Spasm of the Near Reflex: Treatment with Miotics Revisited

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ABSTRACT

Spasm of the near reflex, as first described by Cogan in 1955, is a triad of intermittent convergent strabismus, accommodative spasm, and pupillary miosis. The accommodative spasm induces pseudo-myopia that is usually accompanied by visual blurring. It is a functional disorder that has been attributed to hysteria, although it can have an organic etiology. Definitive treatment remains problematic since the etiology is often elusive.

INTRODUCTION

In published case reports and small case series, cycloplegic agents, minus or plus lenses,1 miotics,2 occluders,3 narco-suggestion4 and, more recently, botulinum toxin A injections5 have all proven to be effective but inconsistent treatments for spasm of the near reflex. Symptoms typically resolve spontaneously over months to years with the exception of those who have underlying neurological disease.6

We revisit the use of miotics in treating this disorder, and present the case of a now ten-year-old boy who was treated with daily phospholine iodide (echothiophate iodide 0.125%) drops. The child has remained symptom free for 10 months.

CASE REPORT:

A 10-year-old Caucasian male presented to the Pediatric Ophthalmology Service complaining of blurred distance vision, trouble with reading, and intermittent horizontal diplopia at both distance and near. He had a his-
tory of partially accommodative esotropia, acquired at the age of four, and was placed in glasses at that time. At the age of five a recession of both medial rectus muscles was performed by another surgeon. The patient’s mother reported good initial binocular alignment following surgery, and the glasses were discontinued. More recently, an optometrist recommended “eye exercises” for recurrent strabismus. The child’s past medical history was unremarkable. Specifically, there was no history of head trauma, recent hospitalization, viral illness, or recent inoculation. His parents were divorced, and his mother had sought professional counseling for the patient in the past. He was taking no medication.

On examination, his uncorrected visual acuity was 20/30 at distance and Jaeger 2 at near in each eye. A manifest and cycloplegic refraction showed a minimal hyperopic refractive error with a spherical equivalent of $-0.50$ D in each eye. He had no measurable stereopsis and demonstrated a diplopic response with the Worth 4-Dot test at near. Muscle balance testing, without correction, revealed an intermittent esotropia of $40^\circ$ in the distance and $45^\circ$ at near. Control was poor. Pupillary responses were normal. No pathology was noted on dilated funduscopic examination. A follow-up visit showed stable alignment, and a 7.0mm resection of one lateral rectus muscle was performed shortly thereafter.

At the first postoperative day examination, the child’s diplopia had resolved at both distance and near fixation, and he demonstrated 50 seconds of arc stereoscopic acuity. He had a flick esophoria in the distance and a $4^\circ$ intermittent esotropia at near by alternate prism cover testing. At eight weeks, his mother reported that he was again doing poorly in school. On examination, he suppressed the Worth 4-Dot at distance and near, his stereoscopic acuity was once again absent, and he now had a recurrent variable $25^\circ$ intermittent esotropia at both distance and near fixation.

A cycloplegic refraction was repeated but was unchanged. Because of the nature of his cooperation at the time of this examination, it was thought that there might be a functional component to the patient’s performance during the motility exam. Nonetheless, an MRI of the brain and orbits was recommended to rule out the possibility of organic etiology; the scan was normal. Pediatric neurological consultation also failed to identify any localizing disease.

Two weeks later, the patient’s mother informed us that he continued to experience difficulty reading. He was known to be a good student and had no known learning disabilities. His uncorrected visual acuity was 20/40 and Jaeger 2 OD and 20/30 and Jaeger 2 OS. Asymmetric and dynamic Bruckner reflexes were noted during retinoscopy. Manifest refraction was plano. However, the child could read 20/20 with each eye while wearing trial frames with neutralized lenses. He fused the Worth 4-Dot test, but had no measurable stereopsis. He again exhibited a transient large-angle esotropia with subsequent orthophoria to alternate cover testing at distance and near. The cycloplegic refraction was repeated and unchanged. Cycloplegia did not change the frequency or magnitude of the transient esotropia.

A diagnosis of spasm of the near reflex was made on the following visit when miosis and a large myopic shift were noted by dynamic retinoscopy during episodes of convergence. For the first time, the patient spontaneously reported that his vision blurred during convergence. A trial of echothiophate iodide, 0.125%, was initiated, one drop in each eye daily at bedtime, in combination with phenylephrine, 2.5% ophthalmic solution. In addition, we recommended that the child be reevaluated by a child psychologist, and he
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started regular counseling sessions shortly thereafter.

