



Study of Risk Factors, Clinical Profile and Visual Outcome in Cases Of Non-Arteritic Anterior Ischemic Optic Neuropathy (NA-AION) at Tertiary Care Centre in Bihar.

Dr Madhulika Sinha¹, Dr Niraj Diwakar², Dr Janardan³, Dr Sanjeev Bharti⁴

¹Senior Resident, Department of Ophthalmology, IGIMS Patna, Bihar, India.

²Senior Resident, Department of Neurology, IGIMS Patna, Bihar, India.

³Associate Professor, Department of Neurology, IGIMS Patna, Bihar, India.

⁴Senior Resident, Department of Ophthalmology, IGIMS Patna, Bihar, India.

Corresponding Author: Dr Niraj Diwakar, Senior Resident, Department of Ophthalmology, IGIMS Patna, Bihar, India.

(Received: 16 April 2024

Revised: 11 May 2024

Accepted: 11 June 2024)

KEYWORDS

Nonarteritic anterior ischemic optic neuropathy, NAION, visual acuity, hypertension, diabetes, ophthalmic evaluation, visual field defects, disc edema.

ABSTRACT:

Background

Nonarteritic anterior ischemic optic neuropathy (NAION) is an acute, painless monocular vision loss condition that primarily affects middle-aged and elderly individuals. Major risk factors include hypertension, diabetes, and nocturnal hypotension. Identifying and managing these risk factors is crucial due to the disease's guarded prognosis.

Methods

This prospective observational case series was conducted at a tertiary care center in Bihar. The study involved 20 eyes of 20 patients presenting with vision loss and disc edema. Comprehensive ophthalmic evaluations were conducted, including visual acuity, pupil assessment, color vision using the Ishihara chart, visual field assessment by Humphrey Field Analyzer (HFA), and fundus examination. NAION diagnosis was confirmed by the presence of relative afferent pupillary defect (RAPD), defective color vision, hyperemic or pallid disc edema, and visual field defects. Visual acuity was assessed at baseline and at six months follow-up. Statistical analysis was performed using SPSS software version 18.

Results

The mean age of patients was 58.50 ± 8.118 years, with a slight male predominance (52%). Hypertension (56%) and diabetes (68%) were the most common comorbid conditions. Inferior altitudinal visual field defects were the most prevalent (64%). Visual acuity improved significantly over six months ($P = 0.000$), with a three-line Snellen acuity improvement observed in 16% of patients. Better visual outcomes were associated with hyperemic disc edema and superior field defects, while poorer outcomes were linked to pallid disc edema and very poor initial visual acuity.

Conclusion

The study underscores the importance of managing systemic risk factors like hypertension and diabetes to improve visual outcomes in NAION patients. Despite the absence of specific treatments, controlling these risk factors may help reduce ischemic damage and prevent recurrence in the affected and fellow eyes.



Introductions

- Nonarteritic anterior ischemic optic neuropathy (NAION) is characterized by the acute painless monocular or rarely binocular loss of vision that may progress over several hours or days.
- It is more prevalent in middle-aged and elderly men and women. Hypertension, diabetes, and nocturnal hypotension are major risk factors.
- A small and crowded “disk at risk” may mechanically contribute to the vascular event.
- In the absence of definite treatment, it is important to find out the risk factors and control or treat them as the disease has a guarded prognosis.

Aim of the study

- to study the clinical profile and assess the relation of systemic risk factors as well as visual outcome in patients with NA-AION.

Materials and Method

- **Study Design** - This prospective observational case series study design.
- **Study group** – A total of 20 eyes of 20 patients present with vision loss and disc edema in OPD at IGIMS.
- **Study duration**- The study was carried out for a period of 6 months for each patients.
- **Sample collection**- Sample collection was done by application of inclusion and exclusion criteria on the patients presenting to the clinic, Informed consent was obtained from all patients.
- A detailed history regarding various risk factors proposed for the disease was taken.
- All patients underwent a complete ophthalmic evaluation which included visual acuity, pupil assessment, color vision using Ishihara chart, visual field by HFA whenever possible and fundus examination with + 90D lens, direct and indirect ophthalmoscopy.
- NAION was diagnosed by the presence of RAPD, defective colour vision, hyperaemic or pallid disc edema and visual field defects.

- Snellen acuity was converted into log MAR for statistical analysis. Visual acuity at 6 months follow-up and its outcome with comorbidities was analyzed.
- Visual improvement was considered when there was a three-line improvement in Snellen acuity. Statistical analysis was performed using SPSS software version 18.
- Chi-square test was done to find significance and odds ratio (OR) was calculated to find the systemic risk factors for poor visual outcome.

Inclusion Criteria

- All New Cases of optic disc oedema with history of sudden visual loss, confirmed to have NA-AION on direct ophthalmoscopy or 90D slit lamp biomicroscopy.
- Cases with optic disc related visual field defects, not due to glaucoma
- Cases with only background diabetic retinopathy (mild to moderate NPDR.).

Exclusion Criteria

- Cases with previous history of NA-AION in fellow eye.
- Cases with any retinal or optic nerve lesion affecting the visual outcome.
- Cases with diabetic retinopathy, with active neovascularization.
- Cases diagnosed to have glaucoma.

Result.

