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Title: Accommodative Esotropia Management: Factors Affecting the Primary Care OD (2)

Article Type: Clinical Care

1 Abstract:

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3 Background: To review prescribing patterns of practicing optometrists on the
4 management of accommodative esotropia. To review of the factors that may affect the
5 decision making process for this condition.

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7 Methods: A survey of practicing optometrists was performed in the Kansas City area.
8 Questions regarding the initial treatment of children presenting with accommodative
9 esotropia were presented. Factors given influencing the prescribing process included lack
10 of acceptance of the full hyperopic correction. A retrospective chart review of patients
11 prescribed the full hyperopic correction was performed. Literature review for the
12 management of accommodative esotropia is presented.

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14 Results: 70 % of surveyed optometrists did not prescribe the full hyperopic correction as
15 the initial management for patients with accommodative esotropia. Reasons given
16 included lack of acceptance of the full prescription and interference with
17 emmetropization. Literature review indicates inconsistent recommendations.

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19 Conclusion: A majority of surveyed optometrists do not prescribe the full hyperopic
20 correction for patients with accommodative esotropia. Children with accommodative
21 esotropia accept their full hyperopic correction. Literature resources may contribute to
22 this practice pattern.

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26 Key Words: accommodative esotropia, hyperopia, glasses, adaptation

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30 The management of hyperopia in children with respect to prescribing glasses is
31 controversial. Recent studies revealed varying prescribing patterns for varying degrees of
32 hyperopia.^{1, 2, 3, 4} There is evidence in these studies that optometrists, ophthalmologists
33 and pediatric ophthalmologists have different criteria for prescribing hyperopic correction
34 in children without strabismus.

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36 The treatment of hyperopia, in the presence of esotropia, should be to prescribe the full
37 amount of hyperopia correction as found in a cycloplegic refraction (1 %
38 cyclopentolate).^{5,6,7,8,9,10,11} If the esotropia is fully corrected at distance, then the
39 diagnosis of accommodative esotropia can be made. If the esotropia is not fully
40 corrected at distance then this may represent a mixed mechanism esotropia.

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42 But is the concept of prescribing the full hyperopic correction in the presence of esotropia
43 the standard of care among optometrists who manage accommodative esotropia? Is there
44 a lack of clinical experience in optometry school, or a lack of good references to guide
45 the practitioner? Do the concepts of emmetropization or lack of acceptance of the
46 hyperopic correction change the practice pattern for this entity? This paper explores
47 these topics in the following manner.

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49 First, a survey of practicing optometrists was performed to see what the initial treatment
50 for scenarios commonly found in patients with accommodative esotropia would be.

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52 Second, a retrospective chart review of patients with a new diagnosis of accommodative
53 esotropia was performed. Each of these patients was prescribed the full hyperopic
54 correction as found under cycloplegic retinoscopy. The chart review collected data on
55 the amount of the hyperopia for each, and whether or not the children accepted the
56 glasses prescription without modification (reducing the level of hyperopic correction).

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58 Third, a review of literature for optometry and pediatric ophthalmology describes the
59 recommendations for the treatment of accommodative esotropia. Finally, a discussion of
60 the relevance of emmetropization in the management of accommodative esotropia is
61 presented.

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64 **The Survey**

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66 Methods: Optometrists in the Kansas City community were surveyed regarding
67 prescribing patterns for the initial treatment of accommodative esotropia in children.
68 Three scenarios were provided, containing patients of differing ages. The cycloplegic
69 refraction was provided, as well as magnitudes of the esotropia and age appropriate
70 acuities. The survey was designed to seek the optometrist's initial management of the
71 hyperopia in the presence of esotropia.

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73 Scenario #1

74 A 20 month old presents to your office with a history of the left eye crossing in
75 for the past 2 weeks. On examination, you find a constant alternate esotropia of 30 prism
76 diopters at near. The child's fixation for distance is not consistent for a distance
77 measurement of the esotropia. A cycloplegic refraction (1% cyclopentolate) reveals a
78 refraction of + 6.00 in each eye. The remainder of the examination is normal.

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82 Scenario #2

83 A 4 year old boy presents with a history of wearing glasses in the past for eye
84 crossing, but has lost them and not worn them for the past one year. On examination, you
85 find a constant right esotropia of 35 prism diopters at distance and near. Unaided acuities
86 are 20/80 in the right eye and 20/50 on the left eye. A cycloplegic refraction (1%
87 cyclopentolate) reveals a refraction of OD: +7.50 and OS: +6.00. The remainder of the
88 eye health examination is normal.

