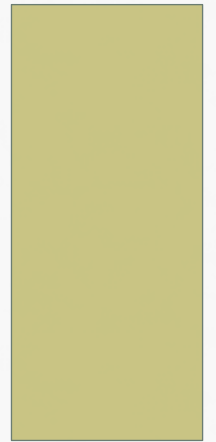


VISION REHABILITATION CASES

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CASE #1: PATIENT JS

- 33 yo male active duty army soldier
- 2012 – stateside fall accident during training
- (-) no loss of consciousness
- (+) altered consciousness x 24 hours
- (+) post- traumatic amnesia x 24hrs

CASE #1: PATIENT JS

- Complaints since injury:
 - Intermittent, binocular, horizontal diplopia worse at near and when tired
 - Inability to read for longer than 10 min due to “eyes feeling tired“
 - Chronic headaches with light sensitivity
 - Decreased memory
 - Dizziness

CASE #1: PATIENT JS

- Past Medical/Surgical History:
 - PRK OU x 2009
 - C5-6 cervical fusion March 2013
- Medications:
 - ACETAMINOPHEN/OXYCODONE, ALBUTEROL, ALLOPURINOL, ATORVASTATIN, CETIRIZINE, DIAZEPAM, FISH OIL, FLUOXETINE, GABAPENTIN, HYDROCHLOROTHIAZIDE, LISINOPRIL, MINERALS/MULTIVITAMINS, MONTELUKAST SODIUM, NAPROXEN, OMEPRAZOLE , TESTOSTERONE CYPIONATE, ZOLPIDEM
- Social History:
 - Married x 4yrs, 2 children
 - Denies tobacco/alcohol/illicit drug use
- Family History:
 - Father: Diabetes: Glaucoma
 - Mother: Brain tumor glioblastoma

CASE #1: PATIENT JS

Sensory Examination Results	
Mental status	Alert & orientated x 3
VA (distance, uncorrected)	20/15 OD, OS, OU
VA (near, uncorrected)	20/20 OD, OS, OU
Fixation	Central, steady, accurate
Color vision (Ishihara)	6/6 OD, OS
Confrontation fields	Full to finger counting OD, OS
Stereopsis (uncorrected)	Global: 200 sec of arc, Randot Local: 20 sec of arc, Wirt
Worth 4 Dot	Distance: ortho, no suppression Near: intermittent exo posture
Acuity suppression check #9	Intermittent suppression OD
Pupils	Round, reactive, (-) no APD
Light sensitivity/visual discomfort	Mild

CASE #1: PATIENT JS

Extra ocular Motilities	
Voluntary ductions	Full in 9 positions of gaze OD, OS
Smooth pursuits	Smooth, no re-fixations, no movement of head and body
Saccades	Accurate, no under or over shoot, no movement of head and body

CASE #1: PATIENT JS

Ocular Alignment	
Distance cover test	3 PD intermittent alternating exotropia
Distance alternate cover test	4 PD exophoria, comitant
Near cover test	8 PD intermittent alternating exotropia
Near alternate cover test	10 PD exophoria, comitant

CASE #1: PATIENT JS

Vergence Results	
Distance step vergence	BI: X/7/4 BO: X/14/12 (OD out)
Distance vertical fusional amplitude	3/2 BD OD, OS
Near step vergence	BI: X/13/10 BO: X/14/12 (OD out)
Near point of convergence (accom Target)	Initial: 5 in/6in OD out Fifth trial: 5 in/6in OD out
Vergence facility (3BI/12BO)	15 cpm (OD out intermittently)

CASE #1: PATIENT JS

Accommodating Results	
Amplitude (push up)	6 Diopters OD, OS
Accommodative facility	Binocular: 8 cpm, no suppression Monocular: 15 cpm OD, OS

CASE #1: PATIENT JS

Phoropter Results	
Subjective refraction	OD: -0.25-1.00X005 20/15 OS: -0.25-0.25X075 20/15
Distance vertical phoria	Ortho
Distance horizontal phoria	2 exophoria
Distance vergence testing	Suppression OD in phoropter
Near fused cross cylinder	+0.50 OU
Negative relative accommodation	+2.50 OU, no suppression
Positive relative accommodation	-2.50 OU, no suppression

Rechecked near vergence testing after prolong binocular workup:

Near step vergence:

BI: X/13/10

BO: X/10/8 (reduced after prolong testing)

CASE #1: PATIENT JS

- Trial frame: 2 BI total horizontal prism over manifest Rx and rechecked near binocularity
 - Near step vergence:
 - BI: X/13/10
 - BO: X/19/14
 - NPC (accom. target): TTN

CASE #1: PATIENT JS

- Slit lamp examination: unremarkable OU
- IOP: 18 mmHg OD, OS @ 1530
- Dilated fundus exam: Unremarkable OU

