Asymptomatic fellow eye involvement in non-arteritic anterior ischemic optic neuropathy

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INTRODUCTION

- Non-arteritic anterior ischemic optic neuropathy (NAION) **is the most common** acute **optic neuropathy in older adults** [1].
- NAION is presumed to occur due to **hypoperfusion** of ONH which is supplied by short posterior ciliary arteries[2]. Once NAION occurs in one eye, the risk of fellow eye involvement in the next 5 years has been reported to be approximately **15%**, however, **recurrent episodes** in the previously affected are **very uncommon**[3,4].
- When studies analyzed VFs in the "**unaffected" fellow eye** in patients presenting with acute NAION, they **were often found to have a VF defect**[5,6].
- In our study we reviewed all cases of acute NAION seen over 5 years in a single neuro-ophthalmology practice to determine the **frequency VF defects in the fellow asymptomatic eye**. We then determined which VF defects were **consistent with a presumed episode of asymptomatic NAION in the fellow eye.**
- We also determined whether certain **patterns of VF defect were more likely to be asymptomatic.**

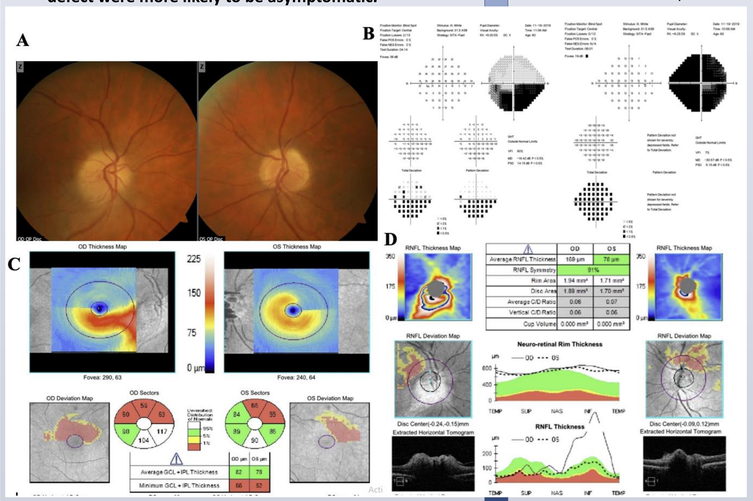

Figure 1. A- Fundus photo showing inferior disc edema OD and superior pallor OS. B- 24-2 Visual field testing demonstrating inferior field defect sparing fixation OS and diffuse field defect OD. C– OCT of the ganglion cell complex demonstrating thinning superiorly OU. D - OCT of the retinal nerve fibre layer demonstrating inferior disc edema OD and superior thinning OU.

MATERIALS AND METHODS

- **Retrospective chart review** of all patients in a single, tertiary university-affiliated neuro-ophthalmology practice from January 2016 to September 2021 with the diagnosis of acute NAION.
- **Data collected:** NAION risk factors (diabetes, hypertension, dyslipidemia, obstructive sleep apnea, and smoking history). Snellen visual acuity in each eye, ocular examination findings, mean deviation and shape of VF defect on Humphrey 24-2 perimetry in the symptomatic and fellow eye, OCT of the peripapillary retinal nerve fibre layer (RNFL) and ganglion cell complex-inner plexiform layer (GCC-IP) thickness.
- **VF defects were classified** into 3 main categories: diffuse, altitudinal (superior or inferior) and nerve fibre bundle defects (superior or inferior). VFs with more than 33% of fixation losses or over 15% false positives were considered unreliable and excluded from analysis.
- **Exclusion criteria:** Patients with no VF or OCT data, lack of follow-up or with ocular comorbidities that

RESULTS

190 patients who presented with **acute NAION** were included**. 139 had reliable VFs** and were included in the study. **10%** had clinical, visual field and OCT findings consistent with a **presumed previous NAION in the fellow eye (**see Figure 1).

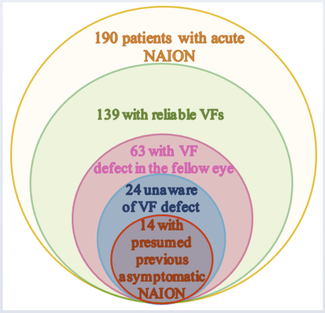

Figure 1. Graphic representation of patients included in the study according to VF.

When studying patients with sequential NAION which were symptomatic in both episodes compared to those had a previous asymptomatic episode, **we did not find differences in age, sex or risk factors** (Table 1).

Table 1. Demographic and clinical variables in patient with sequential non-arteritic anterior ischemic optic neuropathy.

	Bilateral Symptomatic	Bilateral-Fellow eye asymptomatic	p value
Male	27/40 (67.5%)	9/14 (64.3%)	1
Age (Mean ± SD)	71.0 ± 12.3	69.4± 9.2	1
Risk Factors			
Hypertension	21/40 (52.5%)	9/14 (64.3%)	0.65
Dyslipidemia	15/40 (37.5%)	5/14 (35.7%)	1
Diabetes	9/40 (22.5%)	1/14 (7.1%)	0.26
Obstructive sleep apnea	7/40 (17.5%)	2/14 (14.3%)	1
Smoking history	3/40 (7.5%)	0 (0%)	0.56

RESULTS

The **most frequent VF defect in asymptomatic eyes** was an **inferior altitudinal** defect. However, superior visual fields were almost 3 times more frequent in this group. **100%** of cases the VF defect in the asymptomatic fellow eye was in a hemifield where there was a new loss in the symptomatic eye. (Table 2).

Table 2. Prevalence of the different VF defects in symptomatic and asymptomatic eyes.

Visual Field Pattern	Symptomatic Eyes	Asymptomatic Eyes
Superior NFBD	12/180 (6.7%)	2/14 (14.3%)
Inferior NFBD	41/180 (22.8%)	1/14 (7.1%)
Superior and Inferior NFBD	9/180 (0.5%)	2/14 (14.3%)
Superior Altitudinal	8/180 (4.4%)	2/14 (14.3%)
Inferior Altitudinal	40/180 (22.2%)	7/14 (50%)
Superior and Inferior Altitudinal-fovea sparing	5/180 (2.8%)	0/14 (0%)
Diffuse	55/180 (30.6%)	0/14 (0%)
Other (paracentral, non-specific)	10/180 (5.6%)	0/14 (0%)

DISCUSSION

- **50%** of patients with asymptomatic fellow eye involvement presented with an **inferior altitudinal** defect sparing the centre of fixation.
- **100%** of patients with an **asymptomatic VF defect** occurred in a **hemifield which was now affected in the symptomatic eye.** This could be explained by the fact that the visual field of each eye **overlaps in the central 120** degrees with that of the fellow eye, and only when a field defect in the same area occurred in the fellow eye, they **became aware of the new deficit**.
- **Superior VF defects** were relatively **more prevalent in asymptomatic eyes** versus symptomatic eyes, in **28.6% versus 11.1%.** Theoretically, a superior VF defect is more easily disregarded.
- **We could not find a correlation** between the presence of obstructive sleep apnea, hypertension, diabetes, age or gender and probability of having had a previous episode

TAKE HOME MESSAGE

10% of patients with acute NAION had previous presumed asymptomatic NAION in the fellow eye.

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