Acquired Brain Injury and Vision

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Optometry's Role – The Past

- Until about the mid 1980's
  - we just didn't see these people or if we did it was only to get them new glasses after they had recovered.
- Until this time we didn't see many of these because plain and simple: most of them died.
- Modern medicine is keeping them alive and some recover enough to seek out optometric services.

Optometry's Role – The Present

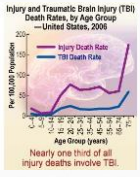
- We are now getting involved earlier and earlier with an ever more broadening scope.
- Rather than being peripheral to the medical care of these patients we are now becoming an integral part of their health care team.
- This means getting involved directly with many other health care practitioners.

Practice Sites

- Getting involved in TBI/ABI work may involve your having to provide care in different locations:
  - Inpatient consultation
  - Outpatient clinic
  - Rehabilitation hospital
  - Nursing home
  - Home care

TBI Incidence

- Every 15 seconds, someone receives a head injury in the United States.
  - Every five minutes, one of those people will die and another will become permanently disabled.
- Two-thirds of all persons sustaining head injuries are under age 30.
- Young men are more than twice as likely as women to suffer head injuries.
- Only one head-injured survivor in 20 is receiving appropriate rehabilitation today.



Signs of Stroke

Who are the patients that optometrists work with?

- Craig et al. SUNY College of Optometry
- 220 patients with ABI
  - 160-TBI, 60-CVA

	TBI	CVA
Age Range	8-91	24-90
Age Mean	45	61
Years post injury-Range	0.1-42.0	0.1-18
Year post injury-Mean	4.5	2.7
Number with multiple TBI	52	N/A

Where do they come from?

TBI	CVA
Hospital Rehabilitation Medicine Department(47.5%)	Hospital Rehabilitation Medicine Department (46.7%)
Internal Referral (17.5%)	Internal Referral (17.5%)
Non-hospital Rehabilitation Center (10%)	Non-hospital Rehabilitation Center (10%)
Private Physician (9.4%)	Private Physician(6.7%)/Optometrist (6.7%)

What other services are they getting?

TBI	CVA
Physical Therapy (57.5%)	Physical Therapy (75%)
Cognitive Therapy (36.9%)	Occupational Therapy (60%)
Occupational Therapy (28.8%)	Speech Therapy (43.3%)
Speech/Psychosocial Therapy (22.5%/22.5%)	Cognitive Therapy (25%)

What are the most common symptoms?

TBI	CVA
Loss of Balance (58.1%)	Loss of Balance (55%)
Dizziness (56.3%)	Dizziness (31.7%)
Vertigo (28.1%)	Vertigo (15%)
Motion Sickness (7.5%)	Motion Sickness (1.7%)
Eyestrain with Near Vision Tasks (51.9%)	Near Vision Blur (40%)
Increased Light Sensitivity (49.4%)	Eyestrain with Near Vision Tasks (38.3%)
Headaches with Near Vision Tasks (44.4%)	Loss of Place When Reading (33.3%)
Near Vision Blur (43.8%)	Distance Vision Blur (31.7%)

Visual Symptoms

"I just don't feel like myself…"

- Blurred vision
- Diplopia
- Loss of place
- Bumping into things
- Difficulty with concentrating on reading tasks
- Dizziness
- Poor balance and coordination

Visual Symptoms

- Visual field defects
- Reduced or diminished stereopsis
- Reduced reaction time
- Reduced accommodative ability and flexibility
- Dry eye symptoms
  - decreased blink rate
  - medications
- Reduced hand eye-coordination

Even More Problems

- Visual field defects
- Increased sensitivity to visual motion
- Visual inattention and distractibility
- Short-term visual memory loss
- Difficulty judging distances
- Difficulty with personal grooming, especially involving the face
- Inability to interact/cope visually in a complex social situation (e.g., minimal eye contact)
- Inability to tolerate complex visual environments

Optometric Assessment

To evaluate the three key areas of vision: **acuity, sensory motor and perception**

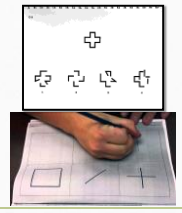
1. Case history-COVD checklist
2. Observation – head tilt, non-comitant deviations
3. Eye Movements: King-Devick, NSUCO, ductions, versions,
4. Motor Alignment: CT and/or Maddox rod.
5. Accommodation (critical)- amp, near retinoscopy, facility, NRA/PRA, AC/A

Optometric Assessment

5. Vergence: ranges and facility
6. Sensory fusion: W4D, Randot stereopsis
7. Internal and external ocular health, including tear film assessment
8. Visual field assessment-CF, Humphreys or Goldmann

Optometric Assessment

9. Visual perceptual testing
   - Visual motor integration
   - Pegboard
   - Test of Visual Perceptual Skills
   - Gardner Test for reversals
   - RAN/RAS-automaticity



Optometric Assessment
Sequence of Management

Correction of Refractive Error
⇩
Added lens power
⇩
Prism (H, V, O)
⇩
Occlusion
⇩
Vision Therapy
⇩
Surgery

Top Ten Commandments of Treating ABI

[redacted]

You've Seen one brain injury…you've seen one brain injury

We must think outside the box to treat brain injury!

