Anomalous Correspondence in the Real World

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Disclosures

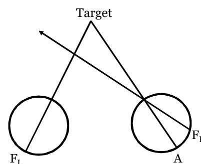
The Presenter and Organizers for

"Anomalous Correspondence in the Real World"

by Dr. Alexis Coffey has no financial relationship with any company or products mentioned in this presentation

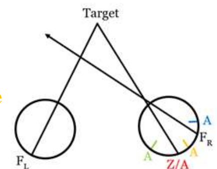
What is Anomalous Correspondence?

- Definition
  - Non-corresponding retinal points are linked in the visual cortex
  - "Point A": point on the retina of deviating eye that gives rise to same visual direction as fovea of fixating eye
  - Entire retina of deviating eye appears to have shifted in binocular visual field around new "point A"
- Why does it develop?
  - Neural adaptation to strabismus



Types of Anomalous Correspondence

- Comparing subjective angle (<S) with objective angle (<H) to find angle of anomaly (<A)
  - <A = <H - <S
    - <H measured from Z point to fovea
    - <S measured from Z point to point A
- Harmonious Anomalous Correspondence
- Unharmonious Anomalous Correspondence
- Paradoxical Anomalous Correspondence
  - PAC I
  - PAC II
- Co-variation



Tests to Determine Anomalous Correspondence

- Red Lens Test*
- Major Amblyoscope/Synoptophore
- Hering-Bielschowsky After-Image Transfer*
- Bagolini Striated Lenses*
- Haidinger Brush After-Image Transfer
- Bi-foveal test of Cüppers

Typical Treatment of Strabismus

- Spectacle considerations
  - Prism, bifocal, monovision
- Surgery
- Vision therapy
  - Occlusion
- No treatment

RG – 5 year old female

- First visit 5/21/19 – wanting second opinion about esotropia and blurred vision with habitual Rx
  - Constant esotropia in OD since 6 months old
  - Not improved with habitual Rx
    - Blur at distance
    - Rx 2 months old
  - Attempted binasal occlusion but noted difficulties with tripping and navigation problems

Exam Findings

- ROS: Normal
- POH: Esotropia OD, Spectacle History
- PMH: Negative
- FOH: Strabismus (paternal grandmother)
- Medications: Multivitamin
- NKDA
- Habitual Rx:
  - OD: +2.50 DS
  - OS: +2.50 DS

Exam Data Cont.

- Distance VAs cc
  - OD 20/40-2, OS 20/50+1, OU 20/40-1
  - Near VAs: 20/20 OD/OS
- Cover Test
  - CC: 25 Δ RET distance/near
  - SC: 30 Δ RET distance/near
- Stereo: (-) Lang I, (-) RDS and LD on Randot
- MEM: -0.75 OD/OS
- Concomitancy
  - EOMs: Full and unrestricted OD/OS
  - 25 Δ RET found in all 9 positions of gaze
- Pupils: PERRL (-) APD

Exam Data Cont.

- Dry Retinoscopy
  - OD: +2.00 -0.75 x135 20/30-1
  - OS: +1.75 -0.50 x060 20/25+2
  - CT through findings: 25 Δ RET
- Worth 4 Dot
  - Light: OD suppression at all distances
  - Dark: Alt. suppression 10cm, OD suppression beyond 10cm
- Correspondence (Major Amblyoscope)
  - Needed to dim rheostat to 4 over OS to assess
  - Objective angle: 25 BO
  - Subjective angle: 10 BO
  - Douse: Movement

Assessment and Plan

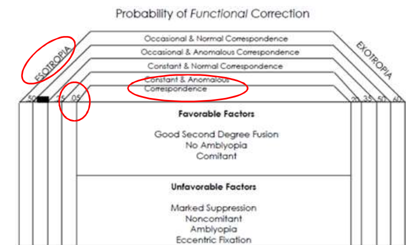
- Assessment:
  - Constant Right Esotropia
    - Concomitant deviation, anomalous correspondence, deep suppression OD
    - Over-plussed in habitual spectacles
    - Borderline mild amblyopia OD
- Plan:
  - Update Rx
    - OD: +2.00 -0.75 x135
    - OS: +1.75 -0.50 x060
    - +2.00 add bisecting pupil
  - Interested in starting VT

Management for Strabismus… With Anomalous Correspondence

- Spectacle considerations
  - ~~Prism~~
  - Bifocal
  - ~~Monovision~~
- ~~Surgery~~
- Vision Therapy
  - Active vision therapy
  - Over-corrective prism
  - Full-time occlusion
- ~~No treatment~~

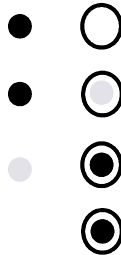
What's the likelihood of success?

