

Amblyopia 101: ***How to use Current Amblyopia*** ***Research in Clinical Practice***

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Amblyopia is the condition in
which the observer saw nothing
and the patient very little."

(Von Graefe 1888)

PREVALENCE OF AMBLYOPIA

- 2% of population
- Leading cause of monocular vision loss in the 20-70 age group
- Responsible for more vision loss than all ocular disease combined

Amblyopia Definition

DEFINITION OF FUNCTIONAL AMBLYOPIA

- Unilateral (infrequently bilateral) condition
- BVA < 20/20
- No structural or pathologic anomalies
- ³1 of the following occurring before age 6:
 - *Amblyogenic anisometropia*
 - *Constant unilateral strabismus*
 - *Amblyogenic bilateral isometropia*
 - *Amblyogenic uni / bi astigmatism*
 - *Image degradation*

Strabismic Amblyopia

CONSTANT / UNILATERAL
Strabismus

Refractive Amblyopia

Strabismic and Refractive Causes of Amblyopia

Image Degradation Amblyopia

14 month old female

Case findings	
VA sc	F & F OD, OS
Cover Test	35 Δ CRXT Possible R Hyper deviation
Stereopsis	UTT
Retinoscopy	+0.50 sphere +0.50 sphere
Anterior Segment Evaluation	?????
Dilated exam	Unremarkable Poor view OD

Review of types of amblyopia

- Anisometropic Amblyopia
- Strabismic Amblyopia
- Isometropic Amblyopia
- Image degradation Amblyopia

Potentially Amblyogenic Refractive Errors

Isometropic Amblyopia	Diopters
Astigmatism	> 2.50
Hyperopia	> +5.00
Myopia	> -8.00

Anisometropic Amblyopia	Diopters
Astigmatism	> 1.50
Hyperopia	> +1.50
Myopia	> -3.00

Determining the Best Treatment Options

Traditional Amblyopia Treatment

- Refractive Error Correction
 - Occlusion
 - Atropine

Amblyopia Severity

- Severe - worse than 20/100
- Moderate - better 20/80

PEDIG Studies

- PEDIG
 - Pediatric Eye Disease Investigator Group: (PEDIG) is a collaborative network dedicated to facilitating multicenter clinical research in strabismus, amblyopia and other eye disorders that affect children.
 - The network, which was formed in 1997, is funded by the National Eye Institute (NEI)
 - <http://pedig.jaeb.org/Publications.aspx>

Amblyopia Treatment

PEDIG studies simplified

Questions addressed by PEDIG Studies

- How well do glasses alone treat amblyopia?
- Do we really know that occlusion works?
- How many daily hours of prescribed occlusion are necessary?
- What happens when occlusion is stopped?
- Does occlusion work in older children?
- Does atropine work as well as occlusion?
- How often does Atropine need to be used?

And so on....

ATS Summary ATS 1-2B

TABLE A4-1 PEDIATRIC EYE DISEASE INVESTIGATOR GROUP STUDIES WITH PUBLISHED RESULTS

Study	No. of Patients (age at enrollment)	Follow-up Period	Result
Randomized trial comparing occlusion vs pharmacologic therapy for moderate amblyopia ^a (ATS 1)	419 (3 to <7 years)	6 months	<ul style="list-style-type: none"> VA improved in both groups: 3.15 lines in occlusion group, 2.84 lines in atropine group Mean difference = 0.34 lines (95% CI, 0.05 to 0.6) VA ≥20/20 and/or improved by ≥3 lines in 79% of occlusion group and 74% of atropine group
Randomized trial comparing occlusion vs pharmacologic therapy for moderate amblyopia ^a (ATS 1)	419 (3 to <7 years)	2 years	<ul style="list-style-type: none"> VA improved in both groups: 3.7 lines in occlusion group, 3.6 lines in atropine group Mean difference = 0.01 lines (95% CI, -0.02 to 0.04) Atropine or patching for an initial 6-month period produced a similar improvement in amblyopia 2 years after treatment
Randomized trial comparing part-time vs full-time patching for severe amblyopia ^a (ATS 2A)	175 (3 to <7 years)	4 months	<ul style="list-style-type: none"> VA improved in both groups: 4.8 lines in the 6 hours patching group, 4.7 lines in the full-time patching (all hours or all but 1 hour per day) group Mean difference = 0.02 lines (95% CI, -0.04 to 0.07)
Randomized trial comparing part-time vs minimal-time patching for moderate amblyopia ^a (ATS 2B)	589 (3 to <7 years)	4 months	<ul style="list-style-type: none"> VA improved in both groups was 2.40 lines Mean difference = -0.07 lines (95% CI, -0.055 to 0.036) VA ≥20/20 and/or ≥3 lines in 62% of patients in both groups VA improvement similar for 2 hours of daily patching and 6 hours of daily patching

