

**The Successful Treatment of Adult Strabismus:
The Road Less Traveled**

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Financial Disclosure

I receive no financial compensation for any instrument, book, or piece of equipment I will discuss in my lecture.

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Introduction

Practice Overview

OBJECTIVES

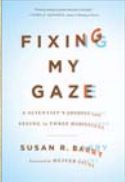
- Changing how you do things:
 - CASE HISTORY
 - DIAGNOSTIC TESTING
 - CASE PRESENTATION
 - LENSE PRESCRIBING GUIDELINES
 - TREATMENT OVERVIEW

Adult Strabimics:

Why are they here?

TOP 20 REASONS THEY COME IN

- 1) DR.SUE BARRY'S BOOK "FIXING MY GAZE"
 - WANT 3D VISION
 - 3D IS ALSO DESIRED FOR VIEWING 3D MOVIES AND VIDEO GAMES
- 2) COSMESIS
- 3) SECOND OPINION TO EYE MUSCLE SURGERY
- 4) IMPROVE ACUITY IN AMBLYOPIC EYE
- 5) HAVE PRISM IN RX AND WANT TO WEAR CONTACT LENSES
- 6) WANT TO REDUCE OR ELIMINATE NYSTAGMUS



TOP 20 REASONS THEY COME IN

- 7) DIPLOPIA SECONDARY TO:
 - Post-Lasik
 - Scleral buckle
 - De-compensated long standing strabismus
 - Virus
 - Post-eye muscle surgery
 - TBI/stroke/tumor
 - Systemic disease

TOP 20 REASONS THEY COME IN

- 8) WANT TO IMPROVE EYE-HAND COORDINATION
 - Accident prone or clumsy
- 9) CAN'T SEE WELL OR DRIVE AT NIGHT
- 10) NEED TO PASS JOB VISION REQUIREMENT
- 11) MOTION SICKNESS, HEADACHES, ASTHENOPIA
- 12) WANT TO IMPROVE READING SPEED, READING STAMINA, AND LEARNING EFFICIENCY
- 13) OD/MD/DO/OT/CHIROPRACTIC REFERRAL

TOP 20 REASONS THEY COME IN

- 14) CONCERN ABOUT DETERIORATION OF ACUITY IN THE PREFERRED EYE
- 15) DIFFICULTY WITH EYE CONTACT
- 16) DECOMPENSATED SUPERIOR OBLIQUE PALSY/MONOVISION
- 17) ROUTINE EYE EXAM/FIRST EYE EXAM
- 18) PRISM RX KEEPS WORSENING
- 19) FOUND ON THE INTERNET/NEW TREATMENT
- 20) WANT TO IMPROVE THEIR VISION

WHY THE RULES NEED TO BE CHANGED

- All the prognostic indicators we were taught in school would exclude many of these patients from receiving treatment
- The needs of these patients do not always relate to a functional cure, cosmetic cure or elimination of amblyopia
- Data gathering can be difficult due to head posture, non-comitancy, suppression, etc.

ROADBLOCKS

What keeps Optometrists from working with this population?

- 1) Knowledge disseminated during their optometric education.
 - Amblyopia can't be treated after a certain age
 - You can't achieve good cosmesis without good acuity in the strabismic eye
 - If angle of deviation exceeds a certain number of degrees VT can't help
 - If a patient has had multiple surgeries, VT won't work
 - You can't develop stereopsis in long standing strabismus

ROADBLOCKS

- 2) Other optometric colleagues don't refer them
- 3) Ophthalmologists won't refer and are often hostile
- 4) Fear of creating intractable diplopia
- 5) Patient history of unresponsiveness to occlusion therapy
- 6) Patients are unaware the service is available

ROADBLOCKS

- 7) Misconception that treatment takes years
- 8) Misconception that the treatment is costly
- 9) Optometrists don't feel confident to treat them
- 10) Prognostic indicators point to a low functional cure rate
- 11) Belief that patients with ARC cannot be successfully treated
- 12) Lack of awareness about what other benefits can be provided to these patients

CASE HISTORY DATA THAT SHAPES PROGNOSIS

ASK ABOUT:

- Premie/toxic birth or pregnancy
 - Was the birth weight normal?
 - Was the pregnancy complicated in any way?
- Episodes of high fever, childhood illnesses, head trauma prior to onset of problem
- Developmental delays/low muscle tone/disabilities
- Family history of strabismus
- When was it first noticed and by whom?
- Actions taken

ASK ABOUT:

- Was patching done?
 - Constant? Unilateral?
 - What age?
- Was surgery ever done or recommended?
 - What age?
 - Successful?
- Were glasses prescribed or recommended/if so was there improvement?
- Have they ever had VT or orthoptics or were they recommended?
- What did the last doctor say about the condition and when was their last exam?
- How do they think it has affected their life?
- Is it a cosmetic problem to them?
- Can they see double, change the fixating eye?

ASK ABOUT:

- Do they see double?
 - When?
- Are they aware of which eye is weaker or which eye they are using?
- Do they experience eye strain, headaches, eye fatigue
- Do they exhibit a head tilt or distorted posture/are they aware of it?
- How is their driving, eye hand coordination and depth perception?
 - Do they have problems driving at night

ASK ABOUT:

- Can they multi-task well?
- How do they learn best?
 - Quality of math, spelling, and handwriting skills
 - Do they enjoy reading? How good is their reading performance
 - Speed
 - Comprehension
 - Endurance
- What are the visual demands of their job or hobbies?
- If we could help, what do they want us to do?
- Ability to verbalize problem and goal
- Motivation/actions prior to visit

ORGANIZE YOUR DATA

Creating themes within your evaluation helps to determine diagnosis, prognosis and duration of the treatment.

ORGANIZING YOUR DATA INTO THEMES

- VISUAL ACUITY POTENTIAL
- EYE HEALTH
- RETINAL CORRESPONDENCE
- MAGNITUDE, LATERALITY AND FREQUENCY OF DEVIATION
- OCULOMOTOR ABILITIES
- VOLUNTARY CONTROL OF FIXATION OR ALIGNMENT
- REFRACTIVE STATUS
- DIFFERENCES IN VISUAL PROCESSING IN THE 2 EYES
- CONSISTENCY OF THE DATA
- BINOCULAR STATUS
- BILATERAL ORGANIZATION
- PERFORMANCE/COGNITIVE ABILITIES

Visual Acuity Potential

- Standard Snellen Chart
 - Far and Near
 - With and without Rx
 - Single Line
 - Single Letter
 - Pinhole
 - 2.5 Teleschope
 - Subjective differences in brightness, size, and spacing
- Keystone Skills
 - Distance VA slides
 - With occlusion of non-fixating eye
 - Dots in front of one eye
- Contrast sensitivity
 - Far and Near

Visual Acuity Potential

- Fixation
 - Use visuoscopy to determine whether fixation is central or eccentric
 - MIT Brushes
 - AI transfer if fixation is central
- Anisometropia
- Patching Impact
- Appearance of macula and disc

Eye Health

- Appearance of corneas, lenses, foveas, maculae, and optic nerve heads
- Amsler Grid
- Color Vision
- Pupil Reflexes
- Keratometry Readings/corneal topography
- OCT/VEP if acuity reduced

Visual Processing Differences Between the Two Eyes

- Speed, Facility, Amplitude, and Flexibility of Accommodation
- Spatial Localization
- Subjective Reports of Differences
- Brightness of the Retinoscopic Reflex Differs
- Refractive Differences
- Changing Head Posture
- Contrast Sensitivity Differences when Snellen VA is the Same
- Visual-Perceptual Processing Differences Especially in Cases of Amblyopia or EF

Oculomotor Abilities

- Pursuits
 - Monocular and Binocular
- Saccades
 - Monocular and Binocular
- Park 3-Step
- Hess-Lancaster/Limits of Gaze
- Case History

Refractive Status

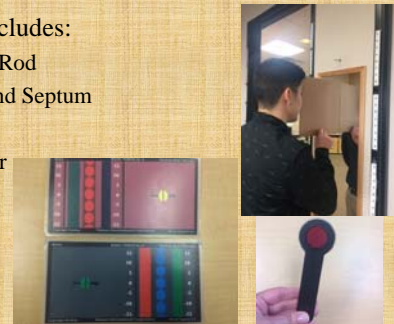
- Dynamic Retinoscopy:
 - With working distance lens
 - With non-fixating eye occluded
 - With non-fixating eye over-plussed
- Book/Bell/MEM/Stress Point Retinoscopy
- Subjective Refraction
- Qualitative Response Reliability
- Affect of lens power on eye alignment and performance