- Flom's Barn
  - Probability of functional success in strabismus



Re-establishing Normal Correspondence – Our Plan

- Over-correcting prism
  - 30 BO prism OD → 15 ET
  - 50 BO prism OD → 5 XP
  - Final prism Rx: 65 BO prism → 12 XP
- Constant alternating patching
- Active vision therapy
  - Sensory stimulation
  - "Binocular triplopia" effect



Where Are We Now?

- As of 3/3/20:
  - 18 session of VT over 7 months
  - VAs have improved to 20/20 OD/OS
  - CT now 20Δ AET (OS preferred 80%) at distance/near
  - Over-correcting prism decreased from 65 BO to 45 BO
  - Constant alternating patching changed to switching every day
  - Sensory stimulation method
    - Constant suppression/AC response → some (but fleeting) binocular triplopia responses → NC responses up to 5-10 seconds

Case #2

KS – 15 year old female

- Experiencing blur and diplopia with habitual Rx – sees better without Rx
  - Constant at distance, but not as noticeable at near
  - Removes glasses and will close and eye for relief
  - Diplopia noted the same in all gazes
- H/o several strabismus surgeries in 2010 and 2011 for esotropia
- Patients mother interested in other alternatives

- No significant medical history
  - FOH: strabismus (paternal aunt)

- Habitual Rx:
  - OD: -0.25 DS 6.5 BI 1.5 BD
  - OS: -0.50 DS 6.5 BI 1.5 BU

Exam Data

- Distance VAs
  - OD cc: 20/20-2, sc: 20/20
  - OS cc: 20/25-1, sc: 20/20
- Cover Test cc
  - 18Δ AXT at distance, 18Δ AX(T)' at near (30% POTS)
  - 2Δ RHyperT at distance/near
- Cover Test sc
  - 25Δ AXT and 5Δ RHyperT at distance/near
- Stereopsis: (-) Lang I, (-) RDS/LD
- Pupils: PERRLA, (-) APD

Exam Data Cont.

- Worth 4 Dot
  - Alternating suppression at all distances
    - Mostly suppressed OS at distance and OD at near
- Correspondence
  - Major Amblyoscope
    - Objective angle: 18 BI, 2 BD OD
    - Subjective angle: 20 BO, 1 BD OD
    - Douse: Movement
- Concomitancy
  - EOMs: full, (-) restrictions
  - Maddox Rod
    - 20-25 BO in all 9 positions of gaze, 4-8 BD OD in all 9 positions of gaze

Management for Strabismus… With Anomalous Correspondence

- Spectacle considerations
  - ~~Prism~~
  - ~~Bifocal~~
  - Monovision
- ~~Surgery~~
- Vision Therapy
  - ~~Active VT~~
  - Occlusion
- No treatment

Our Plan of Action

- Monovision Rx
  - W4D demonstrates which eye patient prefers for distance/near tasks
    - OD for distance, OS for near
- Rx trialed:
  - OD: -0.25DS
  - OS: +3.00DS
  - No diplopia noted at distance, clear and comfortable vision at near around 30-35cm

In Conclusion…

- All patients with constant strabismus need to have correspondence tested
- Typical strabismus treatment is not likely to be successful for patients with anomalous correspondence
- Consider patient/parent expectations in combination with the likelihood of success
- **"The world would be a better place if nobody had thought about anomalous correspondence" – Arthur Jampolsky M.D.**

Thank You!

Any further questions, please feel free to email me at:
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Vertical Concussion and Sequela:
A Case Presentation

Patient – 64 y/o white female

- Reports being in good health
  - Low blood pressure
- Kindergarten/ Grade 1 teacher
- Working half time
- Saw a psychiatrist due to a stalker, but had completed therapy.