ATS Summary ATS 3-6

Randomized trial comparing treatment of amblyopia ^a (ATS 3)	507 (3 to 17 years)	6 months	<ul style="list-style-type: none"> For moderate amblyopia in children 7 to 17 years old, 50% achieved 20/20 or better with optical correction/occlusion compared with 14% with optical correction alone (P<0.001) For severe amblyopia in children 7 to 17 years old, 29% achieved 20/20 or better with optical correction/patching, compared with 7% with optical correction alone (P<0.001) For moderate amblyopia in teenagers 13 to 17 years old, 14% achieved 20/20 or better with optical correction/occlusion, compared with 7% with optical correction alone (P<0.05)
Randomized trial comparing daily atropine vs occlusion for moderate amblyopia ^a (ATS 4)	100 (3 to 7 years)	4 months	<ul style="list-style-type: none"> VA improvement in both groups was 2.3 lines Mean difference = 0.02 lines (95% CI, -0.04 to 0.08) 47% of daily group and 52% of the occlusion group had better VA ≥20/20 or greater than or equal to that of the nonamblyopic eye
Prospective comparative trial to evaluate 2 hours of daily patching for amblyopia ^a (ATS 5 - encephalitis only phase)	84 (3 to 7 years)	10 to 30 weeks	<ul style="list-style-type: none"> Patients treated with optical correction by 2 lines in 77% Amblyopia resolved with optical correction in 27% (95% CI, 16% to 38%)
Randomized trial to evaluate 2 hours of daily patching for amblyopia ^a (ATS 5 - non-encephalitis phase)	180 (3 to 7 years)	5 weeks	<ul style="list-style-type: none"> After a period of treatment with eyeglasses and vision therapy, patients treated with 2 hours of daily patching combined with 1 hour of near visual tasks had an improvement in VA of 1.1 lines compared with 0.5 lines in the control group Mean difference (adjusted) = 0.67 lines (95% CI, 0.02 to 1.12, P=0.002)
Randomized trial comparing near vs distance while wearing VA ^a (ATS 6)	403 (3 to 7 years)	17 weeks	<ul style="list-style-type: none"> At 6 weeks, improvement in amblyopic eye VA averaged 2.6 lines in the distance while wearing group and 3.1 lines in the near while wearing group (P=0.001) Group showed clinically similar at the 6, 8 week, 10 week, and 17 week visits At 17 weeks, children with severe amblyopia improved a mean of 7.7 lines with 2 hours of daily patching

ATS Summary ATS 7-10

TABLE A4-1 PEDIATRIC EYE DISEASE INVESTIGATOR GROUP STUDIES WITH PUBLISHED RESULTS (CONTINUED)

