

REFERENCES

- Roper-Hall G, Chung SM, Cruz OA. Ocular neuromyotonia: differential diagnosis and treatment. *Strabismus*. 2013;21:131-6.
- Plant GT. Putting ocular neuromyotonia in context. *J Neuroophthalmol*. 2006;26:241-3.
- Salchow DJ, Wermund TK. Abducens neuromyotonia as the presenting sign of an intracranial tumor. *J Neuroophthalmol*. 2011;31:34-7.
- Choi KD, Hwang JM, Park SH, Kim JS. Primary aberrant regeneration and neuromyotonia of the third cranial nerve. *J Neuroophthalmol*. 2006;26:248-50.
- Morrow MJ, Kao GW, Arnold AC. Bilateral ocular neuromyotonia: oculographic correlations. *Neurology*. 1996;46:264-6.
- de Saint Sardos A, Vincent A, Aroichane M, Ospina LH. Ocular neuromyotonia in a 15-year-old girl after radiation therapy. *J AAPOS*. 2008;12:616-7.
- Giardina AS, Slagle WS, Greene AM, Musick AN, Eckermann DR. Novel case of ocular neuromyotonia associated with thyroid-related orbitopathy and literature review. *Optom Vis Sci*. 2012;89:e124-34.
- Kau HC, Tsai CC. Abducens ocular neuromyotonia in a patient with nasopharyngeal carcinoma following concurrent chemoradiotherapy. *J Neuroophthalmol*. 2010;30:266-7.
- Lee K, Aui-Aree N, DP A. A 54 year old man with intermittent diplopia. *Digit J Ophthalmol*. 2005;11.

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Mydriasis due to Opcon-A: an indication to avoid pharmacologic testing for anisocoria



CASE REPORT

A 35-year-old woman presented to the Emergency Department with an acute, painless, dilated left pupil. Her medical history was notable for myopia and truncal herpes zoster infection that had completely resolved 2 years ago. Ocular history was significant for bilateral contact lens wear, and her preferred wetting and cleaning solution was Opcon-A (naphazoline and pheniramine). Her surgical, social, and family history and a complete review of systems were unremarkable. On examination, the visual acuity was 20/20 OU. The left pupil measured 8 mm in the dark and 7 mm in the light, and the right pupil measured 5 mm in the dark and 2 mm in the light. The left pupil did not react as well to light compared with the right and did not demonstrate light near dissociation OS. The slit-lamp examination showed no iris abnormality or uveitis, and its findings were otherwise normal.

The anisocoria was measured as worse in the light, and thus topical 1% pilocarpine was administered to confirm a possible pharmacologic dilation OS. After 5 minutes, it was noted that both pupils had constricted to 1 mm OU (Fig. 1). The examining ophthalmology resident became concerned about the possibility of a compressive lesion, and the findings of computed tomography scan of the head were negative. The neuro-ophthalmologist recommended to closely follow the patient without further intervention for the presumed diagnosis of inadvertent topical sympathomimetic use as the cause for the anisocoria. The next morning the patient reported that the anisocoria had completely resolved and has not returned for follow-up.

DISCUSSION

Opcon-A is an over-the-counter combination eye drop containing pheniramine maleate, an antihistamine used for ocular allergies, and naphazoline hydrochloride, a decongestant and vasoconstrictor used for ocular hyperemia.¹ To our knowledge, there have been 5 prior case reports of transient mydriasis attributed to the use of this agent in the literature.²⁻⁴ Ogidigben et al. reported a dose-dependent mydriasis that occurred with topical naphazoline, suggesting the mechanism of mydriasis as a direct sympathomimetic effect and an indirect parasympathetic blockage.⁵ In our patient, who was a soft contact lens wearer, the drug was being used as a wetting solution and may have had a greater effect because of increased corneal penetration. There may have been an asymmetric effect of topical Opcon-A between the 2 eyes in our patient presumably because of either differential topical dose exposure or perhaps asymmetric dose response. Contact lenses can produce changes in the corneal epithelium that in turn can lead to differential absorption rates of topical agents.

Traditional flow charts and topical diagnostic pharmacologic recommendations for anisocoria include the fol-

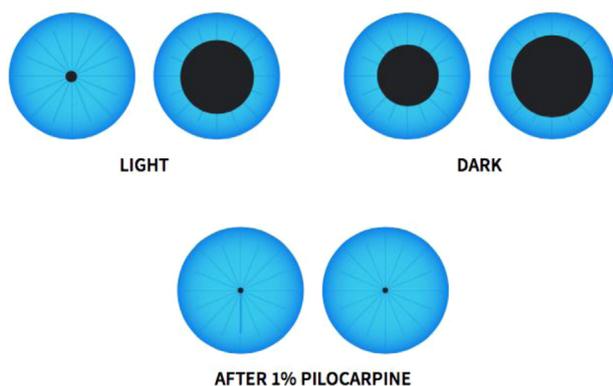


Fig. 1—Pictorial representing pupil measurements of 8 mm OD and 5 mm OS in the light, 7 mm OD and 2 mm OS in the dark, and 1 mm OD and 1 mm OS after 1% pilocarpine.

