral occurrence of the NAION following cataract surgeries in each eye suggest that coincidental, spontaneous NAION is unlikely in our case. However, a prospective case-control study would be required to determine if there is a true association between cataract extractions and NAION.

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