History is crucial to understanding how to help the patient's needs and how best to help them.

Communication is an important aspect of your success.

Trust your instincts

If you don't know-Call a friend

There are 100's of ways to ask the same question

We are first and foremost "problem solvers"

Some patients follow patterns and some don't. Be prepared for both types!

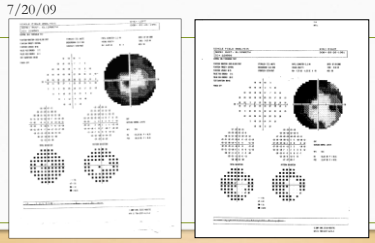
Start where they are and go where they ain't

Case 1:Visual Field Issues

- 60 year old white female
- History of 2 CVA's 3 months prior
- She was referred from her nephew who is a 4th year student at SCO
- Complained of having to turn her head to the left of midline to see objects
- She could not read for even short periods of time, had headaches, and motion sickness
- Her private optometrist had not referred her for any further treatment.

Visual Field Issues

- 7/20/09



Diagnoses

- Saccadic Eye Dysfunction
- Visual Field Defect OD, OS
- Convergence Insufficiency
  - Intermittent alternating exotropia
- Visual Processing was normal

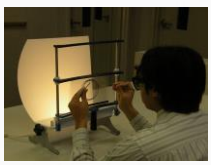
Treatment and Goals

- Treatment:
  - Best corrected glasses at distance and near
  - Vision Therapy-estimated 15-20 sessions.
- Therapy Goals
  - Improve visual attention
  - Improve jumping eye movements
  - Improve binocular vision

Vision Therapy- Goal

- To reduce effort necessary to process visual information and improve accuracy and flexibility of visual system….

Vision Therapy



- Same core concepts
- Controlled environment
- Prof. supervision
- Specific techniques to stimulate neurons assoc. with visual functions
- Limited in restoring visual function completely

Vision Therapy

- Oculomotor: stressing accuracy and equal (close to equal) eye movements
- Accommodation: monocular to binocular, then integrate with vergence…
  - Speed, accuracy, stamina, sustainability then flexibility…emphasis on size and distance changes, eye feelings

Vision Therapy

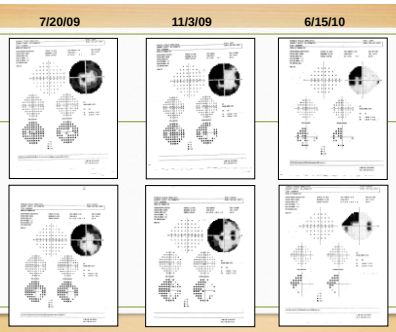
- Fusion Training…start where fusion meets least resistance then where fusion is difficult/absent.
  - Goal, may not be single clear comfortable vision, but fusion free of diplopia out of instrument with suppression or diplopia in instrument….
  - Go from large peripheral objects to smaller central ones.
  - Large stereoscopic targets give strong fusion lock (peripheral retinal areas)

Vision Therapy

- The use of VT with prisms is very helpful!
  - Can be monocular or binocular
  - Expand field awareness
  - Increase fusional capability
  - Shifting visual space
  - Disrupt perception

Treatment Outcome

- Improvement seen much quicker than anticipated
  - 12 sessions completed
- Original diagnoses-All reduced or eliminated
  - Visual Field Defect
    - Significant resolution-next slide
  - Saccadic Eye Dysfunction
    - reduced about 10 fold
  - Convergence Insufficiency
    - Before-Intermittent alternating exotropia, reduced stereopsis
    - After-low exophoria, improved stereopsis



Case 2: Lightning Girl

- 18-year-old African American female was struck by lightning while walking home from school (7 months prior to exam)
- Lightning entered her side and exited through her feet.
- Patient was found unconscious, MD presumes her heart stopped beating for 20-30 minutes.
- Patient was in a coma for 5 weeks and was in multiple hospitals for 5 months.
- Released from hospital and now attends outpatient rehabilitation 3 days/week.

