

# Article ▶ Amblyopia with Co-existing Near Point Disorders: A Case Report

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## ABSTRACT

**Background:** Patients with anisometropic amblyopia may often have associated accommodative and vergence dysfunction. In many cases, these associated near point disorders are undiagnosed and untreated. This case shows the different possibilities of associated near point disorders and their management.

**Case Report:** A 15-year-old female patient presented with a complaint of diminished vision in the left eye. She was found to have anisometropic amblyopia. Before starting vision therapy, a comprehensive binocular vision assessment was performed to determine the presence of any co-existing near point vision disorders. Convergence insufficiency, reduced near stereo acuity, accommodative infacility in the amblyopic eye, and accommodative excess in the non-amblyopic eye were documented. This patient was treated with 20 visits of office-based vision therapy with home reinforcement. A post-vision therapy assessment showed marked improvement of visual acuity in the amblyopic eye and stereo acuity and successful treatment of the convergence insufficiency and accommodative dysfunction.

**Conclusions:** Amblyopia can be associated with many other near point vision disorders. A comprehensive binocular vision assessment is recommended before initiating amblyopia therapy.

**Keywords:** accommodative excess, accommodative infacility, amblyopia, anisometropia, convergence insufficiency, occlusion therapy, office-based vision therapy.

## Introduction

Anisometropic amblyopia is a well-known clinical entity. Anisometropic amblyopia occurs as a result of clinically significant and unequal amounts of uncorrected refractive error. Amblyopia develops due to a unilaterally blurred retinal image.<sup>1</sup> Reduced acuity is not the only clinical finding associated with amblyopia; many other conditions may be associated, such as accommodative insufficiency.<sup>2,3</sup> A detailed binocular vision assessment is essential to rule out any binocular vision anomaly. Vision therapy (VT) can be used as a successful treatment modality.<sup>4</sup>

## Case report

SS, a 15-year-old girl, presented with a complaint of diminished vision in the right eye, noticed three months back. This was accidentally detected while she was rubbing her left eye. There was no history of any associated redness, pain, or ocular trauma. There was a normal birth history (full term Caesarean delivery, birth weight 3.2 kg) and no history of any delay in developmental milestones. There was no history of previous ophthalmic consultation or receiving previous treatment.

Upon examination, her distance visual acuity was 20/600 OD and 20/20 OS. Near vision was N 63 and N 5 @ 40 cm in the OD and OS, respectively, using a Bailey Lovie word reading chart. Static retinoscopy showed high hyperopia OD and emmetropia OS. Cycloplegic refraction was +7.00 DS OD and plano OS. The best corrected visual acuity was 20/240 through the spectacle trial lens OD. Anterior and posterior segment evaluations were unremarkable.

She was diagnosed with anisometropic amblyopia, high hyperopia OD, and emmetropia OS. She was then referred to the contact lens department and was given a soft contact lens (BC 8.60 mm/power +7.50 DS/diameter 14.2 mm) OD. The best corrected visual acuity was 20/240, N 42 @ 40 cm. At a two-week follow-up visit, the visual acuity remained the same, and the fitting was deemed acceptable. After six weeks of adaptation to the new contact lenses, the patient reported for a comprehensive binocular vision assessment. Table 1 shows the comprehensive binocular vision assessment data.

Based on the binocular vision assessment, she was diagnosed with:

- High hyperopia OD
- Anisometropic amblyopia OD
- Accommodative Infacility OD
- Accommodative excess OS
- Exophoria OU
- Convergence insufficiency OU

## Management Plan

She was prescribed part-time occlusion<sup>5-9</sup> OS for six hours daily<sup>7</sup> using an Opticlude eye patch at home during waking hours while continuing her regular activities like watching television and near activities<sup>10</sup> like reading, writing, drawing, computer use, and video gaming. Office-based vision therapy (OBVT), one session per week, along with home reinforcement of six days each week was initiated.