Study	No. of Patients (age at enrollment)	Follow-up Period	Result
Treatment of bilateral refractive amblyopia ^a (ATS 7)	113 (3 to <10 years)	1 year	<ul style="list-style-type: none"> Bilateral VA improved on average 3.9 lines (95% CI, 3.5 to 4.2) At 1 year, 74% had binocular VA of 20/20 or better
Randomized trial comparing atropine vs atropine plus plano lens for the fellow eye in children 3 to 6 years old ^a (ATS 8)	180 (3 to <7 years)	18 weeks	<ul style="list-style-type: none"> Amblyopic eye VA was 20/25 or better in 29% of the atropine-only group and in 40% of the atropine plus plano lens group (P<0.05) More patients in the atropine plus plano lens group had reduced fellow eye acuity at 18 weeks. However, there were no cases of persistent myopia/amblyopia
Randomized trial comparing occlusion vs atropine for amblyopia ^a (ATS 9)	103 (7 to <13 years)	17 weeks	<ul style="list-style-type: none"> Similar improvement in VA in both groups Amblyopic eye VA of 20/25 or better in 17% of atropine group and 20% of the patching group (95% CI, -2% to 17%)
Randomized trial comparing Bangerter filters vs occlusion for the treatment of moderate amblyopia in children ^a (ATS 10)	106 (3 to <10 years)	24 weeks	<ul style="list-style-type: none"> Similar improvement in VA in both groups Amblyopic eye VA of 20/25 or better in 36% of Bangerter group and 31% of patching group (P=0.38) Patching was not superior (95% CI difference between groups, -0.16 to 0.83 lines)

ATS Summary ATS 1-2B

Randomized trial to evaluate combined patching and atropine for residual amblyopia ^a (ATS 11)	55 (3 to <10 years)	10 weeks	<ul style="list-style-type: none"> Better amblyopic, slight subjects had no improvement with 6 hours daily patching or daily atropine Intensive treatment group had 5 hours of prescribed daily patching combined with daily atropine, wearing group had 4 weeks of individual treatment, then atropine Amblyopic eye VA improved similarly in both groups, an average of 0.56 lines in the intensive group (95% CI, 0.16 to 0.95) and 0.52 lines in the wearing group (95% CI, -0.04 to 0.88)
Nonrandomized prospective trial of eyeglasses alone for strabismic and strabismic/amblyopic combined amblyopia in children ^a (ATS 12)	146 (3 to <7 years)	28 weeks	<ul style="list-style-type: none"> Mean 7.5 lines improvement (95% CI 2.3 to 12.7) 75% required ≥2 lines and 54% required ≥3 lines Resolution in 26% (95% CI 24% to 41%) Treatment effect was greater for strabismic amblyopia than for combined strabismic amblyopia (3.2 vs 2.3 lines, adjusted P=0.002)

NOTE: In the ATS, mild to moderate amblyopia is defined as VA in the amblyopic eye of 20/60 or better; severe amblyopia is defined as VA in the amblyopic eye of 20/100 to 20/400.

Further information about the published results of the Amblyopia Treatment Study is available from the Pediatric Eye Disease Investigator Group: <http://dx.doi.org/10.1016/j.jama.2016.08.015>

ATS = Amblyopia Treatment Study; CI = confidence interval; RCT = randomized clinical trial; VA = visual acuity

Case Example

Case Example 7 year old male

Snellen VA	Case findings			
	Distance OD	OS	Near OD	OS
Distance/Near Cover Test	20/60	20/20	20/50	20/20
Cycloplegic retinoscopy	+2.50 -3.50 x 180 OD +2.00 -1.50 x 180 OS			
Stereopsis cc	(-) Forms, (+) Fly			
Trial Frame Rx	+1.00 -3.00 x180 +0.50 -1.00 x180		20/40 20/20	

Potentially Amblyogenic Refractive Errors

Anisometric Amblyopia	Diopters
Astigmatism	> 1.50
Hyperopia	> +1.50
Myopia	> -3.00

25

Dx: Anisometropia Amblyopia

*High refractive error OD vs. OS
UNILATERAL decrease in VA*

Assessment / Plan

□ Assessment

- Anisometric Amblyopia
- Hyperopia OU
- Astigmatism OD>OS (no previous Rx hx)

□ Plan

- Rx given
 - +1.00 -3.50 x 180 OD
 - +0.50 -1.50 x 180 OS
 - RTC 1 month after Rx dispense

