# Non-Arteritic Anterior Ischaemic Optic Neuropathy in a Patient with Bilateral Carotid Plagues Following Coronary Artery Bypass Surgery

N. Ezhilvathani[1*], Sanjay Theodore[2], Siddartha[3]

{[1,2]Associate Professor, Department of Ophthalmology, Pondicherry Institute of Medical Sciences, Ganapathychettikulam, Kalapet}

{[3]Private Consultant} Pondicherry, INDIA.

[*]Corresponding Address:

ezhilvathani@sify.com

***Research Article***

***Abstract:*** Anterior ischemic optic neuropathy (AION), a rare cause of visual loss in patients following non-optical surgery. One of the etiologies includes pre-existing carotid artery disease and hypotension. A case of Non-Arteritic AION following coronary artery bypass surgery (CABS) is being reported. A 63 year old man, presented with complaints of sudden, painless, diminution of vision in left eye following CABS 20 days ago, from first postoperative day. Vision was normal in right eye and diminished with RAPD and colour vision defects in left eye. Bjerrum's screen revealed altitudinal field loss in left eye. Computerized Humphrey field analysis revealed bilateral altitudinal field loss.

***Keywords:*** Altitudinal field loss, hypotension, Computerized Humphrey field analysis

## Introduction

Anterior ischemic optic neuropathy (AION) is a disease describing the infarction of optic nerve head, characterized by sudden painless loss of vision due to optic disc edema, resolving to optic atrophy, in patients having cardiac surgery with cardiopulmonary bypass [1, 2]. The incidence of AION, in cardiac surgery differs between 0.06% and 1.3% [2, 3]. The etiology of AION following cardiac surgery with cardiopulmonary bypass is believed to be multi-factorial such as, hypotension, peri-operative uncontrolled diabetic status, micro-embolisation, glaucoma or other ophthalmological problems and pre-existing carotid artery disease. AION clinically is of two types: (1) that due to giant cell arteritis (Arteritic AION: A-AION) and (2) Non-arteritic AION (NA-AION), the more common of the two, is one of the most prevalent and visually crippling diseases in the middle-aged and elderly, and is potentially bilateral. NA-AION is a multi factorial disease, with many risk factors collectively contributing to its development. Although there is no known treatment for NA-AION, reduction of risk factors is important in decreasing chances of involvement of the second eye and further episodes. We report a case of NA-AION following coronary artery bypass surgery.

## Report

A 63 year old man presented with complaints of sudden painless diminution of vision in his left eye, following coronary artery bypass surgery since 20 days, which the patient had been experiencing since the first post-operative day of surgery. Patient was a known diabetic and hypertensive since 3 years. He had developed a myocardial infarction 3 months ago. On evaluation of the visual acuity, patient was found to have 6/6 visual acuity in right eye and a visual acuity of 3/60 improving to 6/36 in left eye. Anterior segment evaluation revealed a normal direct and a sluggish consensual light reflex response in the right eye while a RAPD light reflex in left eye was detected. Posterior segment evaluation was normal in the right eye and revealed a sectoral pallor of the disc in left eye. Colour vision was defective in left eye and the full field evaluation by Bjerrums screen revealed the typical inferior altitudinal field loss in left eye. But on computerized Humphrey field perimetry, patient was also found to have an altitudinal field loss of milder sensitivity in the right eye also. ESR, C-reactive protein and a carotid Doppler was ordered. C-reactive protein was elevated to – 8 mg/1 and ESR was 30 mm in 1 hour. Carotid Doppler revealed a calcified plaque in right carotid bulb extending into the proximal internal carotid artery causing 46% stenosis. It was not a haemodynamically significant stenosis. A calcified plaque is seen in the left carotid bulb extending into the left proximal internal carotid artery causing 70% stenosis which is found to be haemodynamically significant. Patient was started with systemic steroid in the dose of 1 mg/kg body weight, T. Ecospirin 75 mg along with neurovitamins. On review after 15 days, patients' visual acuity remained the same.

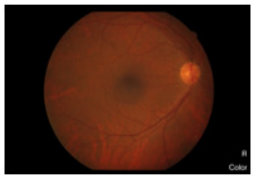


***Figure 1:*** Right eye

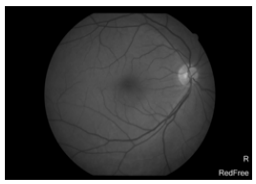


***Figure 2:*** Left eye

Fundus colour photograph and red free photograph of right eye eye and left eye showing sectoral pallor in left eye (figure 1 and 2)

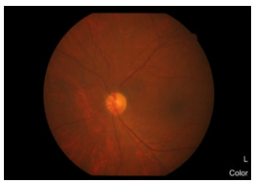


***Figure 3:*** Right eye

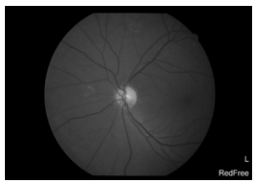
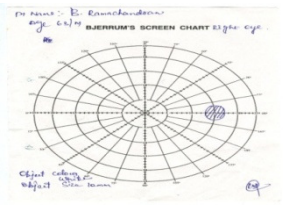


***Figure 4:*** Left eye

The typical altitudinal field loss of AION in the left eye by Bjerrum's screen (figure 3 and 4)