Magnitude, Frequency, and Laterality of the Deviation

- Cover Test
 - Far and Near
 - Subjective and Objective
- Maddox Prism
- Phorofter at Far and Near
- Mirror and Septum Standing
- Visacare Slides at Far Point
- VO Star
- Brock Posture Board
 - Straight Ahead
 - Through Reading Lens
- Lantern with Prisms
- Straited Lenses with Prisms
- Cheirosopic Tracing
- Troposcope
- Effect of Vestibular Stim

Vertical Deviation

- Testing Includes:
 - Maddox Rod
 - Mirror and Septum
 - Visacare
 - Phorofter



Voluntary Control and Awareness

- Can the patient:
 - Voluntarily change the fixating eye?
 - Voluntarily create double vision?
 - Control the alignment of their eyes?
- Do they have peripheral awareness on all tasks?
 - Walking, Standing, or Sitting

Ease of Achieving Double Vision

- Test using:
 - Phoropter
 - Septum
 - Keystone Skills
 - Red-Green Lantern
 - Prism Dissociation
 - Binasal Occlusion
 - Grating Filter over fixating eye

Consistency of the Data

- Eye health appears the same but one eye has reduced VA
- Magnitude of deviation varies depending on test distance, position of gaze, and test used
- Performance behind the phoropter is different than outside the phoropter
- Retinal correspondence varies depending on the test used
- Patient suppresses on some activities and is diplopic on others
- Patient can voluntarily change the data
- Preferred eye is different on some tests or at different distances

Binocular Status

- | | |
|--|---|
| <ul style="list-style-type: none"> • Objective appearance of the eyes • Unilateral cover test at far and near with and without Rx (Neutralize!) • Keystone Skills flat fusion slides at far and near • Red-green Lantern (Flat Fusion) at far and near • Brock Posture Board at near • Brock String (spatial localization) | <ul style="list-style-type: none"> • Randot Stereo • Acuity Supp/Quoits Slides • Phoropter Testing • Striated Lenses at Far and Near • Affect of Overplus on fixating eye/Binasals on eye alignment • Ability to make eye contact without being prompted • Hirschberg Binocular Test • Monocularity |
|--|---|

Bilateral Organization/Posture

- Posture and gait are observed
 - Midline subjective and objective
- Head posture observed under monocular and binocular conditions
- Bimanual circles, homolateral and cross-pattern marching, general movement patterns are observed
- Primitive Reflexes probed
- Case history data related to coordination

Performance/Cognitive Abilities

- Case History Data
- How Well Does Patient Follow Instructions
- Does Patient Need a Lot of Data Before Making a Decision
- Observation Skills
- Visual-Perceptual Abilities
- Expressive Language

Retinal Correspondence

- Test Using:
 - Keystone Skills
 - Bagolini Lenses
 - Phoropter
 - Cover test with prism neutralization
 - Afterimage transfer if eccentric fixation is absent

CASE PRESENTATION GUIDELINES

- Most of it done during the testing
- Arc is a non-issue
- To be accepted in the program, the benefits it provides go beyond me telling them they are better
- No promises about VA in amblyopic eye.
- Patient must understand that RX may change, prism maybe necessary and full time RX may result
- I only arrange conditions for them to learn, progress is a function of their learning curve, motivation and severity of the visual condition
- The worst we can do is better than anything ophthalmology can

CASE PRESENTATION GUIDELINES

- Each patient goal is given a prognosis
- You can significantly reduce asthenopic symptoms without achieving fusion or improving binocular function
- Cosmesis awareness varies from individual to individual
- Patient goals are always lower than yours – and more important
- Often, the happiest patients are the ones you feel you do the least for
- For many patients, they feel empowered to be able to do something about their condition

CASE PRESENTATION GUIDELINES

- The In-office Treatment Option:
 - Trial period/estimated duration
 - Consequences if proceed:
 - Headaches
 - Diplopia
 - Slower reading speed
 - Reduced eye hand coordination
 - Possibility of compensatory prism
 - Scaling down goals

