


Sensory Fusion, Motor Fusion, Life...A Top Down Approach For Better Outcomes in Strabismus

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Overview

- Prevalence of strabismus is 2-4% of the population
- Types: Esotropia, Exotropia, Hypertropia
- Definition: A dysfunction in the visual system affecting proper coordination of the two eyes, leading to defective depth perception, defective eye movement control and defective eye hand coordination.




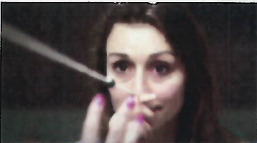
Assessment of Strabismic Patients

- Visual Acuity: Determine if amblyopia is present
- Cover Test in all gazes: Determine if angle is comitant or non comitant
- Worth 4 Dot: Determine zone of suppression
- Maddox Rod: Asses if anomalous correspondence is present
- Visuoscopy: Asses if eccentric fixation present
- Refraction
- Vergence Testing if Able
- Accommodation Assessment
- Oculomotor: Pursuits and Saccades
- Comprehensive Eye Health Evaluation
- Visual Processing Testing When Applicable



Treatment Options

- Surgery
- Prism: fresnel or ground in
- Vision Therapy

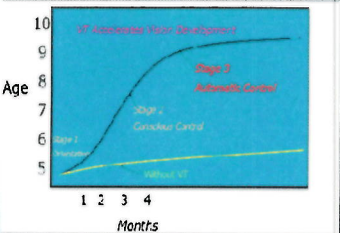
Treatment Tools

- Lenses
- Prism: Compensatory, Therapeutic, Yoked
- Binasal Occlusion
- Vision Therapy:
 - Office Based Vision Therapy with Home Support Activities




Phases of Vision Therapy Treatment

- 1.) Orientation
- 2.) Conscious
- 3.) Loading



Vision Therapy for Strabismic Patients


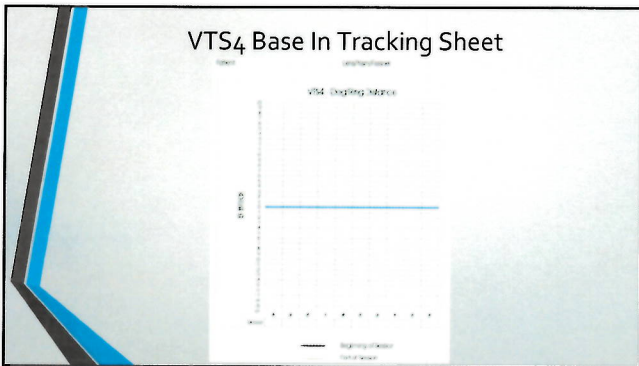
- Have patient set their goals that they hope to achieve in vision therapy
- Recommend strabismic patients keep a journal during their VT journey
- Antisuppression
- 1st Degree Fusion → Simultaneous Perception
- 2nd Degree Fusion → Flat Fusion
- 3rd Degree Fusion → Stereopsis
- Expand Ranges of Fusion
- KEY: Ensure transfer of visual skills learned in the therapy room to patient's everyday life



Esotropia Treatment Protocol

PHASE 1:

- Application of bifocal and binasal occlusion on ALL esotropes
- Antisuppression Therapy: Send home MFBF activities to be completed for 1 hour daily
- Home Vivid Vision sent home with angle of deviation set on the unit
- Focus on peripheral awareness activities and peripheral fusion
- Build sensory and motor fusion ranges
- Begin base in tracking using VTS4 dog/ring target
- **Apply Fresnel Prism if Needed/Appropriate


