

## Visual Field Improvement in Non-Arteritic Posterior Ischemic Optic Neuropathy in a Patient Treated with Intravenous Steroids

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### Abstract

### Case Report

A 50-year-old man presented with a nasal visual field defect in the left eye. His medical history was unremarkable. On ophthalmic examination, his best-corrected visual acuity (BCVA) was 1.2 in both eyes. Fundoscopy revealed no abnormalities in either eye. Goldmann visual field test showed a nasal visual field defect in the left eye. The patient was diagnosed with NPION of the left eye and was followed up without treatment. However, four days after the initial visit, his BCVA decreased to counting finger in the left eye. Goldmann visual field test showed a complete nasal visual field defect with central absolute scotoma. Following admission, the patient was treated for 3 days with intravenous methylprednisolone pulse therapy. Three months later, his BCVA was improved to 0.8 in the left eye, but central relative scotoma was remained. Six months later, his BCVA was maintained at 0.8, and central relative scotoma was disappeared. However, the optic disc looked diffusely pale in the left eye. This case highlights that steroid therapy is an option for severe cases with posterior ischemic optic neuropathy.

**Keywords:** Non-arteritic posterior ischemic optic neuropathy, visual field, steroid pulse.

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## INTRODUCTION

Posterior ischemic optic neuropathy is a disorder of reduced blood flow to the retrobulbar optic nerve, usually of acute onset. This condition can be classified as surgical, arteritic or non-arteritic [1-3]. Use of high dose systemic steroids to treat non-arteritic posterior ischemic optic neuropathy (NA-PION) results in improved visual acuity [1-3]. However, steroid therapy is not universally successful.

In the current case, visual fields as well as visual acuity were improved in a patient with NA-PION treated with intravenous steroids.

## CASE REPORT

A 50-year-old man presented with a nasal visual field defect in the left eye. His medical history was unremarkable. On ophthalmic examination, his best-corrected visual acuity (BCVA) was 1.2 in both eyes. Fundoscopy revealed no abnormalities in either eye (Figure 1A, B).

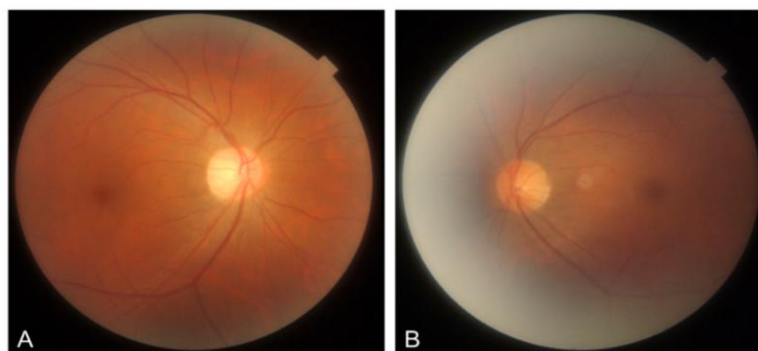
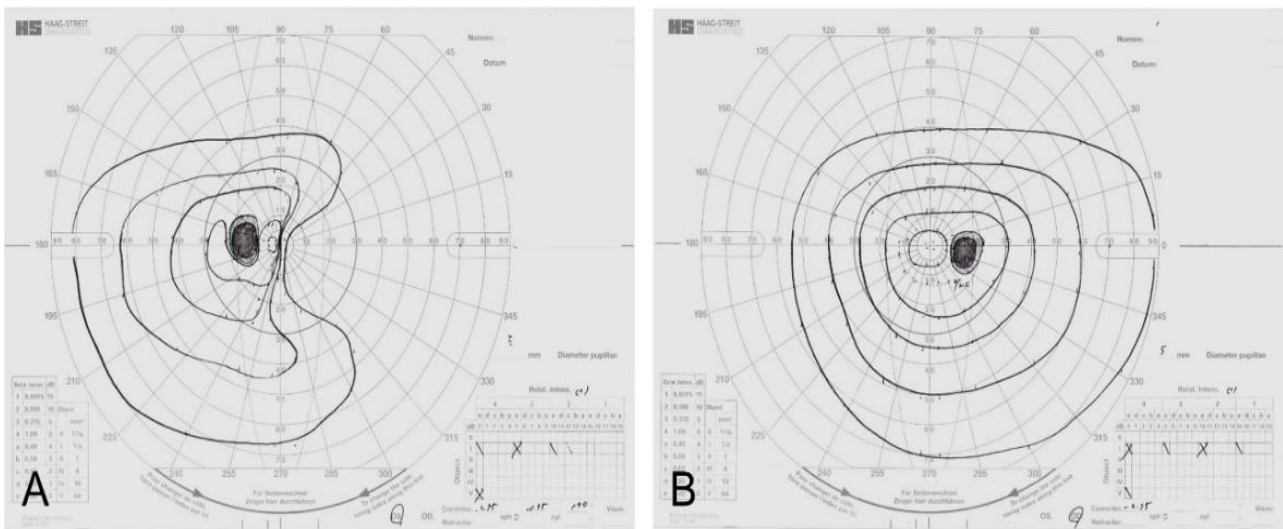


Figure 1: Fundus photograph of the right (A) and left (B) eyes

Funduscopy revealed no abnormalities in either eye.

