Abstract. – Purpose/Method: To present a 72-year-old woman affected by non-arteritic anterior ischemic optic neuropathy (NA-AION). To our knowledge, this clinical case, showing a bilateral form of NA-AION, is uncommon as only very few similar reports have been published in the scientific literature at this time.

Results/Conclusions: Visual acuity was reduced to 6/20 in both eyes, color vision was absent and computerized perimetry showed an absolute and general reduction of the retinal sensitivity within 30° around the fixation point. Pattern visual evoked potentials and pattern electroretinograms showed normal morphologies but delayed latencies and reduced amplitudes. An updated review of the literature has also been done.

Key Words: Non-arteritic anterior ischemic optic neuropathy, Optic disc atrophy, Optic disc oedema, Visual field defect, Retina.

Introduction

Ischemic optic neuropathy represents an acute disorder of the optic nerve and may be clinically classified in two main groups: the anterior ischemic optic neuropathy (AION), involving the optic nerve head (ONH) as well as its posterior ciliary artery circulation, and the posterior ischemic optic neuropathy, involving the optic nerve posteriorly to the ONH1-3. The former is far more common than the latter. It is often not adequately appreciated that the AION is one of the most prevalent and visually crippling disease among middle aged and elderly people, and, even though in few cases only, may affect both eyes at the same time.

Moreover, the AION could be divided in an arteritic (A-AION) and a non-arteritic (NA-AION) form: the first one is due to Horton’s giant cell arteritis whereas the second one may be mainly recognised as a multifactorial disease, with many risk factors collectively contributing to its pathophysiology. In fact, NA-AION could be caused by several combined factors:

1. Increasing blood flow resistance, due to systemic and local causes including aging processes, arterial hypertension, diabetes mellitus, atherosclerosis, hypercholesterolemia or increased blood viscosity due to haematologic disorders4-6;
2. Arterial hypotension mainly caused by nocturnal arterial hypotension during sleep7,8 or by intensive antihypertensive medication;
3. Reduction of perfusion pressure – intended as the difference between the mean systemic blood pressure and the intraocular pressure (IOP) – which may be due to arterial hypotension but also to a relevant rise of the IOP.

Thus, according to the available evidence, ischemic optic neuropathy, and particularly the NA-AION, is a multifactorial disease: this means that each patient may have a special combination of systemic and local factors that all together may have caused it4-9. Finally, it should be emphasized that the management of NA-AION remains mainly unsatisfactory due to its uncertain etiopathogenesis and pathophysiology10,11.

In this paper, we present an unusual case of a 72-year-old woman affected by bilateral NA-AION. An updated review of this disease has also been done.

Case Report

S.M., a 72-year-old woman, came to our attention in 2003 complaining for myodesopsia
and reduction of visual acuity since 1991. The patient reported us to have been affected by AION in the left eye in 1991 and three months after in the right eye, both treated with retrobulbar steroid injections. From 2003, she is characterized by a moderate form of hypertension while other systemic parameters were within normal ranges. The patient has never smoked in her life.

Far best corrected visual acuity was 6/20 in both eyes (OU) while near visual acuity was J10 in OU. Slit lamp examination of the anterior segment showed only blefaritis and a lens sclerosis in OU. A relative afferent pupillary defect (RAPD) (so-called Marcus Gunn pupil) was present. The intraocular pressure was normal (14 mmHg) in OU. Fundus examination confirmed the suspected diagnosis of optic atrophy due to the recurrence of AION, having a papillary subatrophy in the right eye and a complete atrophy of the ONH in the left eye also associated with several bleedings at the posterior pole. Papillary atrophy was confirmed by computerized perimetry with an absolute and general reduction of the retinal sensitivity within 30° around the fixation point in OU (Humphrey System, program 30-2). Electrofunctional exams have also been done (pattern visual evoked potentials and pattern electroretinograms) and showed normal morphologies but delayed latencies and reduced amplitudes in OU. Colour vision was absent (Ishihara test).

Blood test underlined hypercholesterolemia and increased levels of fibrinogen and anti-cardiolipin antibodies (ACA), even if there was a normal platelet aggregation. Immunological examination, based on the suspected diagnosis of an antiphospholipid syndrome (APAS) and also to exclude the Horton’s giant cell arteritis, was negative. Lupus anticoagulant was borderline (1.18 Ratio) while antithrombin III, protein C and S, ANA, PCR, ACA, homocysteine were all within normal ranges. Finally, a genetic study of the patient has also been done, in order to check some potentially relevant markers of thrombophilia, obtaining the following results: homozygosis without mutation for the factor V Leiden G1691A and prothrombin gene G20210A; heterozygosis for the methylenetetrahydrofolate reductase (MTHFR) C677T.

