CASE REPORT

FELLOW EYE INVOLVEMENT IN LOW COMPLIANCE PATIENT WITH NON-ARTERITIC ISCHEMIC OPTIC NEUROPATHY: A CASE REPORT

Syntia Nusanti[1], Dearaini[2], Rasyidia Lakmita Putri[2], Rianti Wulandari Pratiwi[2]
[1]Neuro Ophthalmology Division, Ophthalmology Department, Universitas Indonesia Cipto Mangunkusumo Hospital, Jakarta
[2]Research Assistant, Ophthalmology Department, Universitas Indonesia Cipto Mangunkusumo Hospital, Jakarta
Email: syntia_nusanti@hotmail.com

ABSTRACT

Introduction: *The incidence of fellow eye involvement in non-arteritic anterior ischemic optic neuropathy (NAION) is 15% at 5 years after initial onset, although risk factors have not been identified. The aim of this article is to determine the risk factor that could influence the fellow eye involvement with NAION.*

Case Report: *A 72 year-old male presented with gradual painless vision loss in the left eye (LE) for 3 months. He did not have smoking habit. BCVA on the LE was 3/60 and RAPD was present. Funduscopic examination showed optic disc atrophy on LE. Humphrey test revealed altitudinal pattern on LE with visual field index (VFI) 63%. OCTA showed significant decreased capillary perfusion on LE retinal nerve fiber layer thinning and poor capillary perfusion on LE while the right eye (RE) was normal. Laboratory examination indicated diabetes mellitus, dyslipidaemia, and hypercoagulable state. He was prescribed antidiabetic medication, antithrombotic therapy, and statin. After a month, patient showed improvement in both ocular and laboratory examinations. He was advised to continue treatment until the next visit, but he didn't comply. Two months later, patient was presented with painless vision loss, edematous optic disc, and altitudinal visual field defect in the RE. Laboratory examination also revealed unsatisfactory results.*

Discussion: *Prior studies discovered that hypercoagulable states potentially contribute to NAION, presumably due to altered blood viscosity, which further leads to vascular occlusion. Our case showed hypercoagulable state patient with increased d-Dimer and fibrinogen level. Antithrombotic therapy was found beneficial to improve patient's symptoms. However, he did not comply to therapy, thus vision loss of the fellow eye occurred.*

Conclusion: *Non-compliant behaviour of patient could be the risk factor for fellow eye involvement.*

Keywords: *NAION, hypercoagulable state, fellow eye involvement, low compliance, treatment*

INTRODUCTION

Non-arteritic anterior ischemic optic neuropathy (NAION) occurrence is closely related to systemic vascular disease and one of the main causes of blindness or visual impairment in the middle age or elderly population.[1,2] It is the most common cause of optic neuropathy, with an estimated annual incidence in the US 2.3-10.2 per 100.000 population.[3] In Indonesia, there were 87 cases of NAION from 2006 – 2011.[4]

The exact pathophysiological mechanism of NAION are still unknown, however vascular insufficiency is believed to be the pathophysiology of NAION.[5,6] NAION is a multifactorial

disease that systemic risk factors such as hypertension, diabetes mellitus, nocturnal hypotension, sleep apnea, cardiovascular disease and hypercoagulable states may play a role to NAION.[7,8]

NAION patients usually presents with sudden painless visual loss, often described as dimness, blurring or cloudiness in the affected region.[8] The inferior region is frequently affected in NAION with arcuate or altitudinal visual field defect as the most common form.[9,10] Visual acuity of NAION patients are ranging from 20/20 to no light perception.[11] Majority of NAION cases start unilaterally and the fellow eye may be involved within 3-5 years.[12,13] The incidence of fellow eye involvement was 15% at 5 years after the first eye was affected, but the study findings focusing on the risk factors are quite limited.[12]

Due to the unknown pathophysiology, NAION treatment varies widely but mostly aim to prevent the fellow eye involvement.[8] Most treatments proposed for NAION are empirical and include a wide range of agents presumed to act on thrombosis, on the blood vessels, on the disc edema itself or to have a neuroprotective effect.[14] The aim of this article is to determine the risk factor that could influence the fellow eye involvement with NAION.

CASE ILUSTRATION

A 72 year-old male presented with gradual painless vision loss in the LE for 3 months. Patient also had difficulties in his active daily living such, most prominently in reading. He did not have any known history of systemic diseases or smoking habit. His vital signs were normal. He did not have smoking habit. BCVA on LE was 3/60 and RAPD was present, meanwhile RE was 6/7,5 and RAPD was negative. Funduscopic examination (Figure 1) showed optic disc atrophy on LE. Humphrey (Figure 2) test revealed altitudinal pattern on LE with visual field index (VFI) 63%. Additional examination such as OCTA (Figure 3) showed decreased capillary perfusion in superior and inferior region on LE, while RE remains normal. Laboratory examination result indicated diabetes mellitus (HbA1c 9.4%), dyslipidaemia and hypercoagulative blood, as shown in table 2. He was given antidiabetic medication, statin 10mg, antiplatelet 80mg and anticoagulant 10mg for a month. In 1 month follow up, patient showed improvement both in ocular examinations and laboratory results, although difficulty in reading persists. Patient was advised to continue medication until the next visit be he did not comply. Two months after initial visit, he presented with painless vision less in the RE. Funduscopic examination showed edematous optic disc in RE and Humphrey test showed altitudinal pattern with VFI 77%. Laboratory examination also revealed unsatisfactory results of various parameters.