**Table 1. Pre-Vision Therapy Binocular Vision Assessment**

TEST	RESULT	
VA	OD: With CL 20/240, N42@40cm	OS: 20/20, N5@40cm
Refractive Status	OD: +7.50 DS in SCL	OS: Plano
Cover Test	@ 20 feet: orthophoria	@ 40 cm: mild exophoria
Prism Bar Cover Test	@ 20 feet: N/A	@ 40 cm: 6 PD exophoria
NPC	10 cm	
Accommodative Amplitude (push up)	OD: 18.50 D	OS: 20 D
Monocular Accommodative Facility (+/-2.00 D)	OD: 1 cpm; equal difficulty in clearing plus & minus	OS: 4 cpm; difficulty in clearing plus
MEM	OD: +0.50 D	OS: -0.25 D
Saccade (NSUCO)	5/5/5	
Pursuit (NSUCO)	5/5/5	
Ocular Movement	OD: full	OS: full
Stereopsis (Stereofly)	200 arc seconds	
Base-in break (objective)	@ 20 feet: 6 PD	@ 40 cm: 14 PD
Base-out break (objective)	8 PD	10-12 PD
Visuoscropy	Central, slightly unsteady	Central, steady

**Table 2. Post-Vision Therapy Binocular Vision Assessment**

TEST	RESULT	
VA	OD: with CL 20/20, N5@40cm	OS: 20/20, N5@40cm
Refractive Status	OD: +7.50 DS	OS: plano
Cover Test	@20 feet: orthophoria	@40cm: mild exophoria
Prism Bar Cover Test	@20 feet: N/A	@40cm:2 PD exophoria
NPC	5.5 / 7.5 cm	
Accommodative Amplitude (push up)	OD: 13.50 D	OS: 14.25 D
Monocular Accommodative Facility (+/-2.00 D)	OD: 22 cpm; almost equally difficult	OS: 26 cpm; almost equally difficult
Binocular Accommodative Facility (+/-2.00 D)	24 cpm	
MEM	OD: +0.50 D	OS: +0.50 D
Saccade (NSUCO)	5/5/5	
Pursuit (NSUCO)	5/5/5	
Ocular Movement	OD: full	OS: full
Stereopsis (Stereofly)	40 arc seconds	
NRA	+2.00 DS	
PRA	> -3.00 DS	
NFV	@ 20 feet: x/10/8 PD	@ 40 cm: x/16/14 PD
PFV	@ 20 feet: x/16/12 PD	@ 40cm: x/35/30 PD
Vergence Facility (12 BO & 3 BI)	16 cpm, almost equally difficult	
Visuoscropy	OD: central & steady	OS: central & steady

## Vision Therapy

Each office therapy session lasted one hour. Visual acuity was measured on every alternate session. Monocular acuity activities OD and monocular accommodative activities OD, OS were started. Upon completion of the 10th session, her visual acuity improved to 20/30 OD, and binocular vergence and anti-suppression therapy was initiated. Upon completion of the 12th session, her visual acuity improved to 20/20 OD. Occlusion was reduced to three hours daily during visually demanding tasks. The patient underwent a total of 20 therapy sessions over a period of five months. Table 2 shows the post-VT data, and Appendix A shows the sequential vision therapy program.

Post-VT, she was advised to reduce the occlusion from three to one hour daily during all visually demanding tasks for the next three months to prevent amblyopia recurrence.<sup>11,12</sup> Maintenance therapy for vergence (opaque eccentric circle

without the help of pointer, twice daily) and accommodation (calendar rock OD and OS separately, twice daily) was recommended. After three months, the improved visual acuity and other parameters were well-maintained.

## Discussion

It is well known that eyes with amblyopia have reduced visual acuity, but there are many other features that are overlooked by most eye care practitioners, including reduced stereo acuity, contour interaction, contrast sensitivity, and accommodative and vergence dysfunctions and strabismus. Flom et al.<sup>13</sup> reported that a functional cure results in equal visual acuity in each eye, along with comfortable, single, binocular vision at all distances. There should also be good stereopsis and a normal range of motor fusion. An approach that includes binocular vision therapy is the ultimate goal in treating amblyopia<sup>14-17</sup> with co-existing near point disorders.