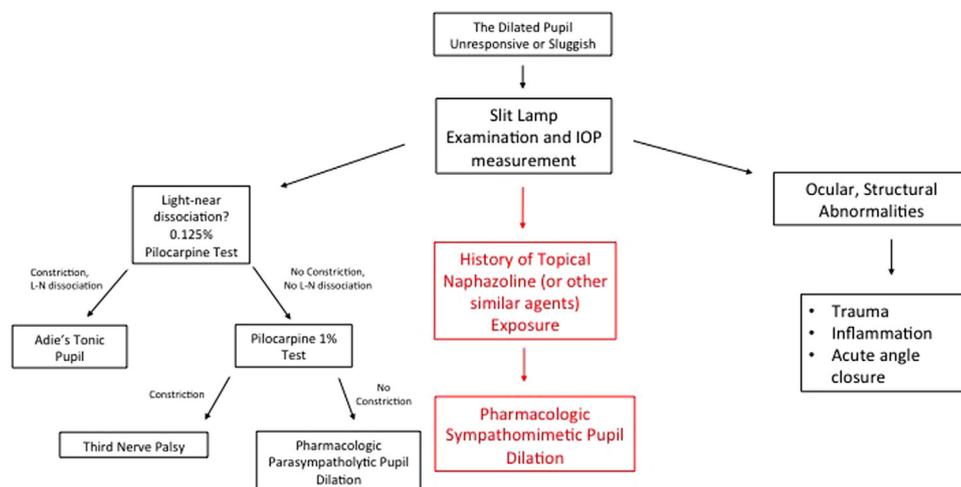


Fig. 2—Modified anisocoria algorithm including anisocoria related to topical naphazoline exposure. (Modified with permission from Caglayan HZ, Colpak IA, Kansu T. A diagnostic challenge: dilated pupil. *Curr Opin Ophthalmol*. 2013;24:550–7.)

lowing: (i) an assessment of whether the anisocoria is greater in the light than in the dark (physiologic anisocoria is considered if the pupil size difference is less than 1 mm and the difference is equal in the light and dark); (ii) if the anisocoria is greater in the light, then consideration for topical dilute pilocarpine (0.125%) is recommended to assess for Adie's tonic pupil; (iii) topical 1% pilocarpine is then considered to differentiate a dilated pupil from a third nerve palsy from pharmacologic mydriasis due to parasympatholytic agents. Pilocarpine, a direct parasympathomimetic, binds to alpha-1 postsynaptic receptors of the pupil constrictor muscles. This can be useful to differentiate cases of mydriasis caused by inhibited pre-synaptic release of acetylcholine versus postsynaptic blockade of acetylcholine receptors.⁶

The mechanism of pilocarpine facilitates evaluation of parasympathetic deficits leading to mydriasis. However, in a patient presenting with mydriasis and a history of chronic topical sympathomimetic use, the pharmacologic testing with pilocarpine can complicate the diagnosis. This is because the mydriasis caused by these agents is predominantly due to a direct sympathomimetic effect on the pupil dilator, rather than a parasympathetic deficit of the pupil constrictor. In addition, naphazoline, in contrast to direct sympathomimetic agents (e.g., phenylephrine and other epinephrine derivatives), may have both sympathetic and parasympathetic effects on the pupil. We therefore recommend a slight modification to the traditional anisocoria algorithm that includes consideration for exposure to topical agents such as naphazoline and to avoid the topical pilocarpine testing in these settings as it might produce diagnostic confusion and

anxiety as well as prompt inappropriate and expensive testing (Fig. 2).

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REFERENCES

1. Bausch & Lomb Incorporated. Opcon-A itching and redness reliever eye drops. www.bausch.com/our-products/allergy-redness-relief/opcon-a-itching-and-redness-reliever-eye-drops.V9CVI45E9tI.
2. Cook BE Jr, Holtan SB. Mydriasis from inadvertent topical application of naphazoline hydrochloride (Opcon-A, Bausch & Lomb). *CLAO J*. 1998;24:72.
3. Keklikoglu HD, Gilbert A, Torun N. Transient mydriasis due to Opcon-A. *Austin J Clin Ophthalmol*. 2015;2:1049.
4. Williams TL, Williams AJ, Enzenauer RW. Case report: unilateral mydriasis from topical Opcon-A and soft contact lens. *Aviat Space Environ Med*. 1997;68:1035-7.
5. Ogidigben MJ, Chu TC, Potter DE. Naphazoline-induced suppression of aqueous humor pressure and flow: involvement of central and peripheral alpha(2)/I(1) receptors. *Exp Eye Res*. 2001;72:331-9.
6. Luviano D. Pharmacologic mydriasis (anisocoria). Atlas of Ophthalmology. Michelson G (ed.). <http://www.atlasophthalmology.com/atlas/photo.jsf?node=8003&locale=en>.

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