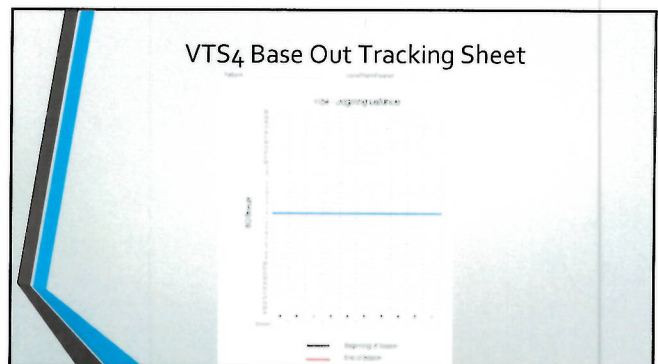
Esotropia Treatment Phase 2

- Build flexibility in vergence and accommodative system: BIM/BOP
- Add loading to vision therapy activities:
 - Cognitive
 - Vestibular
 - Auditory




Exotropia Treatment Protocol

- Antisuppression Therapy: Send home MFBF activities to be completed 1 hour per day
- Home Vivid Vision sent home set at patient's angle of deviation
- Focus on detailed activities
- Strengthen accommodation
- Build peripheral fusion
- Build sensory and motor fusion ranges
- Begin base out tracking on VTS4 dog/ring target
- **Apply fresnel prism if needed/appropriate

Exotropia Treatment Phase 2

- Build flexibility in vergence and accommodative system: BIM/BOP
- Add Loading to vision therapy activities:
 - Cognitive
 - Vestibular
 - Auditory



Phase 3 for All Strabismic Patients: Application of Skills in LIFE!

- Modify traditional vision therapy techniques to target patients' goals
- Discuss/encourage the patient to try new things that they typically avoided in the past
 - Ex: Play catch, go to a batting cage etc



Pearls for Working with Strabismic Patients in Therapy

- Be creative in therapy to help each patient achieve their individual goal
 - The Wow GR team will present 3 cases and show how we modified traditional techniques to specifically help the patient achieve THEIR goals!
- Remember that there is a significant emotional component for these patients, especially in adults that have had this their entire life.
- Have empathy and understand that these patients will have good days and bad days in therapy and be supportive on their journey



Strabismus impact on mental health

PEDIATRICS
OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Mental Illness in Young Adults Who Had Strabismus as Children
Brian G. Motyko, MD, MSc, Katherine Rosen, MEd, Robert J. Nurez, David Mrazik, and Nisha V. Dheer
Pediatrics. 2009; 124:1333-1338
DOI: 10.1542/peds.2007-3284

- **Objective:** Study investigated the prevalence and types of psychiatric disorders diagnosed by early adulthood who had forms of strabismus as children
- Strabismus afflicts 3-5% of children
 - Esotropia > Exotropia in Western populations
 - Exotropia > Esotropia predominates the Asian population

- **Methods:** Medical records of children (<19 years) who were diagnosed as having strabismus were reviewed **retrospectively** for psychiatric disease diagnoses.
 - Each case subject was compared to a randomly selected, individual birth- and gender-matched (control subject)
- **Results:** Mental health disorder was diagnosed for **168 of the 407 patients with a history of childhood strabismus**. (41.3%)
 - compared to the control subjects (30.7%)

- **Results:** Children with exotropia were **3x more likely** to develop a psychiatric disorder than were control subjects
 - Intermittent exotropia were significantly more likely to have more:
 - mental health disorders
 - mental health emergency visits
 - mental health hospitalization
 - suicidal or homicidal ideation
- Patients with strabismus in this study displayed:
 - **greater number and severity** of mental illness compared to the control group.

American journal of ophthalmology
Author Manuscript | 1845 Public Access

The effects of strabismus on quality of life in adults

Sarah R. Hatt, David A. Leske, [...], and Jonathan M.