Eight weeks later, his mother reported she had only seen the esotropia once since starting treatment, and that his school performance had improved. The patient reported the diplopia had resolved. Upon examination, he had 20/20 vision in each eye. We measured a $6^\circ$ esophoria at distance and $10^\circ$ esophoria at near to accommodative targets without correction. The echothiophate iodide treatment was discontinued, resulting in a recurrence of the spasm. Miotics were then resumed and are being more slowly tapered.

DISCUSSION

Spasm of the near reflex is clinically characterized by transient episodes of variable esotropia, accommodative spasm, pseudomyopia, and miosis. Individuals usually present with complaints of intermittent diplopia, eyestrain, headache, blurred distance vision and, sometimes, blurred near vision. Pupillary miosis is helpful in the diagnosis, particularly in ruling out sixth nerve palsy, but may be difficult to observe and document, as was the case in our patient, due to his variable and unstable fixation. Usually seen in young patients, spasm of the near reflex is generally accepted as a functional disorder. A number of neurological entities have, however, been associated with it. These include trauma, Wernicke-Korsakoff syndrome, Arnold-Chiari malformation, pituitary disease, pineal gland tumor, and sixth nerve palsy. It is therefore important to rule out a central nervous system etiology by thorough ophthalmic and neurological evaluation in combination with neuroimaging. In infants and children, spasm of the near reflex can resemble sixth nerve palsy, nystagmus blockage syndrome, and the convergence substitution frequently observed in patients with congenital or acquired gaze paralysis. Full abduction will be observed, however, by repeating version testing when the spasm has stopped or by covering the affected eye and noting full abduction with the doll’s head maneuver.

One method of treating spasm of the near reflex is to administer cycloplegic agents, typically atropine sulphate, in combination with reading glasses for near work. Atropine breaks the accommodative spasm by paralyzing the ciliary muscle rather than by altering accommodative effort. In some patients, however, atropine may stimulate accommodative effort and induce convergence spasm as the patient attempts to overcome the blurred near vision induced by cycloplegia.

Non-cycloplegic treatments have also been proposed. Moore and Stockbridge reported success with miotics in most of their patients in a 1972 trial, preferring miotic to cycloplegic treatment because it obviated the need for temporary reading glasses. Of note, they also had success with two patients who received placebo drops, reinforcing the theory of a functional origin for the accommodative spasm.

Although many studies have demonstrated the efficacy of miotics in treatment of refractive and non-refractive esotropia, the mechanism by which miotics relieve accommodative spasm is unknown. It has been suggested that miotics facilitate peripheral accommodation without central accommodative effort and the associated convergence, or that constriction of the pupil results in greater depth of field, reducing the need to accommodate and thus reducing accommodative effort. The latter was challenged by Ripps and coworkers, who have shown that drug-induced miosis and the corresponding increase in depth of field does not affect the accommodative requirements or the AC/A ratio.
If the use of potent miotics is being considered, important and potentially life-threatening side effects need to be communicated to the patient or their family. Anticholinesterases lower blood cholinesterase levels, which, although well tolerated, may prove dangerous to children receiving general anesthesia. Acetylcholinesterase is required for the hydrolysis of succinylcholine, a commonly used paralyzing agent, and depleted levels may induce prolonged apnea or death following general anesthesia if succinylcholine is used during surgery. Therefore, the use of succinylcholine should be avoided in children treated with echothiophate iodide within six weeks of surgery. Other systemic side effects include perspiration, nausea, vomiting, excessive salivation, frequent urination, diarrhea, and abdominal cramping. Local effects include transient visual blurring, dimming of the field of vision, and the development of iris epithelial cysts. Iris cysts are potentially amblyogenic, but can be prevented or diminished with the concomitant use of phenylephrine 2.5%.

CONCLUSION

Although the dramatic and clear benefit of miotic treatment in this particular case is noteworthy, a placebo effect cannot be ruled out, particularly in light of the prior work of Moore and Stockbridge. Additionally, the importance of the psychological counseling this child received should not be discounted. This child’s clinical course suggests that a multifaceted approach to treatment will probably prove to be the most effective in these patients.

REFERENCES


Key words: esotropia, miotics, accomodative spasm, acquired strabismus.