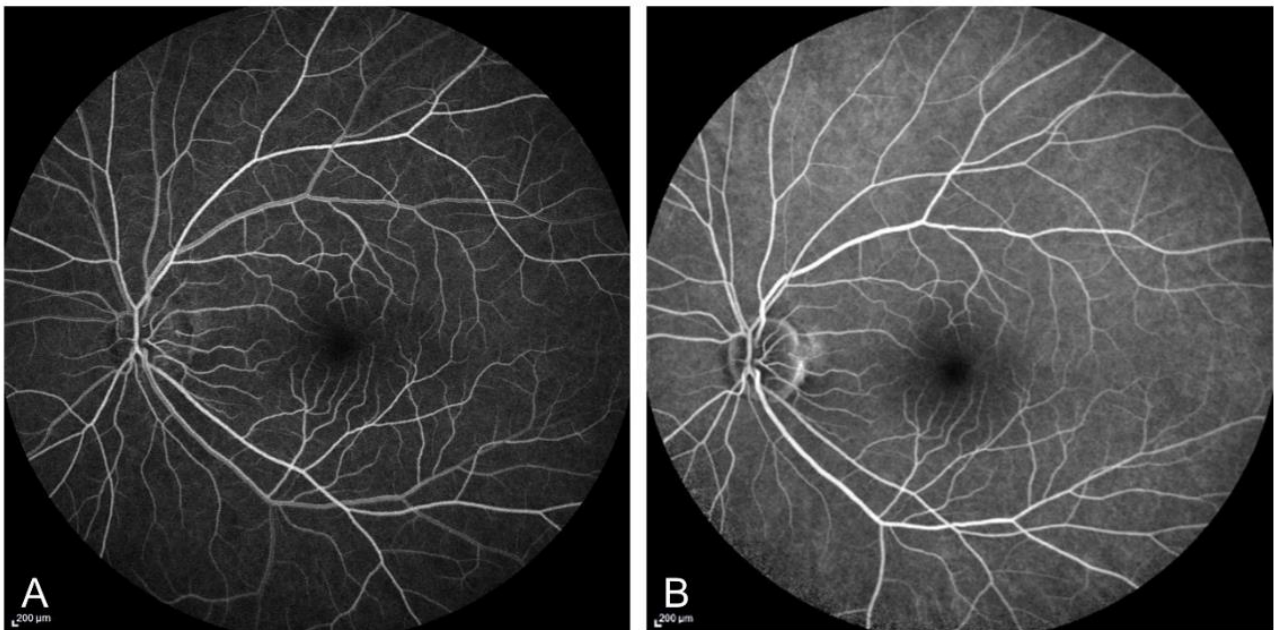
Goldmann visual field test showed a nasal visual field defect in the left eye (Figure 2B).



**Figure 2: Goldmann perimetry of the left (A) and right (B) eyes**

Note a nasal visual field defect in the left eye.

Fluorescein angiography revealed no abnormalities in either eye (Figure 3A, B).

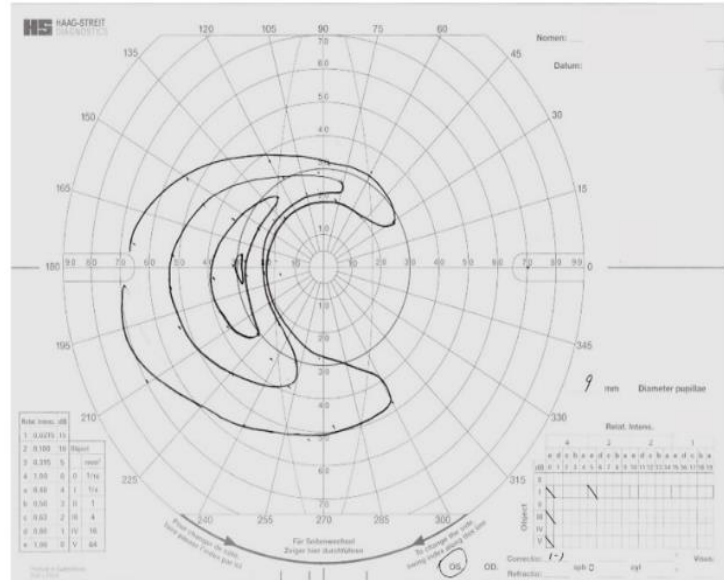


**Figure 3: Early (A) and late (B) phase fluorescein angiography of the left eye**

Fluorescein angiography revealed no abnormalities in either eye.