Holmes

Additional article information

Strabismus and Quality of Life

- **Objective:** In-depth interviews to identify the specific concerns of adults with strabismus
 - 30 adults with strabismus
 - 17 with diplopia
 - 13 without diplopia
 - phrases regarding how strabismus affected everyday life were grouped into topic areas

Results:

- Patients **experiencing** diplopia:
 - MOST frequent occurring topic:
 - negative feeling (really hard, emotionally draining, miserable)
 - general disability (affects everything, feel handicapped, problems getting through the day)
 - Driving (extra caution when driving, driving is terrible)
 - Self-esteem (feel inferior)
- Patients **not** experiencing diplopia:
 - MOST frequent occurring topic:
 - Appearance to others ('people notice my eyes', 'look at me funny')
 - Eye contact
 - Interpersonal Relationships (hard to talk to people, make people uncomfortable)

Results:

- Similarities between the patients with and without diplopia:
 - Self appearance
 - Communication with others
 - Financial (lost jobs because lack of eye contact)
 - Self-confidence
 - Work took them longer
- Differences between patients with and without diplopia:
 - Bumping into things and walking - diplopia worse

Conclusion:

- Quality of life concerns varied between the patients with diplopia and without diplopia
 - Non-diplopic patients: expressed problems with **interpersonal relationships** and **non-verbal communication**
 - Patients with diplopia: Reported problems with **everyday physical functioning**

Research | Open Access | Published 07 May 2017

Health-related quality of life and mental health in children and adolescents with strabismus – results of the representative population-based survey KIGGS

Alexander K. Schuster , Heike M. Efflein, Roman Polera, Martin Schaud, Franz Baumgarten & Michael S. Unsworth

Health and Quality of Life Outcomes '17, Article number 81 (2319) | [Cite this article](#)

433 Accessed | 1 Abstracts | Metrics

- **Purpose:** To see the effect of strabismus on mental health and quality of life aspects in children and adolescents.
- **method:** Baseline Survey was given to 12,989 patients and the presence of strabismus was found by parental questionnaire. Quality of life and mental health were investigated via a questionnaire.
 - 579 Out of the 12,989 reported to have strabismus

Strabismus & Life

- Patients with strabismus
 - lower self esteem
 - less social participation
 - not invited to peers' birthday parties
 - 'picked last on the team'
- Another study displayed:
 - as early as preschool, children with strabismus display lower quality of life compared to children without strabismus
- Surgery can improve the alignment issue, but does not improve stereopsis
 - i.e. hitting a ball, not bumping into thing, and many other activities

Results:

- Children with strabismus had **lower scores** :
 - **making friends**
 - social contact with classmates
 - **more mental health problems**
 - hyperactivity/inattention
 - emotional symptoms
 - peer problems

Conclusion:

- The study found impaired quality of life and mental health in children and young adults with strabismus.



Case 1: JK

- Age: 9 years old
- History: Patching and strabismus surgery at age 3 on right eye for esotropia. Now wearing flat top bifocal with +3.50 add.
- Why was JK here?
 - Significant motion sickness and occasional double vision at distance. School reports poor attention/concentration. Right eye still turning in and ophthalmologist recommends second strabismus surgery. Parents and patient do NOT want to have another surgery.
- Diagnosis: 40 Diopter Intermittent Right Esotropia
- Refraction: OD: +2.25 sph OS: +2.00 sph
- Acuity: OD: 20/20 OS: 20/20
- w4D: Right eye suppression beyond 2 inches
- Suppression during fusional vergence testing at distance and near
- Stereopsis: Distance-None Near-80 seconds of arc

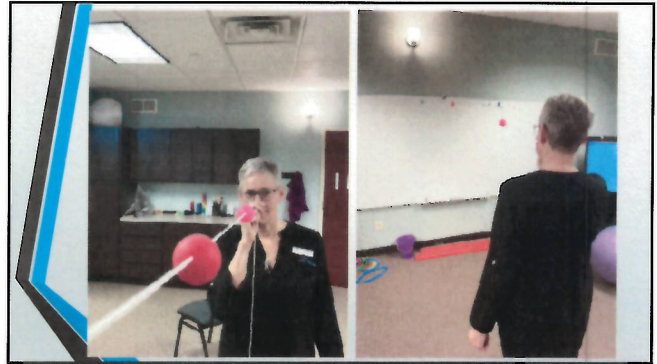
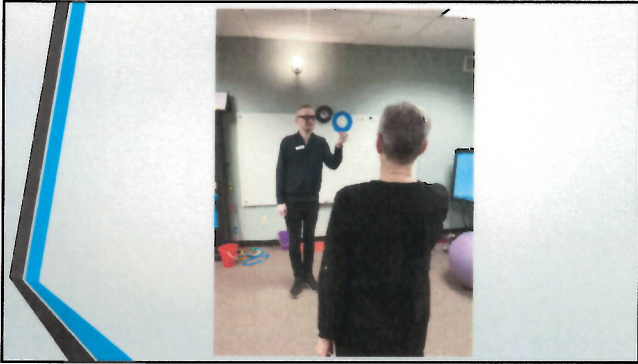
JK's Vision Therapy Goals

