

Case Report

New Onset Seizures in a Child Taking 0.01% Atropine Drops

Caitlyn Mulcahey^{1*} and Steve Gerber²

¹Indiana University School of Medicine, USA

²Clinical Professor, Indiana University School of Medicine, USA

Abstract

Introduction: Myopia is a refractive disorder commonly diagnosed in childhood that follows a progressive course. It is considered a global epidemic with nearly 23% of the world's population being diagnosed with this condition. Moreover, myopia is increasing in prevalence worldwide, demonstrated by studies in Asian and Western populations. This has important implications as myopic progression to high myopia is associated with significant morbidity and visual disability if left untreated. Of these treatments, the pharmacologic agent atropine has demonstrated the greatest efficacy in reducing myopia progression.

Case report: This is a case report of an 11-year-old male treated with 0.01% atropine drops for myopia progression that developed new-onset seizures. The seizures were characterized as benign epilepsy with central temporal spikes and ceased when drops were discontinued.

Discussion: Atropine 1% drops have previously been associated with new or increased seizure activity in a handful of case reports, however, it is our knowledge that this is the first report associated with 0.01% drops. This is important given the growing use of 0.01% drops as well as higher concentrations such as 0.025 % and 0.05% for the treatment of pediatric myopia.

Conclusion: While it cannot be proven that the drops were causative in the seizure events, it is important to consider prior seizures as a relative contraindication to the use of these drops. Atropine has the potential to exacerbate seizure activity, so it is possible that the 0.01% atropine drops played a role in the patient's seizures. Also, any diagnosis of new-onset seizures in pediatric patients should prompt discontinuation of drops at seizure onset.

Introduction

Myopia is considered a global epidemic with nearly 23% of the world's population being diagnosed with this condition [1]. Myopia is increasing in prevalence worldwide, demonstrated by studies in Asian and Western populations [1-3]. This has important implications as myopic progression to high myopia is associated with significant morbidity and visual disability if left untreated [4]. Myopia is most frequently diagnosed before the age of 10 and then follows a progressive course [5]. While there is a long history of variable treatments to slow progression, optical devices (contact lenses and spectacles) and pharmacologic treatments have received the most investigation. Of these treatments, the pharmacologic agent atropine has demonstrated the greatest efficacy in reducing myopia progression in pediatric patients [6,7].

Case presentation

The patient is an 11-year-old male with a past ophthalmologic history of bilateral myopic degeneration

that was started on 0.01% atropine drops to slow myopia progression. Five months after starting drops, the patient had two seizure events six weeks apart. The seizure events occurred early in the morning upon awakening and demonstrated right facial twitching that progressed to rhythmic jerking of his right upper and lower extremities. The patient then lost consciousness as the convulsions became generalized. History revealed no prior seizure events, no familial component and no developmental abnormalities. His parents discontinued the drops immediately after the second seizure event.

With subsequent neurological evaluation, the MRI was reported as normal, and the EEG was reported as right centrotemporal spikes, consistent with Rolandic seizures or benign epilepsy with central temporal spikes (BECTS). The patient was prescribed midazolam nasal spray as needed for seizures greater than 5 minutes and atropine drops were discontinued. The patient experienced no further seizures or facial twitching and continued to follow as needed with neurology.

More Information

*Address for correspondence:

Caitlyn Mulcahey, Indiana University School of Medicine, USA, Email: catmulca@iu.edu

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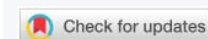
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Keywords: Myopia; Seizures; Epilepsy; Atropine; Pediatrics; Cycloplegic agents





Discussion

Historically, atropine has been theorized to lower the seizure threshold due to its anticholinergic effects causing central nervous system depression [7]. This increased risk often disqualifies patients with a history of epilepsy from randomized control trials of anticholinergic eye drops [8]. And yet, this increased risk of seizures largely remains in theory with fewer than a dozen cases reported since 1890 [9-11]. In these few reported cases, 1% atropine drops have been implicated in either new-onset seizures or increased frequency of seizures in pre-existing epilepsy [9,10]. To the best of our knowledge, there are no known reports of 0.01% atropine drops resulting in new-onset seizures in the pediatric population. This is of particular interest given the growing use of 0.01% atropine drops to slow myopic progression in children.

Although 1% atropine has been used for myopia treatment, there is a growing body of literature to support that lower concentrations may be nearly equally efficacious, while limiting the side effects of higher concentrations that often cause patients to drop out of long-term studies [8,12-14]. Moreover, using lower concentrations may reduce cumulative long-term ocular and systemic effects or rebound myopia [13]. In the most recent studies, 0.01% atropine has shown efficacy in reducing spherical equivalent and axial length progression in pediatric patients compared to no intervention or placebo drops [12-14].

In this case, the patient experienced two episodes of right-sided facial twitching that progressed to rhythmic jerking of the right upper and lower extremities. The patient then lost consciousness and progressed to a generalized seizure. These events occurred early in the morning upon awakening. The patient had no prior history of seizures nor a significant family history of epilepsy. The child also had a noncontributory developmental history. Subsequent EEG demonstrated central temporal spikes, and MRI was without structural abnormality. This evaluation was consistent with Rolandic epilepsy, also known as benign epilepsy with centrotemporal spikes (BECTS).

This form of epilepsy peaks between the ages of 7-10 and often resolves by puberty. There tends to be a strong genetic component with 25% of patients having a family history [15]. Episodes occur most frequently at night or upon awakening. The seizures are typically partial - even going unnoticed if occurring during the night. It is rare for these seizures to progress to status epilepticus or sudden unexplained death. Our patient was prescribed midazolam nasal spray as needed for status epilepticus but did not require other medications. The 0.01% atropine drops were discontinued due to the risk of lowering the seizure threshold, and the patient did not have further seizure events.

While it cannot be proven that the drops were causative in

the seizure events, it is important to consider any association or risk for new-onset seizures in the pediatric population. The literature has reported cases of 1% atropine drops associated with new onset or increased frequency of seizures, but never before reported this association with 0.01% drops. The support for the use of 0.01% drops over higher concentrations has been to decrease side effects, or ocular and systemic toxicity without sacrificing efficacy. However, if this patient's seizures are associated, the argument that lower concentrations reduce systemic toxicity may need to be evaluated further.

In addition, it is worth noting that some studies have demonstrated that lower concentration atropine drops are not produced with accuracy and can have variable concentrations than labeled [16,17]. These particular drops were not specifically tested for their actual atropine concentration, so it is not possible to know the potential contribution to the seizure events.

Conclusion

This case report suggests additional consideration is necessary for pediatric patients treated with 0.01% atropine drops for myopia progression that have a prior history of seizures. Atropine has the potential to exacerbate seizure activity, so it is possible that the 0.01% atropine drops played a role in the patient's seizures. Also, any new onset seizures should prompt immediate discontinuation of 0.01% atropine therapy, and complete workup of underlying seizure type and treatment options.

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