Age Groups	n.	%
40 – 50	4	16
51 - 60	14	56
61 – 70	5	20
71 - 80	2	8

- ❖ The mean age of presentation was 58.50 +/- 8.118, out of which 13 male(52%) and 12 female(48%).
- ❖ Rt eye was more commonly involved (58%) compared to left eye.
- ❖ There was no gender predilection in this study, finding similar to Miller and Arnold et al.



However other studies by Repka et al found males to have increased risk of developing NA AION.

Comorbidity Present n% Absent n%. Controlled n% Uncontrolled n%. OR. 95%CI

Hypertension	14(56%) 8(57.14%).	11(44%) 0.243-30.664	6(42.85%).
Diabetes	17(68%) 9 (52.94%)	8 (32%). 0.131-17.180	8(47.05%)
Dyslipidemia		2(8%)	23(92%)
	1.211	1.004-1.460	
Hypotension.		2 (8%)	23(92%)
	1.211	1.004-1.460	
Smoking		3(12%)	22(88%).
	1.222	1.004-1.488	

❖Hypertension and Diabetes were the most common co morbid condition associated with NA AION.

❖Odds ratio was calculated to find the strength of association of various risk factors. these findings were similar to Repka et al & Hayreh et al.

Visual field defect versus initial vision and vision at 6 months

Type LogMAR	n(%) LogMAR	Mean
V1±SD	V6±SD	
Superior altitudinal ± 0.173	3(12) 0.2 ± 0.173	0.2
Inferior altitudinal. ± 0.275	16(64) 0.7 ± 0.413	0.8
Central. ± 1.55	3(12) 1.533 ± 1.36	2.1
Others. ± 0.00	3(12) 2.133 ± 0.808	3
P		0.000
0.002		

The most common field defect in this study was inferior altitudinal. Similar results were seen in Han et al and Hayreh et al.

Greatest reduction in initial vision loss was seen in patients with the central visual loss

- In our study, 18 patients (72%) had a presenting visual acuity of 6/6- 6/60, whereas 7 patients (28%) had an initial vision of 5/60 or less. This was similar to the finding of Hayreh et al. where 49% had initial acuity of more than or equal to 20/30 and 23% had $\leq 20/200$.

- We found that mean logMAR vision at presentation was 1.048+/-0.802 and vision after 6 months follow-up improved to 0.900+/-0.694 as seen by Hayreh et al and Dickersin et al.

- Initial group mean acuity was compared to final mean acuity at 6 months using t-test, and it was statistically significant (P = 0.000).

- A three-line Snellen acuity visual improvement was noted in four patients (16% in our study after 6 months without any specific treatment).

Conclusion

- In our study favorable visual outcome in NAION were female gender, hyperemic disc edema and superior field defect.

- The poor visual outcome was seen patients who had pallid disc edema and very poor initial visual acuity.

- Associated comorbidities such as hypertension diabetes increased the risk of visual loss.

- As there is no established treatment or NAION, we can control the modifiable risk factors for the disease which further reduce the ischemic insult to some extent in the affected eye as well as prevent

recurrence and occurrence of such an event in the fellow eye.

Reference:

1. Desai N. Nonarteritic Anterior Ischemic Optic Neuropathy. J Clin Hypertens. 2005;7:130–133.
2. Hayreh SS. Acute ischemic disorders of the optic nerve: pathogenesis, clinical manifestations and management. Ophthalmol Clin North Am. 1996;9:407-42.
3. Beck RW, Servais GE, Hayreh SS. Anterior ischemic optic neuropathy: IX. Cup-to-disc ratio and its role in pathogenesis. Ophthalmology. 1987;94(11):1503-8.



4. Hayreh SS. Role of nocturnal arterial hypotension in the development of ocular manifestations of systemic arterial hypertension. *Current Opinion in Ophthalmology*. 1999;10(6):474-82.
5. Hayreh SS, Zimmerman MB. Nonarteritic anterior ischemic optic neuropathy: natural history of visual outcome. *Ophthalmology*. 2008;115(2):298-305.
6. Cullen JF. Optic neuritis in Southeast Asia: a different pattern of disease. *Asian Journal of Ophthalmology*. 2011;12(4):216-7.
7. Kaufman D, Dickersin K, Kelman S, Langenberg P, Newman N, Wilson PD. Ischemic optic neuropathy decompression trial: twenty-four-month update. *Archives of Ophthalmology*. 2000;118(6):793-8.
8. Wolff E. Orbit and eyelids. *Wolff's Anatomy of the Eye and Orbit* Eighth edition. 1997:489-536.
9. Joseph F. Embryology, Anatomy and Physiology of Afferent visual pathway. *Walsh and Hoyt's Clinical Neuro Ophthalmology* Sixth edition. 2004:24-35.
10. Morgan WH, Yu DY, Cooper RL, Alder VA, Cringle SJ, Constable IJ. The influence of cerebrospinal fluid pressure on the lamina cribrosa tissue pressure gradient. *Investigative Ophthalmology & Visual Science*. 1995;36(6):1163-72.
11. Tian GH, Jia N, Lu CF. Clinical characteristics of non-arteritic anterior ischemic optic neuropathy. 2009;45(12):1064-7.
12. McCulley TJ, Lam BL, Feuer WJ. Incidence of nonarteritic anterior ischemic optic neuropathy associated with cataract extraction. *Ophthalmology*. 2001;108(7):1275-8. Hayreh SS. Ischemic optic neuropathy. *Progress in retinal and eye research*. 2009;28(1):34-62.
13. 14. and eye research. 2009;28(1):34-62.