General Rules for Lens Prescribing

- Consider their current Rx – when is it worn, vocational demands, visual needs, flexibility, and goals of Tx
- If not worn full time, strive for symmetry
- Cylinder axis is prescribed as near to axis 180 or 90 as patient can tolerate with good VA
- Cylinder power is the least amount necessary
- Bifocal Rx is determined outside of the phoropter and if there is no simultaneous vision, the bifocal is postponed
- Vertical prism is only prescribed if vision therapy cannot help them control the hypertropia

General Rules for Lens Prescribing

- Lateral Prism is prescribed very sparingly and only if fusion can be achieved in no other way
- Patients that come in wearing lateral prism (especially BO) are hard to wean off of prism
- If my Rx is similar to the patient's old glasses I hold off until the end of therapy to prescribe
- I do not prescribe maximum plus or minus at distance unless it significantly helps alignment – this encourages flexibility with therapy
- I strongly recommend contact lenses for all patients with anisometropia, high corneal astigmatism, and nystagmus.

Working with Adult Strabismics

- They need to have confidence in you because they are frightened of change
- They will ask questions and expect answers
- Watch for nausea, dizziness, lightheadedness, and headaches, especially, early in the therapy program
- Let the patient understand the rationale of each activity
- Lack of success in VT is the doctor's responsibility: Too high a level of demand or inappropriate explanation

Working with Adult Strabismics

- Be patient with stereopsis because it takes time
- Acuity in the amblyopic eye improves to a certain point and plateaus until fusion and stereopsis have been achieved
- Never underestimate motivation in a patient
- Never underestimate the impact of a vision therapy procedure on the patient
- Many of these patients cannot visualize well
- Ask permission before doing certain activities


Working with Adult Strabismics

- Never be afraid to introduce an activity earlier than you normally would
- Many of these patients have poor bilaterality
- Adults are more patient with time than parents of children in therapy
- You never eliminate a strabismus pattern. Instead, you replace it with a more efficient one.
- The patient must be willing to change and able to monitor themselves


OVERVIEW OF TREATMENT

- STRAIGHT AHEAD FIX. ABILITY IN AMBLYOPIC EYE
- MONOCULAR IN BINOCULAR FIELD
- SIMULTANEOUS VISION
- GROSS FUSION/AND OR STEREOPSIS
- WORK WHERE THEY CAN FUSE AND EXPAND
- FINE FUSION
- STEREOPSIS
- CLEAR COMFORTABLE BINOCULAR VISION
- VISION EFFICIENCY/VISUALIZATION IF DESIRED

OD



OS



HOW MY TREATMENT HAS CHANGED

- LESS TIME TO GET DESIRED RESULTS
- TRY TO AFFECT CHANGE FASTER
- TRY TO GET STEREO EARLIER
- LESS SOCRATIC, MORE TELLING THEM WHAT THEY SHOULD SEE
- ACCEPTING THAT I CAN'T HELP THEM ALL
- THE MORE YOU TRY TO DISCOURAGE THEM, THE MORE THEY WANT TO TRY THE TREATMENT
- NEVER ASSUMING IT IS TOO EARLY TO TRY AN ACTIVITY

Partial Occlusion

- Used to elicit diplopia and help eye alignment
 - Binasals
 - Half Nasal Occlusion
 - Cloudy Patch

Binasal Occlusion

- If they produce a straightening of the eye or simultaneous vision
- Start a minimum of 2mm inside near PD at a slight angle
- Promote abduction, eliminate cross fixating, and can create alternation
 - Good for really embedded cases

Binasal Occlusion



- Symmetric Binasals



Binasal Occlusion

- Asymmetric Binasals



Half Nasal Occlusion

- To encourage use of the poorer eye in a binocular field
- Placed in front of the normally fixating eye on an angle



Cloudy Patch

- All Patients with Acuity Better Than 20/200



Case Studies:

When What You've Learned Doesn't Work

Case Study 1: Sue

- 21 year old female with congenital esotropia, 2 P.S. before age 2
 - Was referred by MD 2 years ago and OD
 - Afraid cannot be helped cosmetically