Case history

- First Accident
  - April 2008
  - Rear-ended as a passenger
  - (-) LOC
  - "head ready to explode" "eyes are not working right"
  - Started on Metroprolol and headache subsides
  - Able to continue working

History Continued

- Second Accident
  - January 2010
  - On her way to PT
  - Front loader turned into her lane causing her to turn to avoid a collision and did a "Dukes of Hazzard" onto a packed snowbank
  - Could not breathe until she put her head to her chest and coughed
  - (-) airbag deployed
  - (+) back, neck, and head pain
  - Car frame was bent, but she went to her appointment
  - That night she lost her ability to produce sound/talk
  - No longer able to work

After Care

- Physiotherapists
- ENT specialists
- Speech therapists
- Chiropractor

- 2-3 months later she found she could gain speech when her head was tilted down, but her speech was slow, irregular, varying pitch, broken, and with a variety of foreign accents.
- She noted issues with communication, headaches, breathing, dizziness, balance problems, nausea, unable to read comfortably, photophobia and a fizzing/popping sensation at the back of her neck

History Continued

- Third Accident
  - April 2010
  - buck ran out in front of her vehicle hitting the passenger's side door
  - (+) seatbelt
  - (-) air bag deployment
  - (-) LOC
  - head was thrown in a back and forth motion
  - worse neck and back problems and breathing difficulties
  - must work harder and concentrate to move her tongue and her speech was further impacted

Interdisciplinary Communication

- Neurologist from University of Manitoba
- June 3, 2019
  - "I summarize that I do not think there are any neurosurgical interventions that would be helpful to this woman. I believe she has a strong component of functional disorder, which would be best evaluated through psychological and psychiatric assessment."
  - Copied 6 doctors on this letter

Exam notes

- Stereo (+) RDS 3/8 circles 100"
- Normal colour testing OU
- Aided Distance Acuity
  OD 20/20 OS 20/20^{-2} OU 20/20
- Dynamic Distance VA
  OU 20/20*
- Aided Near Acuity
  OD 20/20 OS 20/20 OU 20/20
- DCT ortho
- NCT 10-15 intermittent exotropia
- EOM- Full (-) pain (-) diplopia
- Pursuits- SFA* (-) Head movement
  - Unable to load
- Saccades- Excellent
- NPC 15/15/15
- *Lost voice and oxygen saturation decreased

Exam notes continued

- Peripheral Motion Sensitivity (OKN drum)- None
- Grasp/Release/Regrasp- Good
- In phoropter
  - DLP 8 exo DVP 3 right hyper
  - DBI x/>30/x DBO X/20/0
  - NLP 18.5 exo NVP 1 right hyper
  - NBI x/12/8 NBOx/10/-2
  - Single with 17 BI
  - NBU x/9/2 NBD x/5/0
- Patient was too tired to continue testing

Video

Assessment and Plan

- Diagnosis
  - Intermittent Exotropia
  - Severe Convergence Insufficiency
  - Positional EOM issues
- Plan
  - Vision Therapy
  - Referral to Dr. Carrington

Therapy- Sept 18, 2019

- Wearing pulse oxygenation monitor
- 1st session
  - Symptom Severity Scale- 47
  - Must lower the point of fixation, keeping head level was difficult
  - Eye Movement Awareness sequence
    - Eye stretch
    - Closed Eye Movements
  - Space Fixator
    - Peripheral awareness
    - Sequencing peripheral targets
    - Using stick or laser pointer due to mobility issues.
- Took several breaks, but insisted on continuing even if oxygenation levels were fluctuating.

Therapy October 1, 2019

- Session #2
  - Reports eye stretches are very difficult when looking up and to the right, easier with eyes open. Most difficult at the 12:00 position
  - Way more HA, nausea, light-headedness, and balance issues
  - Randolph Shuffle- able to do the sequence, but felt lightheaded
  - Space Fixator with center chart- upper dots more challenging
- Able to work through the activities but very tired after the session
- Neuropsychologist from the insurance company said she did NOT have a convergence disorder and she needed to so a psychologist; she is making it up for attention.

Therapy October 17, 2019

- Session 3
- Said she was very tired after her last session
  - Randolph Shuffle
    - Remembered sequence and felt good
  - Space Fixator using dowel- overloaded with the metronome at 50bpm
    - Felt like it "scrambled her brain"
  - Hart Chart Saccades with metronome- 50bpm
    - Did not feel overloaded

Having Trouble

- December 20, 2019
  - Cancelled appointment
- February 19, 2020
  - Returned to talk
  - Tried to do VT exercises and felt wiped out. Can't do them if she knows she needs to drive that day.
  - Went to ENT who recommended speech therapy
    - Already has speech therapy when she lost her voice
  - Neurologist prescribed medication, but she declined to take it
  - Insurance said her problems is psychogenic in nature.

Our plan

- Referral to Dr. Eric Singman at Johns Hopkins
- Referral to Dr. Dennis Carrington, DDS
- Restart VT
  - Going slowly
  - Modifications

Dr. Dennis Carrington's notes

Dr. Eric Singman's notes

Questions?