- 1.) Reduce dizziness
- 2.) To be able to keep his vision clear and single
- 3.) To improve attention span/concentration
- 4.) To be able to read in the car without motion sickness

JK's Therapy Pearls

1. MFBF OD with PTSII at near, and MFBF OD with detailed videogame play in the distance
2. Application of binasal occlusion and base out fresnel OD (Due to unilateral ET)
 - Progressed through Eso (Base In) Tracking
3. Clinical data looking good however JK is still symptomatic with vestibular issues
4. High Level Loading of Activities to integrate vision with vestibular, cognitive and auditory systems

Modified VT Techniques for JK



JK's Outcome

- Cover Test: Distance-10 Intermittent Right Esotropia, Near-6-8 Esophoria
- Worth 4 Dot: Fusion at all distances
- Distance Fusional Vergence Range: BI: x/8/6 BO: x/25/20
- Near Fusional Vergence Range: BI: x/20/15 BO: x/35/30
- Distance Stereopsis: 60 seconds of arc
- Near Stereopsis: 32 seconds of arc
- **Most Important:** ALL goals achieved!!

Case 2: HV

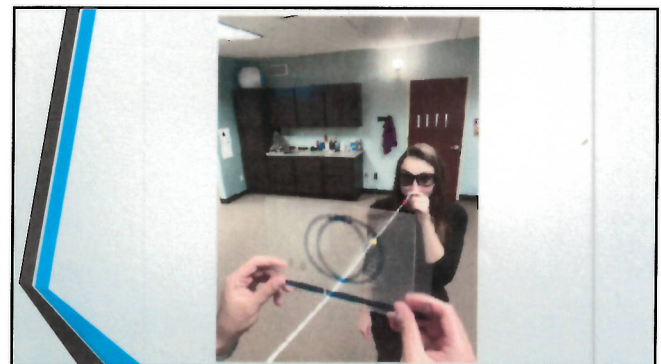
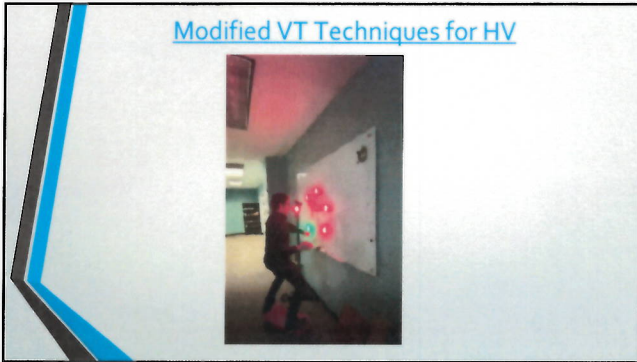
- Age: 29 years old
- Occupation: Dental Hygienist
- History: Bilateral strabismus surgery at 10 months old of alternating esotropia, patching therapy after surgery for many year. Told multiple times by many doctors that she is NOT a candidate for vision therapy.
- Why was HV here?
 - Very aware of cosmesis causing low self confidence. Loses her place often while reading and prefers books on tape. Significant motion sickness also reported.
- Diagnosis: 40 diopter alternating exotropia (left>right) and large angle DVD at distance and near
- Refraction: OD: +0.75 sph OS: +2.25 -1.50 x 055
- Acuity: OD: 20/20 OS: 20/20
- w4D: Alternating suppression at all distances
- Suppression during fusional vergence testing at distance and near
- Stereopsis: None at distance and near

