

Use of Accommodative Therapy in the Treatment
of Pseudomyopia: A Case Report

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Abstract

The normal classroom stresses encountered by a fifth-grader who desires to be a high-achiever in her educational tasks, in addition to past-time reading of two to three hours a day, results in complaints of distance blur mimicking the development of organic myopia. The use of accommodative therapeutic exercises, dillegently adhered to by the patient, results in an improvement in visual acuity with an apparent reduction of myopia which quite possibly was of an accommodative etiology.

Chief Complaint and History

Meghan, a nine year-old caucasian female, was brought to the Pediatric Clinic at Ferris State College of Optometry for complete evaluation of complaints of distance blur which were noticed primarily in the classroom for the past several weeks. Meghan had also been observed to be sitting very close to the television, and also stated that distant objects appeared blurry after periods of prolonged reading. Previous eye examinations did not reveal any ocular health problems nor any binocular problems requiring active therapy or corrective lenses. These complaints were not accompanied by reports of headaches, diplopia or other discomfort. The patient's parents both wear a spectacle correction; her mother for myopic astigmatism (-4.00 DS), and her father for a slight astigmatic error and an unknown accommodative dysfunction. Meghan's mother, who was quite familiar with the onset of myopia and the ensuing lifetime confinement to spectacles, was very interested in any available means to arrest the myopic progression. The timing of this examination occurred near the end of the school year and the patient was striving very hard to achieve good grades. Plans for summer vacation included leisure reading from between one and six hours.

Diagnostic Data and Treatment Plan

Pertinent examination findings from the initial visit were as follows:

Unaided Visual Acuity

(@ distance)	OD	20/40	OS	20/40	OU	20/30
(@ near)	OD	20/15	OS	20/15	OU	20/15

Cover Test

Othophoric at distance and near with an ACA of 5:1

Refraction

OD -0.75 DS
OS -1.00 DS (Maximum plus to best acuity)

Accommodative Facility

Very slow responses to plus lenses of any magnitude at 40 cm.

Dynamic Retinoscopy

OD Plano to -0.25
OS Plano to -0.25

Stereopsis

40 sec. at near

It was decided at this time that the spectacle prescription indicated by the above refractive finding would have been readily accepted by the patient in order to obtain clear retinal imagery, but would have probably lead to the development of a permanent myopic condition. In place of this form of management, it was determined that the patient would benefit most from in-office accommodative training sessions. A treatment regiment directed at relieving the apparent accommodative spasm was designed.

At the next office visit, visual acuity levels had dropped to 20/50 in the right and left eyes and 20/40 with both eyes. An accommodative "rock" regiment was begun and included accommodative flipper activities with ± 1.50 DS and tromboning exercises with and without plus spectacle lenses. Vergence therapy was also initiated with 6BI/8BO flippers and jump vergence activities with 8 and 10 p.d. loose prisms placed before the eyes in both the base-in and base-out position.

The purpose of this therapeutic approach was to relieve the ciliary tension, possibly inducing the visual condition known as pseudomyopia (also referred to as accommodative spasm, over-accommodation), with accommodative flexibility exercises and to improve sensory fusional abilities with the vergence exercises. It was also recommended that a program of daily home training be implemented so as to reduce the likelihood of recurrent accommodative spasms. Specifically, exercises with ± 1.50 DS flippers viewing small letters at 40 cm and near/far accommodative rock activities with a distance chart containing 20/20 letters were utilized. Near push-up exercises were also prescribed using a pencil or finger in the field to provide a physiological anti-suppression check.

Meghan was diligent in her performance of the above techniques for between 15-25 minutes/day on a daily basis. These exercises eliminated all subjective complaints of distance blur and further in-office training sessions were discontinued with emphasis now placed on home-training activities to further loosen the accommodative system. The patient was eventually seated in the back of the classroom and to the present time has not experienced symptoms of blurred vision at distance. Even though subjective complaints were not present, after three months of home visual training, periodic follow-up evaluation was provided.

Visual acuity was seen to fluctuate at subsequent visits between 20/25 and 20/15 while refractive findings were also noted to fluctuate between -0.75 DS and $+0.50-0.50 \times 180$. Dynamic retinoscopy findings were consistently within $\pm 0.25D$ of plano throughout the follow-up period and accommodative facility using plus and minus flippers

was consistently observed to be rapid to both plus and minus lenses and was equal in response quality between the right and left eyes. As can be seen, the progression of Meghan's condition was marked with recurrences of accommodative spasmodic posture which was evidenced by the above findings, but in addition to these, an astigmatic error was also observed and the orientation of this cylindrical error varied dramatically between 90° and 180° with very little consistency, possibly indicating the presence of stress within the visual system. Also on several occasions, an esophoric posture was observed which was primarily at near, but occasionally at distance. It is interesting to note that at no time did the patient present a complaint of distance blur, but in order to maintain a more-or-less stabilized system, maintenance levels of accommodative rock therapy were recommended in addition to the provision of +1.00 spectacle lenses for all periods of prolonged near tasks. These lenses were readily accepted for near use and a moderate degree of system stabilization was evident.