History

- Referred by local outpatient rehabilitation facility, presumed visual deficiencies noticed in therapy activities.
- Patient Ocular History:
  - (+) nearsighted, has worn glasses for years
  - 2 post-incident exams by ophthalmologists, all findings WNL, "vision is good enough to drive again"

History

- Chief Complaints:
  - Patient's mother feels her depth perception "is off." Notices when reaching for objects and during physical therapy walking exercises.
  - Patient reports that she no longer enjoys reading (her once favorite hobby) because of her visual problems.
  - (+) blur at near with glasses
  - (+) intermittent horizontal diplopia, distance and near

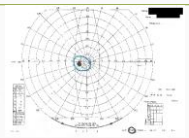
Objective Findings

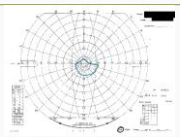
- Distance VA* OD: 20/25-
  - OS: 20/20-
  - OU: 20/20
    - Single letter and someone pointing at the letter.
- Near OU: 20/200 (at 40cm)
- Cover Test Distance: IAXT 18Δ, 70% frequency
  - Near: 18Δ XP, poor fixation
- Stereopsis:
  - (-) *Stereo Fly* and (-) *Keystone Basic Binocular* (KBB)
- Confrontation Visual Field:
  - Significantly restricted

Refraction

- Manifest Distance Refraction: no change/improvement from habitual
  - OD: -0.50-1.00x055
  - OS: -1.50DS
- Manifest Near: prefers +1.00 over habitual
  - 20/25 OU (at 40cm)
  - Trial frame: HUGE smile!

Goldmann Perimetry





OD: 10 degree horizontal static field
25 degree horizontal dynamic field
OS: poor response to horizontal static field
30 degree horizontal dynamic field

Visual Field and Gait

- Patient hunched forward and takes small "shuffle steps."
- Demonstrated 6Δ base down yoked prism.
  - Positive response! Patient stood taller and walked with more confidence. Gait was noticeably improved.
  - Depth perception in reaching for objects also improved.

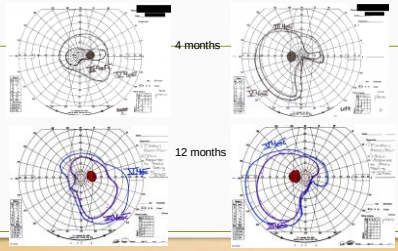
Assessment & Plan

- 1) Constricted Visual Field OD, OS secondary to TBI
  - 6Δ base down yoked prism glasses to be used during therapy activities only (to avoid prism adaptation).
- 2) IAXT secondary to TBI
  - Initiate Vision Therapy.
- 3) Accommodative Dysfunction OU secondary to TBI
  - Release Rx for near vision only.
- 4) Perceptual Dysfunction secondary to TBI
  - Initiate Vision Therapy.

Treatment Approach

- Perceptual first
  - Rhythm-simple clapping to a beat
  - Hand-eye coordination-pegboard, SVI
  - Visual Memory-using letters, shapes, colors and Visual Spatial Skills-parquetry blocks
- Strabismus second
  - Suppression-TBI, OEPF-strabismus grid started 18 months into VT
  - Currently, we are about 4/5 done.
  - Started about 6 months ago with Fresnel prism to spur on binocularity. 15 BI down to 10 BI OU
- Integration third
  - Activities that stimulate perception and vergence/accommodation
  - Computer-based programs such as Vision Builder and CPT
  - MFBF Matching Game
  - Spelling games while doing vectograms

Goldmann Perimetry



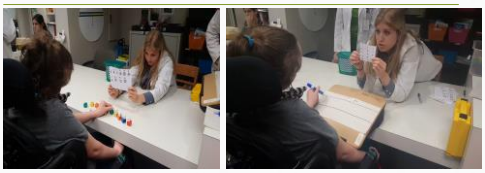
A Break Through!

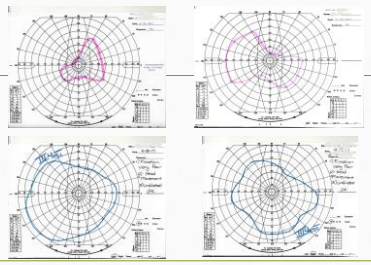
- Comes in one week without Fresnel Prism
- "I don't need it anymore. I don't see double."
- Cover Test
  - 8 XP at distance
  - 12-14 XP at near
- Worth 4 Dot
  - 4 dots
- No supression during therapy session with bar reader and flippers
- Appreicates SILO on Quiot vecto and localizes letters on the Clown vecto
- When asked if she knows when her eye is pointing out, she replied, "Yeah, I just bring it in!"

The Patient in Action

Back from the Dead

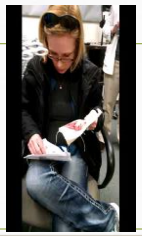
Back from the Dead





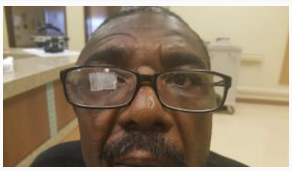
Perceptual Issues

CI with a Twist



Short Term Stabilization-Long Term Gain

When All Else Fails-Spot Occlusion



Thank You

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