Case Example

*7 year old male
2 months after wearing Rx*

Case findings				
Refractive Correction	OD	+1.00 -3.50 x 180		
	OS	+0.50 -1.50 x 180		
Snellen VA	Distance	OD	OS	Near
		20/20	20/20	20/20 20/20
Distance/Near Cover Test	ortho			
Stereopsis cc	(+/-) Forms, (+) Fly			

PEDIG Studies

Spectacle Correction

PEDIG Studies

Rx correction only

- **ATS - 5** (3-7 y.o.) (18 week time course)
 - RX correction (no occlusion tx) for **anisotropic** amblyopes
 - **Mean improvement = 3 lines**
 - Moderate and severe amblyopia (20/40-20/250)
 - Rx correction (no occlusion tx) for **strabismic** amblyopes (or combined mechanism)
 - 74% improved \geq 2 lines, 54% \geq 3 lines, 32% resolved
 - Type of strabismus was irrelevant

PEDIG Studies

Rx correction only

□ **Follow up treatment for Optical Treatment of Amblyopia**

- 4-8 week intervals
- Some patients may not need occlusion
- Attempt one treatment at a time
- Allow for a total of 16-18 weeks to monitor improvement

Case Example

7 year old male, 2nd grade
 2nd opinion on spectacle Rx, 1st Rx given x 3 days prior
 initial symptoms: c/o distance blur, close working distance, excessive blinking and eye rubbing, poor reading skills

Case findings				
Current RX	OD	+3.00 -6.00 x 180		
	OS	+4.00 -6.00 x 180		
Snellen VA cc	Distance		Near	
	OD	OS	OD	OS
	20/100	20/80	20/100	20/80
	ortho			
Distance/Near Cover Test	ortho			
Stereopsis	(-) Forms, (+) Fly			
K readings	40.92 / 40.60 (5.31 D)			
	45.58 / 40.85 (4.73 D)			
Retinoscopy	OD	+3.50 -5.00 x 180		
	OS	+4.00 -5.00 x 180		
Cycloplegic retinoscopy	OD	+4.50 -5.50 x 180		
	OS	+5.00 -4.50 x 180		
Dilated exam	unremarkable			

7 year old male, 2nd grade
 2nd opinion on spectacle Rx, 1st Rx given x 3 days prior
 initial symptoms: c/o distance blur, close working distance, excessive blinking and eye rubbing, poor reading skills

Case findings		
Current RX	OD	+3.00 -6.00 x 180
	OS	+4.00 -6.00 x 180
BVA of 20/50 OU with -1.00D over current Rx		
Cycloplegic retinoscopy	OD	+4.50 -5.50 x 180
	OS	+5.00 -4.50 x 180
Rx Given	OD	+2.00 -5.50 x 180
	OS	+2.50 -4.50 x 180

Dx: Isometropic Amblyopia

*High refractive error OU
 BILATERAL decrease in VA*

Potentially Amblyogenic Refractive Errors

Isometropic Amblyopia	Diopters
Astigmatism	> 2.50
Hyperopia	> +5.00
Myopia	> -8.00

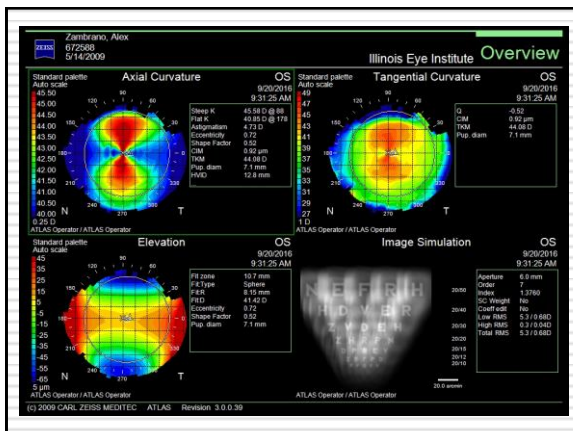
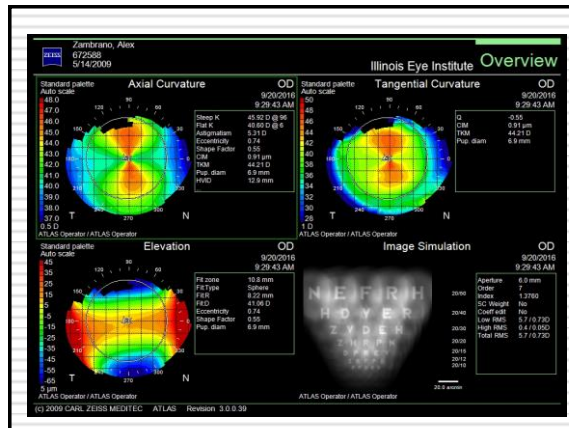
OD +3.00 -6.00 x 180
 OS +4.00 -6.00 x 180