The examination of the epiaortic vessels by means of colour Doppler ultrasonography was negative.

Discussion

In the USA, NA-AION is a severe form of visual impairment that is currently one of the main causes of visual deterioration in adults (above all females aged over 50 years) with an estimated yearly incidence up to 6000 people\textsuperscript{12-15}. It is generally recognised as an acute ischemic disorder of the ONH but could also be characterized by repeated events leading to a permanent visual impairment. This could also be due to some underlying systemic diseases such as diabetes, anaemia, arterial hypertension, vasculitis, use of oral contraceptives or migraine\textsuperscript{14,16,17}.

According to the literature, the ischemic damage could also be subclinical in some cases. It is demonstrated that in cases of NA-AION the risk of involvement of the second eye is about 25%, calculated on a 3 year-follow-up\textsuperscript{18}. On the contrary, a bilateral onset of NA-AION is extremely rare, except in cases with severe arterial hypotension (e.g., during cardio-pulmonary or extensive surgery with massive blood loss, haemodialysis, etc.). In those cases, a sudden and painless deterioration of vision, usually discovered on awaking in the morning, and a visual field defect are main clinical presentation symptoms of NA-AION. Patient may complain of intermittent blurred vision. Colour vision is usually affected and the presence of a RAPD could be a significant clinical sign of optic neuropathy\textsuperscript{19}.

Optic disc oedema (ODE) is a well-established initial clinical sign of acute NA-AION\textsuperscript{20}: the optic disc swelling may be more marked in one part of the disc than the other and splinter haemorrhages may be present at the disc margin very frequently. Gradually, as soon as the oedema decreases, the optic disc becomes pale. Initially, the colour of ODE in NA-AION does not differ from that due to other causes. However, in some cases there may even be hyperemia of the optic disc and the nerve fibre damage is often more extensive compared to the visual field defects or the visual acuity reduction. Moreover, it should be remembered that the distribution of the optic disc pallor does not always correspond with the extent and location of visual field defects and nerve fibre losses and that there could be sometimes a little or no relationship between the extent of the optic disc pallor and the severity of visual acuity loss.

In diabetics, during the initial stages of NA-AION, the optic disc oedema is usually associated with prominent and dilated vessels as well as
many peripapillary retinal haemorrhages. These findings may easily be mistaken for proliferative diabetic retinopathy associated with optic disc neovascularization and wrongly treated with pan-retinal photocoagulation.1,2

Multi-factor analysis showed in previous publications that worse initial visual field defects and worse visual acuity were associated with a faster resolution of ODE. Those patients treated with steroid therapy within 2 weeks after onset of NA-AION had significantly faster ODE resolution compared to untreated cases. In other words, the time for resolution of ODE is shorter in the presence of a greater severity of initial visual field defects and visual acuity loss. Steroid (systemic and/or retrobulbar) therapy was associated with a shorter resolution time of ODE.

Perimetry (Goldmann and computerized perimeter) is the most important test to determine the visual loss in AION. However, electrofunctional exams (pattern visual evoked potentials and pattern electroretinograms) may be of great importance in order to better evaluate the functional alteration of the optic nerve transmission.

Regarding the patient reported in this paper, she probably came to our attention after several years of recurrent ischemic events of NA-AION when her clinical outline was already compromised seriously, showing a bilateral optic atrophy, with a severe reduction of both visual field and visual acuity.

This patient showed a typical clinical outline of a multifactorial disease with several risk factors including age, systemic hypertension, hypercholesterolaemia, increased levels of fibrinogen and ACA and a small optic cup-to-disc ratio. These factors, including also homozygosis or heterozygosis for markers of thrombophilia (factor V Leiden G1691A, prothrombin gene G20210A, MTHFR C677T), are similar to those involved in the retinal venous occlusive diseases.2 The lack of important inflammation signs on the blood tests, and the discordant immunological outline after the first suspected diagnosis of APAS, forced us to suspect a probable ischemic origin of the disease, even though the examination of the epiaortic vessels by means of colour Doppler ultrasonography was negative.

In conclusion, NA-AION could gradually develop to an optic disc atrophy, sometimes even bilateral, with a severe reduction of visual field and visual acuity, being the final deterioration of vision mainly influenced by the recurrence of the attacks. This disease has an important social impact because of the multifactorial aetiology and the high percentage of affected patients that worse towards blindness. Nowadays the lack of an effective treatment for NA-AION, in order to improve the vision loss or to prevent the involvement of the fellow eye, underscores the need for a deeper understanding of its aetiology. Finally, it should be remembered that the oral anti-hypertensive therapy, if taken at bedtime, could represent an important and associated risk factor by increasing the normal fall of blood pressure during sleep (nocturnal systemic hypotension), thus resulting in a significant reduction of perfusion pressure at the ONH.

References