HV's Goals

- 1.) To be able to read without eyes hurting or watering
- 2.) To make driving easier and more accurate
- 3.) To improve her ability to watch, catch, or hit a ball
- 4.) To improve her ability to play volleyball
- 5.) To reduce or eliminate headaches while reading or using the computer

HV's Therapy Pearls

1. Home Vivid Vision set at HV's angle
2. Develop diplopia awareness
3. Application of base in fresnel prism in conjunction with exo (base out) tracking
4. Use patient journal to help create activities targeted towards patients goals



HV's Outcome

- Distance Phoria: 4 Exophoria
- Near Phoria: 4 Exophoria, 2 base down OS
- Worth 4 Dot: Fusion at all distances
- Distance Fusional Vergence Range: BI: x/10/6 BO: 12/24/14
- Near Fusional Vergence Range: BI: x/8/6 BO: 18/24/16
- Distance Stereopsis: 240 seconds of arc
- Near Stereopsis: 200 seconds of arc
- **Most Important:** Significantly improved cosmesis leading to increased confidence and all of patient's goals achieved

Case 3: MC

- Age: 56 years old
- Occupation: College geography professor
- History: Started wearing glasses full time at 18 months old and began patching therapy. Strabismus surgery for large angle constant left exotropia at age 18.
- Why was MC Here?
 - Very aware of cosmesis while teaching college students. Always struggled with sports so avoided them her whole life. No depth perception so while parking in her own garage she uses a suspended tennis ball to know when to stop. Was told she is outside of the critical period therefore she could not change her alignment at this point in her life.
- Diagnosis: 50 Constant Left Exotropia and Left Hypotropia, Left Strabismic Amblyopia
- Refraction: OD: +6.75 -4.75 x 090 OS: +6.50 -4.00 x 085 Add: +2.50
- Acuity: OD: 20/20 OS: 20/400
- w4D: Left suppression at all distances
- Suppression during fusional vergence testing at distance and near
- Stereopsis: None at distance and near

MC's Goals

- 1.) To make driving easier and more accurate
- 2.) To improve her ability to watch, catch, or hit a ball
- 3.) To improve her peripheral awareness to a normal level

MC's Therapy Pearls

1. MFBF OS with Amblyopia I Net
2. Application of fresnel prism OS and begin exo (base out) tracking
3. Add tactile to activities for better spatial awareness
4. As Amblyopia tracking progressed alternating suppression/diplopia occurred but awareness of eye alignment was poor
5. Used journal throughout to better coach and relate to patient in therapy

Modified VT Techniques for MC



MC's Outcome

- Distance Phoria: 5 Exophoria, 1 base up OS
- Near Phoria: 20 Exophoria, 3 base up OS
- Worth 4 Dot: Fusion at near and intermediate distances, occasional left suppression at distance
- Acuity: Distance: OD: 20/20 OS: 20/100 Near: OD: 20/20 OS: 20/40
- Distance Fusional Vergence Range: BI: x/18/10 BO: x/16/6
- Near Fusional Vergence Range: BI: x/28/22 BO: x/22/14
- **Most Important:** Significantly improved cosmesis, improved depth perception while driving, and now plays some sports. MC continues to work on VT exercises at home and is so pleased with her outcome that she reached out to Sue Barry and is considering publishing the journal she kept while in vision therapy!

Summary

- Traditional approach to strabismic patients is to eliminate suppression, and build sensory and motor fusion
- As VT providers we often measure success by improved alignment on cover test, increased fusional vergence ranges and improvement in arc seconds of stereo
- The real key to success is ensuring the patient notes improvement in their visual abilities in LIFE!
 - Have patient set goals
 - Check in with patient throughout therapy to discuss what they note in everyday life
 - Be creative with VT techniques to accommodate patient's individual goals/needs
 - Connect patients with others that are the same age with strabismus to create a strong support network
 - Remember it is an emotional journey for these patients

Questions?