RTC with new RX
 Perform corneal topography
 Discussed options of CL fit

7 year old male, 2nd grade
3 week follow up

Case findings				
Updated RX	OD	+2.00 -5.50 x 180		
	OS	+2.50 -4.50 x 180		
Snellen VA cc	Distance	OD	OS	Near
		OD/50	20/50	20/50
Distance/Near Cover Test	ortho			
Stereopsis	(-) Forms, (+) Fly			

Where do we go from here?



PEDIG Studies

Treatment of bilateral refractive amblyopia in children three to less than 10 years of age

PEDIG Studies

Treatment of bilateral refractive amblyopia in children three to less than 10 years of age.

- Purpose: To determine the amount and time course of binocular visual acuity improvement during treatment of bilateral refractive amblyopia
- Criteria: Previously untreated, 20/40-20/400
- Results at 1 year
 - 20/40 - 20/80 → 3.4 lines of improvement
 - 20/100 - 20/320 → 6.3 lines of improvement
 - 20/25 or better....
 - 21% at 5 weeks
 - 46 % at 13 weeks
 - 59 % at 26 weeks
 - 74 % at 52 weeks

PEDIG Studies

Treatment of bilateral refractive amblyopia in children three to less than 10 years of age.

- Purpose: To determine the amount and time course of binocular visual acuity improvement during treatment of bilateral refractive amblyopia
- Conclusion: treatment of bilateral refractive amblyopia with spectacle correction improves binocular visual acuity in children three to less than 10 years of age, with most improving to 20/25 or better within one year

Case Example

5 year old male

State required exam for Kindergarten entrance

Case findings				
Snellen VA sc	Distance		Near	
	OD	OS	OD	OS
	20/125	20/20	20/300	20/20
Distance/Near Cover Test	ortho			
Stereopsis	(-) Forms, (-) Fly			
Retinoscopy	+5.50 sphere +2.50 sphere			
Cycloplegic retinoscopy	+6.50 sphere +3.50 sphere			
Dilated exam	unremarkable			

Potentially Amblyogenic Refractive Errors

Anisometropic Amblyopia	Diopters
Astigmatism	> 1.50
Hyperopia	> +1.50
Myopia	> -3.00

45

Dx: Anisometropia Amblyopia

High refractive error OD vs. OS
UNILATERAL decrease in VA

5 year old male

State required exam for Kindergarten entrance

Case findings				
Snellen VA sc	Distance		Near	
	OD	OS	OD	OS
	20/125	20/20	20/300	20/20
Retinoscopy	+5.50 sphere +2.50 sphere			
Cycloplegic retinoscopy	+6.50 sphere +3.50 sphere			
Rx given	+4.50 sphere +1.50 sphere			
Full time wear of Rx RTC 2 months				

5 year old male
State required exam for Kindergarten entrance

Progress


Case findings		
	OD	OS
October 2 month follow up Continue FTW of Rx	20/125	20/20
November 3 month follow up	No improvement of VA Begin 2 hours of occlusion daily OS	
December 4 month follow up	No improvement of VA Poor compliance with occlusion Continue 2 hours of occlusion daily OS	
March 7 month follow up	Minimal improvement of VA (20/100) Questionable compliance with occlusion Increase Rx Continue 2 hours of occlusion daily OS	