Accommodative dysfunction may impact both the amblyopic and non-amblyopic eyes. A unique feature in this case is the difference in accommodation between the two eyes. The amblyopic eye had accommodative infacility, and the non-amblyopic eye had accommodative excess. Both accommodative conditions were successfully treated by vision therapy.<sup>18,19</sup> Since the amblyopic eye was not being used efficiently, it led to suppression<sup>20</sup> and vergence dysfunction. In this case, convergence insufficiency<sup>21-27</sup> was also treated successfully with vision therapy. Near stereopsis was also improved to close to normal levels.

In this case, the patient was 15 years old when we started the therapy and 15 years and 5 months at the conclusion. Therefore, 6 years of age (after the sensitive period) is not the upper limit for treating amblyopia.<sup>7,28</sup> Improvement depends upon the individual's neuroplasticity.<sup>29-31</sup> Clinical evidence<sup>8</sup> suggests that residual neuroplasticity remains in the visual system for much longer periods than previously thought.

## Conclusion

Accommodative and/or binocular vision dysfunction may be associated with anisometropic amblyopia. Acuity is not the only aspect of a case on which to concentrate when treating amblyopia. One should do a detailed binocular and accommodative status assessment before initiating therapy. Do not let the patient's age deter you from the most appropriate treatment. An excellent outcome can be obtained through a well-designed vision therapy program.

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Sheet C. Amblyopia with co-existing near point disorder: a case report. *Optom Vis Perf* 2016;4(6):233-6

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## Appendix A: Sequential Vision Therapy Program

### SESSIONS 1-5

#### Office Therapy

- Balance board activities
- Walking rail with distance Hart chart (modified)
- Peg board activities
- Pointer in straw
- Swinging Marsden ball
- Monocular loose lens rock with plus & minus with near acuity appropriate word rock card

#### Home Therapy

- Patching of non-amblyopic eye 6 hours daily
- Letter tracking in newspaper (Ann Arbor tracking)
- Filling “o” by color in newspaper/magazines
- Accommodative push-up & push-down
- Hart chart accommodative rock
- Video game
- Drawing activities

### SESSIONS 6-10

#### Office Therapy

- Balance board activities
- Walking rail with distance Hart chart (standard)
- Peg board activities
- Pointer in straw
- Hitting Marsden ball by VMC stick
- Marsden ball with minus lens
- Brock string
- Monocular loose lens rock with plus & minus with near acuity appropriate word rock card

#### Home Therapy

- Patching of non-amblyopic eye 6 hours daily
- Letter tracking in newspaper (Ann Arbor tracking)
- Filling “o” by color in newspaper/magazines
- Accommodative push-up & push-down
- Hart chart accommodative rock
- Video game
- Drawing activities

### SESSIONS 11-15

#### Office Therapy

- Tranaglyphs: convergence only
- Aperture rule: single aperture, convergence only
- Brock string
- Red/green bar reading with red/green goggles
- Vis-à-vis
- Monocular loose lens rock plus & minus in right eye and with plus only in left eye
- Peg board with balance board
- Marsden ball with VMC stick

#### Home Therapy

- Occlusion of non-amblyopic eye 3 hours daily
- Opaque eccentric circle with the help of pointer
- Brock string
- Accommodative push up & down in right eye
- Accommodative push down in left eye
- Hart chart accommodative rock

### SESSIONS 16-20

#### Office Therapy

- Tranaglyphs: both convergence & divergence, followed by Vectogram
- Aperture rule: single aperture with plus lens binocularly followed by double aperture
- Brock string with base in & base out prism
- Red/green bar reading with red/green goggles
- Monocular loose lens rock plus & minus in each eye
- Binocular accommodative facility
- Bernell-o-scope
- Peg board with balance board
- Marsden ball with VMC stick

#### Home Therapy

- Occlusion of non-amblyopic eye 3 hours daily
- Opaque eccentric circle without the help of pointer, followed by push up & rotation
- Brock string (bug on string)
- Albee 3 dot convergence card
- Hart chart accommodative rock, each eye
- Hart chart saccade