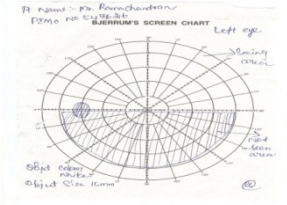
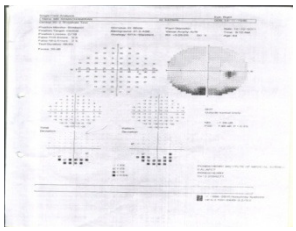




***Figure 5:*** Bilateral altitudinal field loss in both right and left eye by computerised Humphrey field analysis A



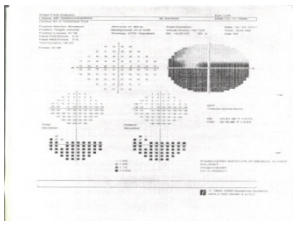


***Figure 6:*** Calcified plaques in both right and left internal carotid artery, more significantly in the left ICA by color Doppler (figure 7.1, 7.2 and 8.1, 8.2)

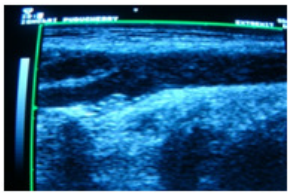


***Figure 7.1:*** Rt. carotid bifurcation

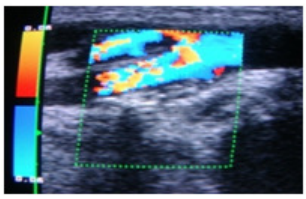


***Figure 7.2:*** RCA bifurcation with color Doppler

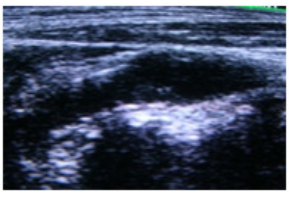


***Figure 8.1:*** Left internal carotid plaque

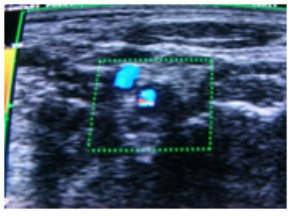


***Figure 8.2:*** Left internal carotid plaque with color Doppler

## Results and Discussion

The development of AION after cardiopulmonary bypass was first described in 1982 by Sweeny *et al* [2]. The incidence of AION, in cardiac surgery differs between 0.06% and 1.3% [2,3]. AION usually affects patients over the age of 50 years. It is an important cause of visual loss in this age group; any recovery of vision is unusual and no treatment has been shown to aid recovery [1]. The pathogenesis is most likely multi factorial. Peri-operative hypo or hypertension, peri-operative irregular blood sugar values, Glaucoma, prolonged CABS time, myocardial ischemia, the risk for micro-embolization during aortic cannulation and clamping, the CABS-related

inflammatory response, excessive haemodilution with low Hgb and Htc,, systemic Hypothermia and the need for vasoactive medication are commonly associated disorders [2,,4,5]. In this case, there is no indication of prolonged CABS time because the CABS were done with a beating heart – off pump. There was no intra-op myocardial ischaemia. The patients' haemoglobin level was 14.2 gm% and the post-op Hb was 9.3 gm%. There was no excess haemodilution as the patient had received only 2 pints of ringer lactate, 1 pint of hydroxyl ethyl starch and 1 pint of autologous blood. The patients' blood sugar levels and Hgb A1C were not in high risk group. There was no evidence of systemic hypothermia in this case. 0.05 micro gm/kg/hr of nor-adrenaline was used as the vaso-active medication which is of negligible dosage. The pre-op BP was 140/80 mm Hg and the peri-op Bp was 100/60 mm Hg. The location of the watershed zone in relation to the Optic nerve head (ONH) is an extremely important subject in any discussion of ischaemic disorders of the ONH. This is because in the event of fall of perfusion pressure in the Posterior ciliary arteries (PCA) or their branches the part of the ONH located in the watershed zone becomes vulnerable to ischaemia as shown by studies. [6] Derangement of the auto regulation in the ONH may be produced by many known, and perhaps some unknown, systemic and local causes, including the aging process, arterial hypertension, diabetes mellitus, marked arterial hypotension from any cause, arteriosclerosis, atherosclerosis, and hypercholesterolemia. [7] Thus, according to the available evidence, [8, 9] ischaemic optic neuropathy is multi factorial in origin, particularly non-arteritic AION (NA-AION). Each patient with NA-AION may have a unique combination of systemic and local factors which together produce it internal carotid artery disease can contribute to development of NA-AION either by embolism or by lowering the perfusion pressure because of marked stenosis. [10] In conclusion, in this case, the major causes of the Non-arteritic AION were 3-year history of DM and hypertension, the presence of right carotid plaque, a haemodynamically significant left carotid plaque and a peri-operative hypotension.

## Key Points and Conclusion

- Anterior Ischaemic optic neuropathy represents an acute ischaemic disorder of the optic nerve. AION is a rare but a severe complication since no effective treatment is available.
- The incidence of AION, in cardiac surgery is rare and the incidence differs between
- 0.06 % and 1.3 %.
- In this case, the cause of NA-AION is found to be the pre-existing presence of right carotid plaque and a haemodynamically significant left carotid plaque with a peri-operative hypotension. There is no evidence of embolic etiology or haemodilution, making a diagnosis of Non-arteritic AION due to hypoperfusion of optic nerve head and stressing the importance of careful monitoring of the per-operative blood pressure especially the nocturnal hypotension and pre-operative evaluation of the carotids or intra-operative management of the carotid plaques.

## Acknowledgments

Prof. Roshini Koshi, HOD, Department of Radiology, Mrs. Gomathi, Ophthalmic technician, the patient and his family.

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