5 year old male


State required exam for Kindergarten entrance

Case findings	
Current Rx	+4.50 sphere 20/100 +1.50 sphere
Cycloplegic retinoscopy	+7.00 -1.50 x 180 +3.00 sphere
New Rx	+6.00 -1.50 x 180 20/80 +2.00 sphere

5 year old male
State required exam for Kindergarten entrance
Progress



Case findings	
OD	OS
20/125	20/20
No improvement of VA Begin 2 hours of occlusion daily OS	
No improvement of VA Continue with occlusion 2 hours of occlusion daily OS	



20/30

7 month follow up	Minimal Questions Continue
May 9 month follow up	
August 12 month follow up	+6.00 -1.50 +2.00 sphere

PEDIG Studies

Occlusion

Prior to PEDIG 6 hours daily = norm

PEDIG Studies

Occlusion Dosage results

- 2 hours vs. 6 Hours = No difference (ATS 2B)
 - moderate amblyopes
- 6 hours vs. Full time = No difference (ATS 2A)
 - Severe amblyopes
- 2-6 hours occlusion vs. daily Atropine (ATS 1)
 - Similar results
 - 2-3 lines of VA improvement

PEDIG Studies

Atropine

Functions by its inhibition of accommodation, preventing the better seeing eye from being used at near fixation distances

PEDIG Studies Atropine and...

Atropine vs. Occlusion (3-7 y.o.) (ATS 1)

- Same results
- Treatment effect similar to 2 and 6 hours of occlusion
- 80% reach max improvement by 4 months
 - 50% ≥ 20/25 by 4 months
 - may take up to 10 months

PEDIG Studies Atropine and...

- **Atropine vs. Occlusion Cost effectiveness**
 - Patching
 - Adhesive patches 35 cents/per x 6 months - \$100
 - Atropine
 - One 15 mL bottle lasts 6 months = \$15

PEDIG Studies Atropine and...

- **Atropine Installation: Daily vs weekend (ATS 4)**
 - Same results
 - Both revealed 2.3 lines of improved VA in moderate amblyopia
 - Slightly less compliance
- **Can Atropine be used for severe amblyopia (20/125 - 20/400)**
 - Atropine only = 21% mean VA \geq 20/40, 4% mean VA \geq 20/25
 - Atropine + plano lens = 39% mean VA \geq 20/40, 13% mean VA \geq 20/25

PEDIG Studies Atropine and Occlusion Psychosocial Effect

- **Amblyopia Treatment Index**
 - 20 question test assesses the psychosocial impact on the child and the family in regard to amblyopia treatment
 - Evaluated after 5 weeks of treatment
- Atropine treatment better tolerated in regard to:
 - Adverse effects
 - Difficulty with compliance
 - Social stigma

PEDIG Studies Near activities while patching...ATS06

- To determine whether "near" activities enhance the effect of patching on visual acuity improvement in strabismic and anisometropic amblyopia when compared with "distance" activities in the treatment of moderate amblyopia and severe amblyopia in children 3 to <7 years old.
- **Results:**
 - At 8 weeks, improvement in amblyopic eye visual acuity averaged 2.6 lines in the distance activities group and 2.5 lines in the near activities group
 - At the 17-week examination, children with severe amblyopia improved a mean of 3.6 lines with 2 hours of daily patching.
- **Conclusions:**
 - Performing common near activities does not improve visual acuity outcome when treating anisometropic, strabismic, or combined amblyopia with 2 hours of daily patching. Children with severe amblyopia may respond to 2 hours of daily patching.