By the end of the summer, after regular sessions of accommodative therapy at home, it appeared that Meghan's system had been stabilized. In an effort to provide a measure of prolonged stabilization and since it was apparent that plus-acceptance was eminent, a pair of bifocal spectacles were prescribed with a plano distance correction and a +0.75 add.

Following a short period of time allowing for spectacle adaptation, a final follow-up examination revealed the following findings:

Unaided Visual Acuity

(@ distance)	OD	20/20	OS	20/20	OU	20/20+
(@ near)	OD	20/15	OS	20/15	OU	20/15

Accommodative Facility

Rapid responses to both plus and minus lenses at 40 cm.

Refraction (BVA)

OD Plano
OS Plano

Delayed Refraction

OD +0.50 DS 20/20
OS +0.50 DS 20/20

Cover Test

(@ distance) Orthophoria
(@ near with bifocal) 1 esophoria
(@ near without bifocal) 2 esophoria

Dynamic Retinoscopy

with Bifocal

Plano to +0.25 OU

without Bifocal

Plano to -0.25

Stereopsis

Better than 40 sec. at near

Case Disposition

It was apparent at this exam that the patient was stabilized, but admittedly, the fragility of this patient's visual system places her in a high-risk category to suffer a relapse of pseudomyopia. The patient was dismissed from active accommodative therapy, and was placed on an "as needed" plan of accommodative rock which the patient would commence at the first sign of distance blur. Several activities to improve peripheral awareness were also demonstrated

and the patient agreed to incorporate these awareness techniques into her daily activities. Meghan will be examined at periodic intervals in the future to monitor her visual status, and at the earliest sign of a pseudomyopic relapse, a vigorous accommodative therapeutic program should be reinstated.

Discussion

Researchers have yet to settle on a final decision as to which of the present theories most accurately describes the cause, development and progression of myopia, one of the most common visual afflictions. Overwhelming evidence does, however, exist on the side of the theory, which proposes near work as the primary etiology of myopia. This theory is most commonly contrasted with the theory set forth by Sorsby which places heavy emphasis on genetic factors as the predominant determinants in refractive error. This theory depends strongly upon the idea that emmetropia, correlation ametropia, and component ametropia, are factors determined in the genetic structure of the human being.^{1,2,3,4,8}

Numerous studies present very strong evidence that prolonged near work or a sudden increase in near visual tasks significantly skews refractive error data into a more myopic range. The most familiar studies were those involving Eskimo children suddenly subjected to mandatory schooling (Young, 1969), and the survey of Colorado school children contrasting refractive error during school months to that of the summer vacation months (Kephart, 1951). Both of these studies presented conclusive evidence that the prevalence

of myopia increases in children who are regularly subjected to a classroom experience with its accompanying near visual demands. If indeed near work is a contributing factor to a noticeable increase in myopic refractive error, then some form of structural or physiological mechanism by which this occurs must exist. It is generally accepted that the accommodative mechanism is the primary culprit, however, much controversy exists as to the exact mechanism of accommodative aberration.^{1,2,4,5}

There is a strong likelihood that genetics also play an important role in a person's refractive destiny. Keller reported that a strong correlation between refractive errors of children and their parents does exist, and found the strongest sex-linked relationship between mother-daughter and father-son with the mother's refractive error having the strongest influence in most cases.² If one is looking for practical means of myopia prevention, it is unlikely that he would concentrate his efforts on genetic alteration. Therefore, the accommodative status and near point environment could be modified with relative ease and hence the majority of effort towards the arrest or prevention of myopia lies in modification of near point habits.⁶

A multitude of preventive measures have been presented and given close scrutinization through research and clinical application. A partial listing includes: bifocals, single vision plus lenses, conventional accommodative training, pharmaceutical therapy, prism therapy, diet modification, and a host of surgical procedures on a number of ocular structures.⁷

The present case presents supportive evidence for the above-mentioned myopia etiological theories of excessive near work as well as a genetic component. Fortunately this patient, whose mother has had a lifelong dependence on a myopic spectacle correction, had not reached a point of no return in her apparent myopic progression, and she was able to be retrieved. It appears that the application of basic accommodative therapeutic approaches and the post-training application of bifocal lenses to maintain a degree of visual stability was able, at least for the present time, to prevent the development of a lifetime dependence on minus lenses to obtain clear vision. It is interesting to note that if only a few basic tests were performed at the initial examination (i.e. retinoscopy, BVA refraction, cover test), and then related to the patient's chief complaint, the conventional treatment plan would have been to prescribe minus lenses. This case points out the importance of a thorough investigation of the complete binocular system, including accommodation and convergence with whatever tests are necessary, to get a complete picture and form the appropriate treatment plan.

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