Case report

Non-arteritic ischemic optic neuropathy and supplemental nitric oxide usage

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ABSTRACT

Purpose: To report a case of Non-Arteritic Ischemic Optic Neuropathy (NAION) in a middle-aged bodybuilder in excellent physiological condition without any signs or symptoms of vasculopathy and a history of nitric oxide supplement usage.

Observations: The patient had visual acuity of 20/25 in the right eye, and 20/30 in the left eye, with a relative afferent pupillary defect and dyschromatopsia in the right eye. Visual field testing with Humphrey perimetry demonstrated an inferior altitudinal field defect OD. Fundus examination showed a small cupless disc OD with mild pallor, and a small cupless disc OS. He denied usage of sildenafil or other phosphodiesterase (PDE) inhibitor medications but frequently ingested megadoses of nitric oxide (NO) as part of his bodybuilding regimen.

Conclusions: Nitric oxide supplements act through the same pharmacologic pathway as PDE inhibitors, and this case is suggestive that other vasodilating agents may be similarly associated with NAION.

1. Introduction

Non-arteritic ischemic optic neuropathy (NAION) has been associated with phosphodiesterase (PDE) inhibitors (i.e. Sildenafil) assumedly due to hypotensive effect and vasodilation, though a causal link has not been established. Many patients afflicted with NAION and taking PDE inhibitors often have confounding factors due to their poor physiologic health. Nitric oxide supplements act through the same pharmacologic pathway as PDE inhibitors through cGMP to mediate vasodilation.

Here, we report a case of a middle aged former athlete in excellent physiologic health, notably taking megadoses of over-the-counter nitric oxide supplements as part of his bodybuilding regimen. This case is suggestive that other vasodilating agents may be similarly associated with NAION.

2. Case report

A 53-year old male with no past medical history was referred to the Neuro-Ophthalmology clinic with sudden vision loss in his right eye that had occurred 3 months ago. The patient denied any other symptoms or further episodes of vision loss. On examination, he was a healthy-looking self-identified Hispanic male. His vision was 20/25 OD, and 20/30 OS, with a relative afferent pupillary defect and dyschromatopsia OD. Extraocular movements were full and painless. Visual field testing with Humphrey perimetry demonstrated an inferior altitudinal field defect OD. Anterior segment was unremarkably normal, though fundus examination showed a small cupless disc OD with mild pallor, and a small cupless disc OS. He had no other ophthalmological or neurological abnormalities. No additional workup or neuro-imaging was performed. He denied usage of sildenafil or other PDE inhibitor medications but frequently ingested megadoses of nitric oxide (NO) and whey protein supplements as part of his bodybuilding regimen.

3. Discussion

This case is suggestive of a possible association with other cGMP-mediated vasodilators and NAION beyond Sildenafil. Sildenafil and similar PDE inhibitors (i.e. tadalafil, avanafil, vardenafil) act on PDE type 5 ligands of the corpus cavernosum, preventing degradation of cyclic guanosine monophosphate (cGMP). Increased levels of cGMP lead to smooth muscle relaxation and vasodilation. Nitric oxide activates guanylate cyclase, increasing levels of cGMP and leading to smooth muscle relaxation and vasodilation (see Fig. 1). Nitric oxide is commercially available as an over-the-counter pre-workout performance enhancing nutritional supplement, used by a variety of athletes, including the bodybuilding community. Though its efficacy as a performance booster has been unsubstantiated in the medical literature, NO supplementation has been aggressively marketed with claims of improved exercise performance and recovery. Other nitrate acting...
medications (i.e., Isosorbide mononitrate) function through a similar mechanism as NO supplements. Prescription nitrates are commonly used in cardiac and atherosclerotic cardiovascular disease patients. Any possible increased risk of NAION in such a cohort may be overlooked because of confounding associated vasculopathies in such a population. Our case’s NAION and association with NO may be coincidental and not causally linked even given the same underlying pharmacodynamics of NO and PDE inhibition. Nitric oxide mediates vasodilation through cGMP, through the same pharmacologic pathway as PDE inhibitor medications. However, any real association between the increased risk of NAION and NO awaits further investigation.

4. Patient consent

Consent was obtained from the patient to publish case details without any identifying information.

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Conflicts of interest

All authors have no financial disclosures. JYH, BK.

Authorship

All authors attest that they meet the current ICMJE criteria for Authorship.

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