PEDIG Studies ATS02C - An Observational Study on Recurrence of Amblyopia After Discontinuation of Treatment

- Recurrence occurred in 35 (24%) of 145 cases and was similar in patients who stopped patching (25%) and in patients who stopped atropine (21%).
- **Conclusions:**
 - Approximately one fourth of successfully-treated amblyopic children experience a recurrence within the first year off treatment. For patients treated with 6 or more hours of daily patching, our data suggest that the risk of recurrence is greater when patching is stopped abruptly rather than when it is reduced to 2 hours per day prior to cessation. A randomized clinical trial of no weaning versus weaning in successfully-treated amblyopia is warranted to confirm these observational findings.

PEDIG Studies

To determine whether age at initiation of treatment for amblyopia influences the response among children 3 to less than 13 years of age with unilateral amblyopia who have 20/40 to 20/400 amblyopic eye visual acuity.

- Amblyopia is more responsive to treatment among children younger than 7 years of age. Although the average treatment response is smaller in children 7 to less than 13 years of age, some children show a marked response to treatment

Case Example

Case Example
4 year old female
c/o eye turn noted in infancy, increasing frequency, LE only

Case findings		
Snellen VA	Distance	
	OD OS	
	20/20	20/200
Distance/Near Cover Test	30Δ CLET	
Stereopsis cc	(-) Forms, (-) Fly	
Refractive Correction	OD	+1.00 -1.00 x 180
	OS	+1.00 -1.00 x 180

Dx: Strabismic Amblyopia

No significant refractive error OD vs. OS
UNILATERAL decrease in VA

Case Example
4 year old female
c/o eye turn noted in infancy, increasing frequency, LE only

Case findings	
No Rx given Began 2 hours daily occlusion OD Poor / intermittent compliance with occlusion tx One year results	
Snellen VA	VA improvement 20/200 to 20/80
Distance/Near Cover Test	30Δ CLET
Stereopsis cc	(-) Forms, (-) Fly

Case Example

Case 5 yo male

- 1st exam April, outside Vision Center
- Referral for vision therapy
- Diagnosis:**
 - **Bilateral Isometric/ Refractive Amblyopia**
 - BVA (Distance) 20/200 OD, OS, OU, NVA 20/80 OU
 - (-) strabismus
 - Trial Frame caused diplopia
 - Trial framed full Rx
 - NO Rx given secondary to pending consultation

Case
5 yo male

- IEI Peds Service Exam one month later
- Cc: holds things close to read, no developmental delays noted
- DVA: 20/125 OD, OS, OU
- NVA: 20/200 OD, OS, OU
- CT: ortho

Retinoscopy / Refraction

- Dry Ret
 - +9.50 -2.00 x 180 OD 20/80
 - +9.50 -2.00 x 180 OS 20/80
 - 20/80 OU
- Trial Frame to determine plus acceptance:
 - +7.50 -2.00 x180 OU D:20/80 N:20/60
 - +5.50 -2.00 x180 OU D:20/50 N:20/80
- Cycloplegic Ret
 - +9.50 -2.00 x 180 OU

Dx: Isometropia Amblyopia

High refractive error OU
BILATERAL decrease in VA

Assessment / Plan

- Assessment**
 - Isometropic Amblyopia
 - High Hyperopia / Astigmatism OU (no previous Rx hx)
- Plan**
 - Rx given
 - +5.50 -2.00 x 180 OD
 - +5.50 -2.00 x 180 OS
 - Add +2.00 D

5 year old male

ONE month follow up / all testing with Rx wearing Rx FT with comfort

Case findings				
Snellen VA cc	Distance		Near	
	OD	OS	OD	OS
Rx	OD +5.50 -2.00 x 180 OS +5.50 -2.00 x 180 +2.00 Add			
Distance/Near Cover Test	ortho			
Stereopsis	(-) Forms, (-) Fly			
Ret over Rx	+4 D			
VA with additional +2D	NI			

5 year old male

TWO month follow up / all testing with Rx wearing Rx FT with comfort

Case findings				
Snellen VA	Distance		Near	
	OD	OS	OD	OS
Rx	OD +5.50 -2.00 x 180 OS +5.50 -2.00 x 180 +2.00 Add			
Distance/Near Cover Test	ortho			
Stereopsis	(-) Forms, (-) Fly			
Ret over Rx	+4 D			
VA with additional +2D	DVA 20/25 OU, NVA 20/30 OU			

