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Systolic hypertension as side effect of topical low dose atropine drops

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ABSTRACT

Purpose: To present a case of increased systemic hypertension and pupil dilation related to low dose atropine eyedrops.
Observations: A thirteen-year-old male with progressive myopia received atropine 0.05% ophthalmic drops to slow down myopia progression. He exhibited systemic systolic hypertension, photophobia, and bilateral nonreactive mydriasis. The atropine drops were discontinued, and his blood pressure and pupillary function normalized.
Conclusions and importance: This case demonstrates sensitivity to low dose atropine with increased systemic blood pressure and pupillary dilation.

1. Introduction

With the publication of several large studies over the past decade, increasing numbers of young myopes have been treated with dilute, or low dose atropine drops to slow myopic progression.[1,2] The drops are generally well tolerated, with a small number reporting photophobia. We present a case of systemic hypertension and large unreactive pupils in a 13-year-old male using atropine 0.05% in both eyes daily. The hypertension resolved and pupils normalized with cessation of the drops.

Case Report: A thirteen-year-old Indian male with history of progressive myopia was prescribed dilute atropine 0.05% drops to both eyes at bedtime (QHs) to slow down myopia progression. A few weeks after starting the drop, he was seen by his pediatrician for a school sports physical. He had no complaints, including ocular or systemic anticholinergic symptoms, but physical examination revealed elevated systolic blood pressure of 133/62. Pediatric cardiology consultation confirmed the hypertension, and cardiac workup including pulse, electrocardiography and echocardiography were otherwise unremarkable. On follow up ophthalmic examination, he complained of mild light sensitivity. Visual acuity with correction was 20/20 bilaterally for both distance and near (Jaeger card equivalent J1+). Pupils were 9mm bilaterally and nonreactive (Fig. 1a and b). The rest of the examination was within normal limits. The atropine drops were discontinued, and within a week his blood pressure had decreased to 114/66, and his pupils returned to normal size and reactivity (Fig. 1c). Several months later, atropine drops were restarted at a reduced concentration of 0.025% drops QHs, with attention to side effects at the next lowest dose available. The patient maintained blood pressure 118–120/60. His pupils were again widely dilated, with minimal reactivity, and he did not complain of photophobia (Fig. 1d).

2. Discussion

This case demonstrates sensitivity to dilute atropine with pupil dilation, but also systemic systolic hypertension. After the unusual finding was confirmed by pediatrician and pediatric cardiologist, we did not rechallenge at the same dose. Rechallenge with the same dose might have been informative, but the parents were unwilling to consent, and ethically we did not pursue it again at the same dose. The dilute atropine was from a compounding pharmacy, and we did not have the atropine concentration tested. Reports have revealed variability among compounding pharmacies, with degraded concentrations in some compounded medications, which would have caused a decreased impact of the atropine, while our patient had an increased/hypersensitivity affect.[3] Atropine Sulfate is an anticholinergic drug used systemically to treat organophosphate poisoning and bradycardia, as well as hypersalivation and bronchial secretions.[4] Secondary tachycardia may occur, but systemic hypertension is not a typical side effect even at higher concentrations including atropine 1%. When our patient was treated with more dilute atropine, blood pressure was little changed, but pupils were again completely dilated and poorly reactive. It is not clear why the atropine 0.025% caused the pupillary dilation without the increased

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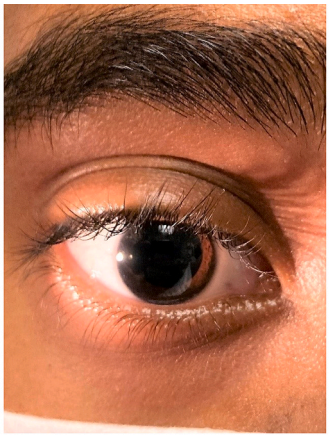
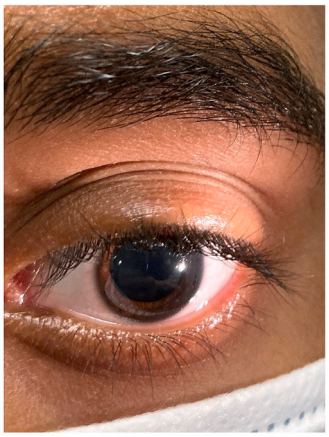


(a)



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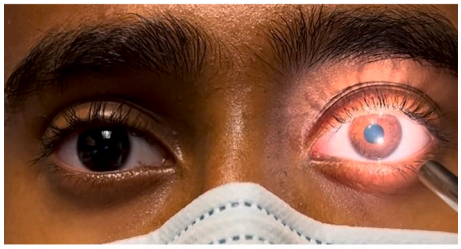

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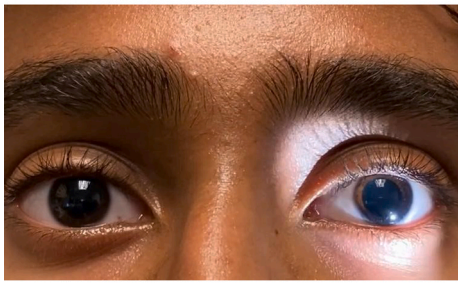

(d)

Fig. 1. a and b: Clinical photos of non-reactive pupils on dilute atropine 0.05% drops, right eye, and left eye. 1c Clinical photo with light on the left eye after discontinuation of the atropine 0.05% with pupils equal and normally reactive. 1d Clinical photo with light on the left eye after starting atropine 0.025% drops, with pupils again dilated and poorly reactive.

blood pressure. We considered whether the hypertension might be related to some 'white coat' anxiety related to the doctor visit, but the patient was asymptomatic and only going for a routine sports physical. It is unlikely that he would have elevated systolic blood pressure in that circumstance and that it would resolve when the drops were discontinued.

Since the landmark 'ATOM2' and 'LAMP' studies, increasing numbers of myopic children have been successfully treated with dilute atropine eye drops to slow progression of their myopia.[1,2] The LAMP study reported a −2.05D loss in accommodation in the atropine 0.05% treatment cohort, but children were able to overcome this deficit and did not require bifocals or complain of near vision blur.[2] While pupil dilation and photophobia have been reported as known side effects of dilute atropine, systemic hypertension has not been previously reported in these large studies.[2] Central anticholinergic syndrome, including agitation and hallucinations have been described in a patient using atropine 1% drops as part of treatment of keratitis, with atropine crossing the blood brain barrier and inducing central excitatory actions.[5] Pediatric central nervous system reactions including behavioral changes and drowsiness, but not hypertension, have been described as side effects of topical cyclopentolate, tropicamide and atropine.[6,7] As our patient had no symptoms, and the hypertension was only noted on physical examination, it is possible that this side effect may be more common but has gone undocumented. It may be that the hypertension is mild and has been noted, but not attributed to the atropine drops. Alternatively, this may have been idiosyncratic to this patient. Consequences of undetected hypertension in children are unknown, but untreated hypertension in adults increases risks of cardiovascular and cerebrovascular disease.[8] Further study is warranted to understand how common this potential side effect may be, and if there are any long-term implications, as dilute atropine is often used for extended durations of several years.

Patient consent

The patient's parent consented to publication of this case and photos in writing.

CRediT authorship contribution statement

Barry N. Wasserman: Conceptualization, Formal analysis, Investigation, Supervision, Writing – original draft, Writing – review & editing. **Erik Massenzio:** Investigation, Writing – original draft, Writing – review & editing. **Karen Lee:** Investigation, Writing – original draft, Writing – review & editing. **David A. Plager:** Conceptualization, Investigation, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper

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