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92 Scenario # 3

93 A six year old presents for an eye examination with a history of wearing glasses
94 full time since the age of 2 years. On examination, with glasses in place, her vision is

95 20/20 in each eye. Her eye alignment with these glasses in place is 15 prism diopters of
96 alternating intermittent esotropia at distance, and 25 prism diopters of constant alternating
97 esotropia at near. Her glasses she is wearing are + 2.50. Her cycloplegic refraction (1%
98 cyclopentolate) is + 5.00. The remainder of the eye health examination is normal.
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100 101 Results

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- 103 • 150 surveys were mailed, 80 were returned
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- 105 • 30% of responders prescribed the full cycloplegic refraction for all three scenarios
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- 107 • 70% of responders prescribed less than the full cycloplegic refraction for at least
- 108 one scenario
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- 110 • The breakdown of responses for each scenario is as follows
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 - 112 – Scenario # 1: 64 % of respondents in this group did not prescribe the full
 - 113 plus for this patient, including 4 who chose not to prescribe any glasses.
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 - 115 - Scenario #2 : 75% of respondents did not prescribe the full plus for this
 - 116 patient, including 2 who prescribed bifocals
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 - 119 – Scenario #3: 89% of responders did not prescribe the full plus for this
 - 120 patient, including 8 who prescribed a bifocal.
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123 An additional question was asked of all responders who did not prescribe the full plus:

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125 *Children are unable to adapt or wear the full amount of “plus” found with cycloplegic*
126 *refraction:*

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129 *Agree*

Disagree

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131 40 % agreed with this statement
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137 Conclusion

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139 A majority of optometrists surveyed do not begin with the full cycloplegic correction for
140 the management of accommodative esotropia. A trend for reducing plus as the child’s
141 age increased was seen, indicating a belief that children cannot accept the full plus.

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Acceptance of Plus

Methods

At the Children’s Mercy Hospital Department of Ophthalmology, a retrospective chart review of patients with the diagnosis of accommodative esotropia was performed. Patients from 2 pediatric ophthalmologists and 2 pediatric optometrists were included. The practice patterns for each of these are to prescribe the full cycloplegic refraction, in spectacles, for full time wear, for patients with the initial diagnosis of accommodative esotropia.

Records for patients with the diagnosis of accommodative esotropia and “new visit” were reviewed, for the period January 2003 – December 2005. Exclusion criteria were: previous use of spectacles prescribed by a doctor outside the hospital, previous eye muscle surgery, or if the patient was lost to follow up.

Data collected from the chart review included: age at first examination, sex, magnitude of esotropic deviation, cycloplegic refraction (as determined by retinoscopy with use of 1 drop of 1 % cycloplentolate), and prescription given. Follow up visit included full time wear of glasses (y or n), angle of deviation if any in the glasses and modification of prescription by doctor after follow up visit.

Results

Ninety nine patient charts were reviewed. 36 records met the inclusion criteria for data collection. Age ranges were 1 year 7 month to 9 year 3 month (mean = 3 year 8 months). Cycloplegic refractions (spherical equivalents) ranged from +1.50 D to +9.00 D (mean = + 4.50 D). Thirty six patients were prescribed the full cycloplegic refraction. Two were prescribed 1 D less plus for an unknown reason. Eight patients did not return for follow up.

Of the 30 patients returning for follow up, no patient had difficulty wearing the prescribed glasses full time (28 with the full cycloplegic refraction and 2 with the reduced prescription).

Twenty four patients’ angle of deviation at the follow up visit was reported as orthotropia. Two were reported as microesotropia (deviation less than 8 prism diopters). Four patients showed no change in their deviation with full time wear of glasses.

Conclusion

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190 Pediatric patients with hyperopia and esotropia can accept the full amount of hyperopic
191 correction in glasses, as measured under cycloplegic refraction.

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193 **Literature Review**

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195 Optometry

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197 The American Optometric Associations Practice Guidelines recommend prescribing the
198 total amount of lens power needed to achieve ocular alignment, but does not specify the
199 starting point. It notes if the patient is unable to adapt to the full prescription, under
200 correction may be used.¹²

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202 *Clinical Pediatric Optometry* by Press and Moore does not specify the starting point for
203 managing the hyperopia in accommodative esotropia, but describes the goal of alignment
204 with the glasses.¹³ Bruce Moore's *Eye Care for Infants and Young Children* in its section
205 on accommodative esotropia states, "... esotropia is eliminated when optical correction to
206 compensate for underlying uncorrected hyperopia is prescribed."¹⁴ Scheiman and
207 Wick's *Clinical Management of Binocular Vision* makes no recommendation for the
208 initial treatment of accommodative esotropia.¹⁵

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210 Harvey and Gilmartin in *Paediatric Optometry* state in all accommodative types of
211 esotropic deviations, a full hypermetropic prescription should be issued after cycloplegic
212 refraction.⁹ Griffin and Grisham also recommend the full optical correction of the
213 uncorrected hyperopia.¹⁰