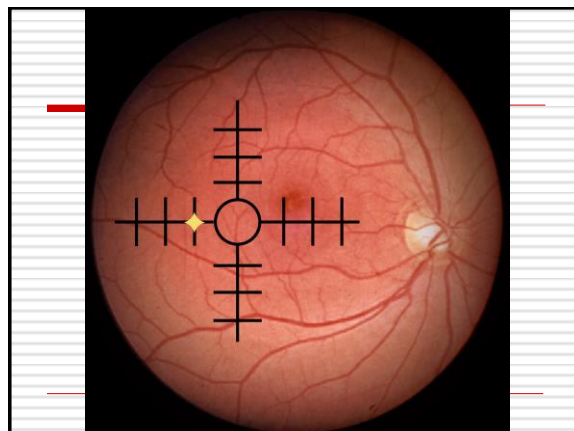
NEW RX

- Increase plus in Rx
- Eliminate Bifocal
 - +8.00 -2.00 x 180 OD
 - +8.00 -2.00 x 180 OS
- RTC 3 months

5 year old male
 FIVE month follow up / all testing with Rx
 wearing Rx FT with comfort

Case findings				
Snellen VA	Distance		Near	
	OD	OS	OD	OS
	20/40	20/20	20/40	20/20
Rx	OD +8.00 -2.00 x 180 OS +8.00 -2.00 x 180			
Distance/Near Cover Test	6Δ CRET			
Stereopsis	(-) Forms, (-) Fly			
W 4 Dot	4 dots near, suppression distance			
Bruckner	Writer brighter OD			
Visuoscapy	2Δ nasal EF			

Bruckner Test



Microtropia / Small Angle Esotropia

Common Clinical Characteristics	
Small Angle Strabismus ($\leq 8-10 \Delta$)	YES
Amblyopia	YES
Defective stereoacuity	YES
Good Peripheral Fusion	YES
Central suppression scotoma	YES

Microtropia

Variable Clinical Characteristics	
Movement on UCT	YES
Size of deviation (2-10 Δ)	6Δ
Presence of Eccentric Fixation	YES
Presence of Anisometropia	NO

Microtropia

Test Sequence

Visual Acuity
Cover test: movement or no movement
Random Dot Stereopsis
Stereo Fly
Bruckner Test
Worth 4 dot - fusion at near (peripheral) / suppression at distance (central)
Visuoscopy

Assessment / Plan

□ Assessment

- Strabismic Amblyopia OD
- High Hyperopia / Astigmatism OU

□ Plan

- Rx given
 - +8.00 -2.00 x 180 OD
 - +8.00 -2.00 x 180 OS

Amblyopia Definition

DEFINITION OF FUNCTIONAL AMBLYOPIA

- Unilateral (infrequently bilateral) condition
- BVA < 20/20
- No structural or pathologic anomalies
- ³1 of the following occurring before age 6:
 - *Amblyogenic anisometropia*
 - *Constant unilateral strabismus*
 - *Amblyogenic bilateral isometropia*
 - *Amblyogenic uni / bi astigmatism*
 - *Image degradation*

Review of types of amblyopia

- Anisometropic Amblyopia
- Strabismic Amblyopia
- Isometropic Amblyopia
- Image degradation Amblyopia

Potentially Amblyogenic Refractive Errors

Isometropic Amblyopia	Diopters
Astigmatism	> 2.50
Hyperopia	> +5.00
Myopia	> -8.00

Anisometropic Amblyopia	Diopters
Astigmatism	> 1.50
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Myopia	> -3.00

Questions addressed by PEDIG Studies

- How well do glasses alone treat amblyopia?
- Do we really know that occlusion works?
- How many daily hours of prescribed occlusion are necessary?
- What happens when occlusion is stopped?
- Does occlusion work in older children?
- Does atropine work as well as occlusion?
- How often does Atropine need to be used?

And so on....

QUESTIONS?

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