Case Study 1: Sue

- Significant History:
 - Congenital ET
 - 2 surgeries before age 2
 - Worn glasses since 6/CL since 15
 - No diplopia
 - Can't read without headaches and no comprehension
- Bulemic and on anti-depressants for over 8 years
- Can control which eye she is using
 - If fixating with OD, cosmetically looks better but auditory comprehension is reduced
 - If fixating with OS, right eye turns way up

Case Study 1: Sue

- More Significant History:
 - Poor coordination
 - When driving she feels as if she will hit parked cars on the right
 - Makes 4 right turns rather than making a left turn
 - Can't park a car
 - Cannot understand movies
 - Cannot drive with the radio on

Case Study 1: Sue

- Exam findings:
 - Eye Health:
 - Fundus exam negative (in depth by prior OD)
 - Foveal reflexes present and equal
 - Slit Lamp/Pupil/Keratometry negative
 - Acuity Potential
 - Aided with -4.25 OU CL: 20/20 OD, OS, OU at far and near
 - Fixation central and steady
 - Grid negative/C.S. negative

Case Study 1: Sue

- Exam Findings Continued:
 - Retinal Correspondence
 - NR due to lack of simultaneous vision/ suspect ARC
 - Magnitude of Deviation
 - Difficult to measure – estimated 45 LET, can alternate with up to 15 Left Hypophoria
 - No diplopia elicited on any task
 - Non-comitant in APOG
 - Ocular Motor Skills
 - OD and OS less than average
 - No limits

Case Study 1: Sue

- Exam Findings Continued:
 - Voluntary Control
 - Good, Low PA
 - Retinoscopy
 - No difference all three ways: good bright pink reflex
 - Binocular Status
 - None
- Differences between the two eyes
 - Versions: OD>OS
 - Accommodation: OS>OD
 - Spatial: OD>OS
 - PA: OS>OD<
 - Average
 - Subjective: OD>OS

Case Study 1: Sue

- Exam Findings Continued:
 - Bilaterality
 - 8 year old level
 - Cognitive Level
 - Very Bright

Case Study 1: Sue

- Diagnosis:
 - Constant Right Esotropia but can alternate
 - Suppression
 - Non-Comitancy
 - Left Hypophoria
- Prognosis:
 - Guarded 12 session trial
- Goal:
 - Establish OD as dominant pattern of operation

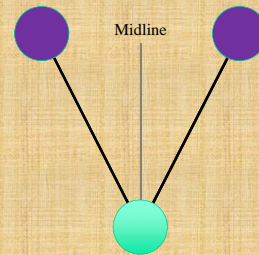
Case Study 1: Sue

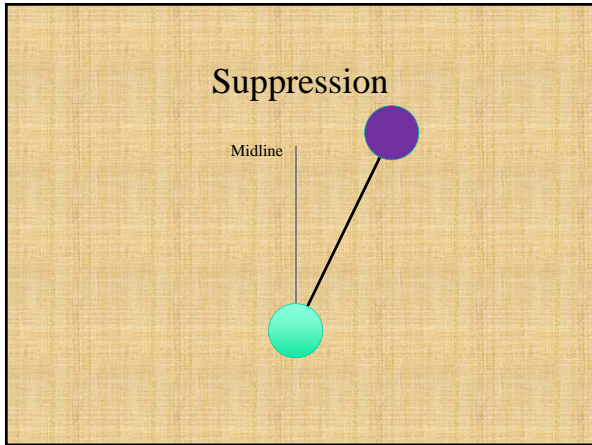
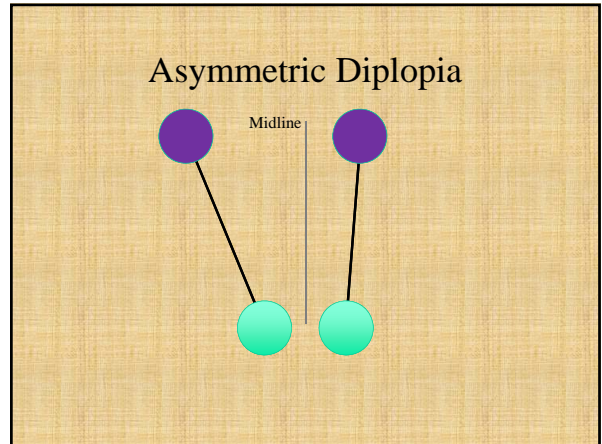
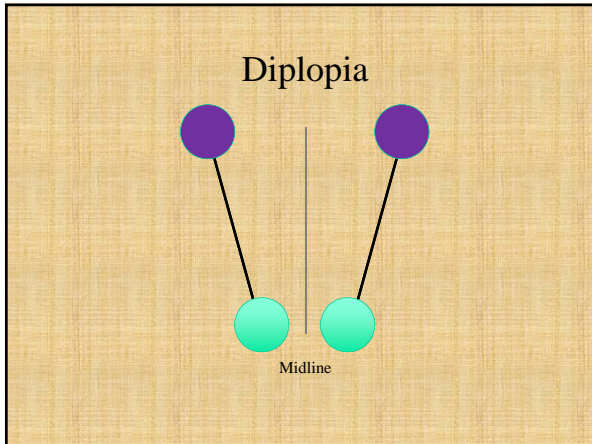
- Vision Therapy:
 - She would initially struggle with simple exercises but would adapt to them quickly throughout the week
 - By controlling her fixation we could achieve 3D (peripheral fusion)
 - She began to integrate binocularity too quickly
 - We would take breaks from therapy so that it wasn't so overwhelming