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218 Pediatric Ophthalmology

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220 Harley's *Pediatric Ophthalmology*, in the chapter on accommodative esotropia,
221 recommends starting with the full hyperopic correction as found in cycloplegic
222 refraction.⁵ Taylor and Hoyt, in *Pediatric Ophthalmology and Strabismus*, indicate that
223 prescribing the full spectacle correction, the patient does not have to accommodate and
224 therefore converge to see clearly. Lesser amounts of the full hyperopic correction can be
225 given only if it renders the eyes in an orthophoric position so that fusion can be
226 reestablished.⁶ *Binocular Vision and Ocular Motility* by Gunter Von Noorden, also
227 recommends the full hyperopic correction for the initial treatment of accommodative
228 esotropia.¹¹

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230 **Emmetropization**

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232 The concept of emmetropization has many facets.^{16, 17, 18,19,20,21} It is believed there are two
233 main components to the emmetropization process. The passive, which occurs with the
234 normal growth of the eye (eg. flattening of the corneal curvature, increased axial length),
235 mainly occurs in the first year of life. The active component is based on the animal

236 models (both chick and primate) in which an induced blurred image to the eye resulted in
237 changes of axial length in an attempt to re focus the image onto the retina. This seems
238 unrelated to the practice of prescribing lenses to the human eye to place a focused image
239 onto the retina.

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241 Mutti, in his review of the emmetropization process, notes that after nine months of age,
242 the slow growth of the eye and the lenticular power changes work against further
243 emmetropizing changes.¹⁹ By 18 months of age the majority of refractive errors for this
244 age group are between -1.00 and +3.00. If a patient has a high degree of hyperopia with
245 an associated esotropia, it is expected that during the time hyperopic regression occurs,
246 their hyperopia will regress also. If the initial amount of hyperopia for instance, is +3.00,
247 natural regression may leave a residual refractive error of plano. If the initial hyperopia
248 is +6.00, with an associated esotropia, full plus should be prescribed. During the time of
249 hyperopic regression, three diopters of hyperopia may regress, leaving a residual
250 refractive error of +3.00. This residual refractive error is based on the initial amount of
251 hyperopia, not on interference with emmetropization by prescribing glasses to manage
252 the accommodative esotropia. It is a possibility that some clinicians reduce the hyperopic
253 prescription, for fear of disrupting the emmetropization process. In cases of
254 accommodative esotropia, the reduction of plus may lead to misalignment and thus
255 decreased binocularity.

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257 In their paper on emmetropizaion in accommodative esotropia, Lowery²² suggests the
258 optical correction of the patient's hyperopia may impede the development of emmetropia.
259 They further suggest weaning the accommodative esotrope out of their hyperopic
260 correction should be a goal of management. In an accompanying editorial, Stass-Isern
261 and Olitsky²³ emphasize the goal of managing accommodative esotropia is the promotion
262 of ocular alignment and restoration of binocularity. They note the normal regression of
263 hyperopia in all children is expected and reducing the glasses prescription is not needed.
264 Additional concepts on reducing the hyperopia, theorize the outcome is only to increase
265 the patient's divergence ranges, and does not play a role in emmetropization.^{24, 25}

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271 Discussion

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273 In managing accommodative esotropia, the elimination of the accommodative effort is
274 essential to determine the effect accommodation has on the deviation.

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276 When there is no accommodative effort at distance (i.e. the full hyperopic correction is in
277 place) the decision about the origin of the esotropia is simplified.

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279 – Ortho at distance = accommodative esotropia

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281 – Ortho at distance, esotropia at near = accommodative esotropia with a high
282 AC/A ratio

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- Residual esotropia at distance and near = partial accommodative esotropia (or mixed mechanism)
- No change in esotropia at distance = non accommodative esotropia

Some practitioners reduce the amount of hyperopic correction prescribed, in the assumption that the pediatric patient may not accept or tolerate their glasses if the “full plus” was given. They then may gradually increase the prescription over months to ease the patient into the full plus. This can be costly to the parents in both time and money, and delay the accurate diagnosis of an esotropia that is fully accommodative versus a mixed mechanism

Other practitioners may reduce the prescription at distance and prescribe a bifocal for near compensation. The use of a bifocal in accommodative esotropia is debatable, but without first eliminating the accommodative effort at distance, the decision regarding a bifocal cannot be accurately undertaken.

Although the acceptance of plus chart review in this paper is limited in its retrospective nature and small population, it demonstrates that children with an esotropic deviation in the presence of uncorrected hyperopia accept and wear the full cycloplegic correction. The concern of not tolerating the full prescription in this group of pediatric patients did not surface.

Some optometric references on managing accommodative esotropia are vague as to the starting point for prescribing glasses. Other sources, including pediatric ophthalmology, recommend the full amount of plus as found with a cycloplegic refraction, are used to manage accommodative esotropia.

There is no evidence that prescribing the full amount of hyperopic correction to manage accommodative esotropia interferes with normal hyperopic regression. The goal of treating accommodative esotropia is to promote fusion and maintain binocularity. The full cycloplegic refraction should be prescribed as the initial treatment for accommodative esotropia. Based on the surveys presented here, more education on the treatment of accommodative esotropia for the practicing optometrist may be beneficial.

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