The cranial MRI finding was unremarkable. The patient was diagnosed with NA-PION of the left eye and was followed up without treatment. However, four

days after the initial visit, his BCVA decreased to counting finger in the left eye. Although funduscopy revealed no optic disc swelling (Figure 4), Goldmann visual field test showed a complete nasal visual field defect with central absolute scotoma (Figure 4).

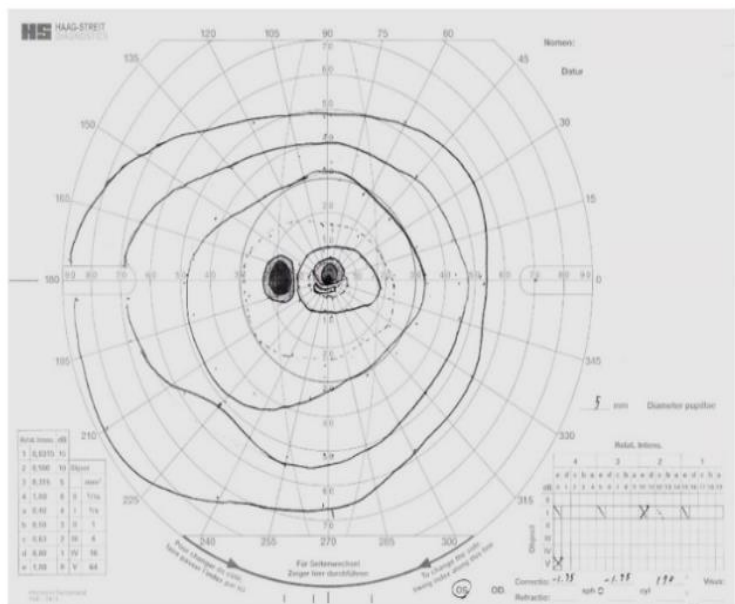
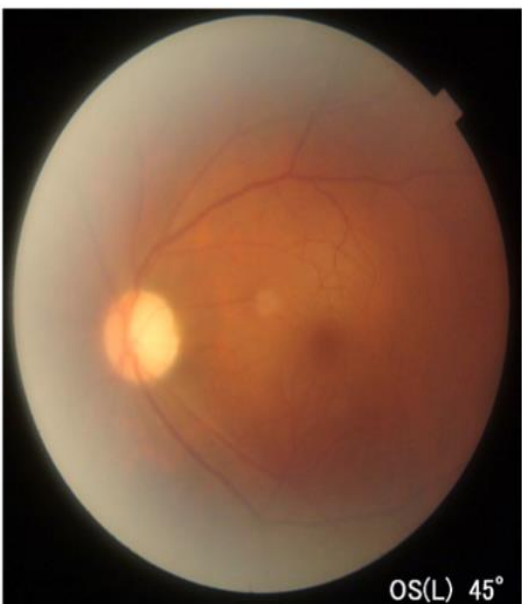


**Figure 4: Fundus photograph and Goldmann perimetry of the left eye**

Note central absolute scotoma in the left eye.

He was diagnosed with advanced NA-PION. We informed to the patient that there is no evidence-based treatment for PION, but we choose steroid pulse therapy for severe visual loss. Following admission, the

patient was treated for 3 days with intravenous methylprednisolone pulse therapy (1000 mg/day). Three months later, his BCVA was improved to 0.8 in the left eye, but central relative scotoma was remained (Figure 5).