Physiological Diplopia

- Physiological Diplopia and diplopia can be your friend when trying to improve comesis
 - Use a penlight in a dark room with the light for fixation.
 - You are striving for symmetrical physiological diplopia

Physiological Diplopia





Diplopia

- Testing/Therapy can include:
 - Red/Green circle, X, and square
 - Pierce Light
 - Red/Green Lines and Light

Controlling Fixation to Gain Peripheral Fusion

- Use a fixation point while attempting to get peripheral stereo
 - With projected Quoits
 - With CE Scope
 - With the Beak
 - With the Brock String

Quoits and CE Scope

Quoits with central target

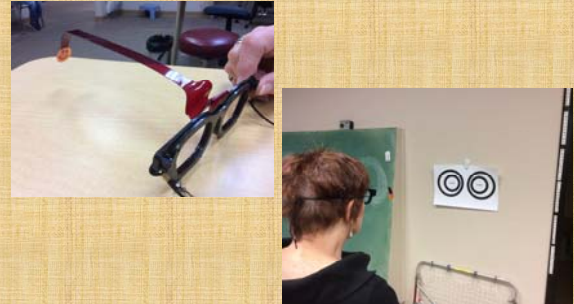
Quoits with suppression slide

CE Scope with central target

Using a Beak



Using a Beak



Case Study 1: Sue

- Outcome:
 - Achieved peripheral fusion and still struggled with small target fusion
 - Created amblyopia in the non-fixating eye in order to achieve the small target fusion
- Don't fix what isn't broken!

Case Study 2: Terry - age 42

- Dx: Acquired Right Superior Oblique Palsy and Diplopia
 - He had no visual problems until a stunt accident 14 years ago where he broke both feet and hit his occipital lobe and developed double vision
 - It improved somewhat over time and then he reinjured the same place on the back of his head 7 years later(never sought help)
 - Socially it affects him(people notice it)

Case Study 2: Terry

- Was never a good student(barely graduated high school)
- Never enjoyed reading, reads slowly
- Good Multi-tasker/Excellent coordination
- Uses left eye but can look through either
- Top tier of movie stuntman
- Vertical prism is not an option, will come as long as it takes

Case Study 2: Terry

- Eye Health: normal
- Unaided VA was 20/20+ in each eye at far and near
- Cover Test: 22 prism diopters of Right HPT at far and near with diplopia which worsened above straight ahead gaze and in looking to his left
- Oculomotor abilities were equal in each eye but his right eye moved upward on gaze to his left

Case Study 2: Terry

- Retinoscopy and Subjective: Plano OU
- Brock Posture Board: 3" Right Hypertropia
- Phoropter Phorias: 19pd Right HYPT at far and near
- Septum: 22 Right HYPT
- Vertical prism was not an option, and he would come as long as it would take

Case Study 2: Terry

- What is the best outcome for a superior oblique palsy?

Case Study 3: Jacky A.

Recommended Reading

THE END