Table 1. Ocular examination from initial visit to 3rd month follow up

	Initial Visit	1st month follow up	3rd month follow up
OD	VA 6/7,5	VA 6/7,5	VA 6/12
	RAPD -	RAPD -	RAPD -
OS	VA 3/60	VA 6/60	VA 6/45
	RAPD +	RAPD +	RAPD +

Table 2. Laboratory results from initial visit to 3rd month follow up

Laboratory Exam	Initial visit	1st month follow up	3rd month follow up
Fibrinogen	464	401	347
D Dimer	660	440	338
Total Cholesterol	326	197	291
Triglyceride	321	143	234

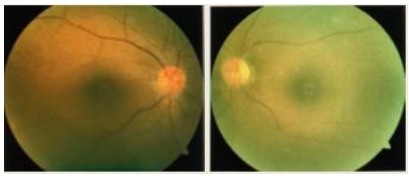

Figure 1. Funduscopy at initial visit
LE : Segmented disc atrophy

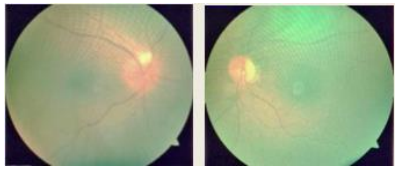

Figure 4. Funduscopy at at 1st month follow up
LE : Segmented disc atrophy

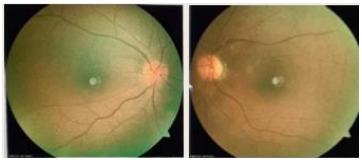

Figure 7. Funduscopy at 3rd month follow up
RE : Optic disc edema

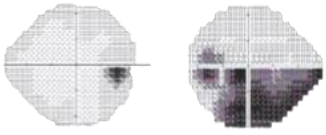

Figure 2. Humphrey ODS at initial visit.
LE : Visual field defect with altitudinal pattern OS, VFI 63%
RE : VFI OD 99%

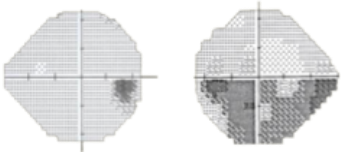

Figure 5. Humphrey ODS at 1st month follow up
LE : Visual field defect with altitudinal pattern, VFI 75%
RE : VFI OD 95%

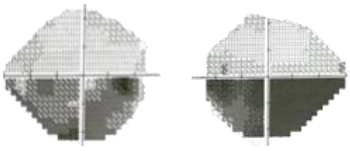

Figure 8. Humphrey ODS at 3rd month follow up
LE : Visual field defect with altitudinal pattern VFI 50%
RE : VFI 77%

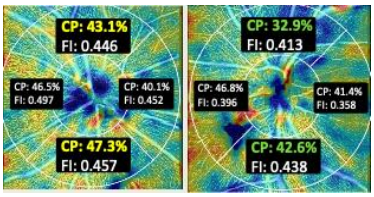

Figure 3. OCTA ODS at initial visit.
LE : Decreased capillary perfusion (CP) in superior and inferior region (green)
RE : Within normal limit (yellow)

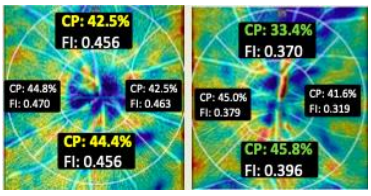

Figure 6. OCTA ODS at 1st month follow up
LE : Improved CP
RE : Slightly decreased CP in superior and inferior region

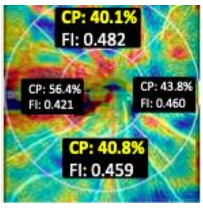

Figure 9. OCTA OD at 3rd month follow up
RE : More profound CP reduction in superior and inferior region compared to 1st month follow up

DISCUSSION

The etiology of NAION is known to be an ischemia due to occlusion of short posterior ciliary arteries causing to decreased optic nerve head perfusion. Arterial hypertension, dyslipidemia, diabetes mellitus (DM) and hypercoagulation are some of risk factors that may predispose to the occlusion process. Study from Ischemic Optic Neuropathy Decompression Trial (IONDT), reported that 60% of NAION patients had at least one vascular risk factor, 47% had hypertension and 26% had diabetes mellitus.[12] Other studies also identified that hypertension, diabetes mellitus, hypercoagulable states, hyperlipidaemia, smoking and sleep apnea are associated with NAION.[6,8] NAION usually affects people more than 50 years old, although some studies showed the mean age of onset ranging from 57 to 65 years old. Other than systemic risk factor, ocular risk factor such as small cup-disc ratio or crowding cup, may contribute to NAION.[5,6] Almost all patients who develop NAION have at least one underlying vascular risk factor that may or may not be known during patient admission.[15] Our patient has diabetes mellitus (HbA1c 9.4%), dyslipidaemia, and hypercoagulable states (Table 2) as risk factors that may contribute to NAION.