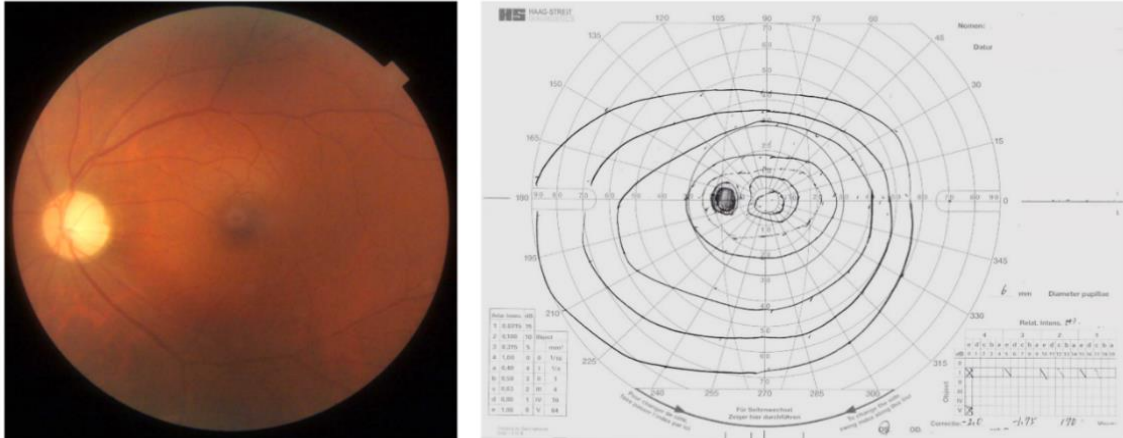


**Figure 5: Fundus photograph and Goldmann perimetry of the left eye**

Note improvement of visual field defect and central relative scotoma.

Six months later, his BCVA was maintained at 0.8, and central relative scotoma was disappeared. However, the optic disc looked diffusely pale in the left eye (Figure 6).





**Figure 6: Fundus photograph and Goldmann perimetry of the left eye**

Note optic atrophy developed and central scotoma was disappeared.

## DISCUSSION

The purpose of this case report is to present further evidence, which includes improvement in visual fields, for the use of intravenous steroids in the treatment of NA-PION.

NA-PION is a disorder of reduced blood flow to the retrobulbar optic nerve [1-3]. Use of high dose systemic steroids to treat NA-PION results in improved visual acuity [1-3]. However, steroid therapy is not universally successful. Prostaglandin E1 (PGE1) given intravenously together with steroids has been successfully used to treat cases of NA-PION and acute non-arteritic anterior ischemic optic neuropathy (NA-AION) [4, 5]. In the current case, intravenous steroids were immediately started as soon as the patient was diagnosed with NA-PION, resulting in an improvement in visual fields and visual acuity. Steroid therapy is, however, not universally accepted. A more recent study using high-dose systemic steroid treatment in acute NA-AION noted no visual or anatomic benefit and some serious complications due to steroids [6].

The role of systemic steroid therapy in PION was evaluated in the study by Hayreh [2, 3]. That showed that the eyes of patients treated with high dose systemic steroid therapy during the very early stages of the disease showed significant improvement in visual acuity and visual field, compared to untreated eyes. In addition, the magnitude of visual acuity and visual field improvement was much greater in the treated group than the untreated group. Thus, it is clear that aggressive systemic steroid therapy has a beneficial effect on visual function during the very early stages of the disease. However, spontaneous improvement in visual acuity and visual field may also occur to some extent in some eyes without steroid therapy. Sadda *et al.*, [1] reported that visual acuity improved in 34%, remained stable in 28% and

worsened in 38%; in that study, however, there is no mention whether any of their patients were treated or not.

## CONCLUSION

This case highlights that steroid therapy is an option for severe cases with posterior ischemic optic neuropathy. The addition of steroids may help to reduce damage from ischemia-reperfusion injury, but this point needs to be evaluated further.

## REFERENCES

- Sadda, S. R., Nee, M., Miller, N. R., Biousse, V., Newman, N. J., & Kouzis, A. (2001). Clinical spectrum of posterior ischemic optic neuropathy. *American journal of ophthalmology*, 132(5), 743-750.
- Hayreh, S. S. (2004). Posterior ischaemic optic neuropathy: clinical features, pathogenesis, and management. *Eye*, 18(11), 1188-1206.
- Hayreh, S. S. (2009). Ischemic optic neuropathy. *Progress in retinal and eye research*, 28(1), 34-62.
- Steigerwalt, R. D., Cesarone, M. R., Belcaro, G., De Angelis, M., Pascarella, A., & Nebbioso, M. (2011). Non-arteritic posterior ischaemic optic neuropathy treated with intravenous prostaglandin E1 and oral corticosteroids. *Neuro-ophthalmology*, 35(2), 81-84.
- Steigerwalt, R. D., Cesarone, M. R., Belcaro, G., Pascarella, A., De Angelis, M., & Bacci, S. (2008). Nonarteritic anterior ischemic optic neuropathy treated with intravenous prostaglandin E1 and steroids. *International Journal of Angiology*, 17(04), 193-196.
- Rebolleda, G., Pérez-López, M., Casas-Llera, P., Contreras, I., & Muñoz-Negrete, F. J. (2013). Visual and anatomical outcomes of non-arteritic anterior ischemic optic neuropathy with high-dose systemic corticosteroids. *Graefes archive for clinical and experimental ophthalmology*, 251, 255-260.