Hypercoagulable states as a risk factor of NAION have been reported in several prior studies. It was stated that NAION is associated with antiphospholipid antibodies, protein C deficiency, anti-thrombin III deficiency and tissue plasminogen activator deficiency.[16,17] Nagy et al, found that NAION patient has elevated p-selectin which indicates an increase in platelet activation.[18] Talks et al, reported that there was a significant association between incidence of NAION and raised level of fibrinogen which may affects whole body viscosity by increases activity of monocytes and macrophages, also platelet aggregation.[19,20] Thus will leads to thrombotic vascular occlusion. In a review by Biousse, routine examination for hypercoagulation is suggested for NAION patient who do not have any other risk factors. [21]

The typical symptoms of NAION are acute unilateral painless vision loss accompanied by sector or diffuse optic nerve edema. Patient may describe the vision loss as a “dim or blur”. NAION is a multifactorial disease, it appears that systemic disease such as hypertension, diabetes mellitus, and hypercholesterolemia might increase patient’s risk of NAION. Other risk factors are smoking, obstructive sleep apnea, hypercoagulable states. These are in line with our case, the patient had all of the risk factors, and patient’s age is similar to previous study.[22]

The therapy of NAION still remains an open question. As mentioned before, most treatments proposed for NAION are empirical and include a wide range of agents presumed to act on thrombosis, on the blood vessels, on the disc edema itself or to have a neuroprotective

effect.[14] Managing NAION risk factors is important to reduce the risk of NAION in the fellow eye or progressing of NAION in the same eye.[8]

Prior study using animal models show that therapeutic windows for NAION is 2-3 weeks.[23] Within 2 weeks of onset, most of NAION patient have an optic disc edema; therefore systemic steroids is recommended for a faster resolution of the optic disc.[5,24,25] In line with previous study, oral steroids did improve the resolution of disc edema, in turn, would reduce compression of capillaries in the optic nerve head and improve blood flow, restoring the function of surviving but non-functioning ischemic axons and improve the visual acuity.[14,26,27]

Because NAION is an ischemic disorder occurring mostly in elderly patient who often have cardiovascular risk factor, most practitioners recommend aggressive risk factor management and anti-platelet therapy.[14] Several prior studies had been evaluated aspirin in the prevention of fellow eye NAION occurrence. A large retrospective study found that aspirin is failing to show benefit in reducing fellow eye NAION occurence.[28] Other studies showed different result that aspirin may be effective in reducing fellow eye involvement. Therefore, Atkins et al suggested that it seems reasonable to recommend aspirin to NAION patient who have cardiovascular risk factors.[14]

Our patient was given antidiabetic medication, antiplatelet 80 mg, anticoagulation 10 mg and statin 10 mg. Systemic corticosteroid was not given to the patient because funduscopic examination showed optic disc atrophy instead of optic disc edema. In 1 month follow up, patient showed improvement both in ocular examinations and laboratory results. We advised to continue follow up but he did not comply. At 2 months after the first visit, he presented with visual loss at right eye and edematous disc was noticeable during funduscopic examination. The IONDT reported that the incidence of fellow eye involvement was 15% at 5 years after the first eye affected. Increase incidence of fellow eye involvement is associated with poor baseline visual acuity in the study eye and diabetes. In addition there is no significant association between age, sex, aspirin use or smoking to NAION incidence in the fellow eye.[12] Another study that showed 29 patients out of 119 developed NAION in the fellow eye with mean follow up period ranging from 1 month – 1 year. These prior studies are in line with our patient who present with NAION at the fellow eye.

Prior study found that some structural changes happened in the unaffected fellow eye of NAION patient. A study by Duman et al assessed the ganglion cell complex (GCC) thickness, retinal nerve fiber layer thickness (RNFL) and optic disk features in NAION patients and compared between the affected eye, unaffected fellow eye and with healthy control eye.[29] Mean GCC and RNFL thickness significantly decreased in unaffected fellow eye compared to healthy

control eye, despite no significant mean optic disk differences between it. Another study, that the presence of bilateral optic disc drusen (ODD) was a risk factor for fellow eye in NAION.[30] From these results, it is proven that structural changes already happened in unaffected fellow eye of NAION patient. Therefore, managing the risk factors of NAION may crucial to halt the disease progression as well as involvement of the fellow eye.

CONCLUSION

Non-compliant behaviour of patient could be the risk factor for fellow eye involvement.

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