CASE #1: PATIENT JS

Assessment	Plan
1. Refractive error, Myopic astigmat	Rx: Single vision, near, ARC, Polycarb, 15% light blue tint OD: -0.25-1.00x005 1 BI OS: -0.25-0.25X075 1 BI
2. Intermittent alternating exotropia with intermittent suppression OD 3. Convergence insufficiency	Vision rehab to improve sustained convergence and reduce amount of suppression to maintain clear and single binocular vision

CASE #1: PATIENT JS

- Vision rehab sequence:
 - Phase I: Visual input stability
 - Develop a working relationship with patient
 - Discuss awareness of various feedback mechanisms
 - Improve accuracy of fixation, pursuits, saccades: letter and symbol tracking, hart chart, pegboard rotator
 - Normalize accommodative amplitude including stimulation and relaxation of accommodation (monocular): loose lens rock, near-far hart chart
 - Brock string activities : kinesthetic awareness of convergence/divergence, voluntary convergence

CASE #1: PATIENT JS

- Vision rehab sequence:
 - Phase II: Binocular integration
 - Improve speed of binocular fixation, pursuits, saccades
 - Binocular accommodative facility with suppression check using red/green glasses: plus and minus lens flippers
 - Voluntary convergence: Barrel cards/Lifesavers
 - Normalize positive fusional vergence (PFV) and negative fusional vergence (NFV) amplitudes: Quoits → Spirangle → Clown
 - Clinical pearl: Vectograms, start with peripheral targets then progress to more central demand

CASE #1: PATIENT JS

- Vision rehab sequence:
 - Phase III: Output stability
 - Vergence facility training (ability to change from convergence to divergence demand): Spirangle/Clown jump ductions
 - Integrate vergence procedures with changes in accommodative demand: BOP/BIM, RDS jump ductions
 - Integrate vergence procedures with versions/saccades: eccentric circles, aperture rule
 - Integrate visuo-motor and vestibular demands: all mentioned procedures with added motion

CASE #1: PATIENT JS

- Completed total of twenty-four 50 minute vision rehab training sessions
- Self- directed home exercises:
 - Hart Chart near-far rock
 - Brock String activities
 - Barrel cards/lifesavers/eccentric circles

CASE #1: PATIENT JS

- Optometry reassessment at end of vision rehab (testing done through trial frame without use of prisms):
 - Distance step vergence: BI X/7/4
BO X/11/7
 - Near step vergence: BI X/15/12
BO X/35/30
 - NPC: TTN (initial and 5th trial)

CASE #1: PATIENT JS

- Case summary:
 - Patient made significant improvements in all areas addressed
 - Patient able to report subjective improvements in reading comfort and endurance
 - Optometry plan:
 - Ordered new single vision glasses without any indications for prisms
 - Now being followed at 3, 6, and 12 months post discharge

CASE #2: PATIENT JB

- 51 yo male active duty Lieutenant colonel
- November 2013 – bicycle vs car accident, first visit 4/14
- (+) loss of consciousness x24 hrs.
- (+) altered consciousness x 30 min
- (+) post- traumatic amnesia x 7 days
- Polytrauma injuries sustained:
 - “brain edema, parietal bone fracture, closed R clavicle and scapula fracture, R 6-7-8 rib fractures, left frontal SAH, T5 and T8 spinous process fractures, small R pneumothorax and left superior orbital fractures, vertigo and headaches”

CASE #2: PATIENT JB

- Complaints since injury:
 - Skipping and repeating lines when reading
 - Discomfort and headaches associated with sustained reading for a few minutes
 - Positional vertigo
 - Currently wearing single vision near only Rx

CASE #2: PATIENT JB

- Past Medical/Surgical History:
 - Shoulder and mouth surgery
- Medications:
 - ACETAMINOPHEN/OXYCODONE, AMLODIPINE, DOCUSATE, IBUPROFEN, MAGNESIUM OXIDE, SENNA, TOPIRAMATE, ZOLPIDEM
- Social History:
 - Married, lives with wife, 2 children
 - Social tobacco/alcohol use, no illicit drug use
- Family History: unremarkable

CASE #2: PATIENT JB

Sensory Examination Results	
Mental status	Alert & orientated x 3
VA (distance, uncorrected)	20/20 OD, OS, OU
VA (near, corrected)	20/20 OD, OS, OU
Fixation	Central, steady, accurate
Color vision (Ishihara)	6/6 OD, OS
Confrontation fields	Full to finger counting OD, OS
Stereopsis (corrected)	Global: 200 sec of arc, Randot Local: 20 sec of arc, Wirt
Worth 4 Dot	Distance: ortho, no suppression Near: ortho, no suppression
Pupils	Round, reactive, (-) no APD
Light sensitivity/visual discomfort	Mild

CASE #2: PATIENT JB

Extra ocular Motilities	
Voluntary ductions	Full in 9 positions of gaze OD, OS
Smooth pursuits	Smooth, no re-fixations, no movement of head and body
Saccades:	Accurate, no under or over shoot, no movement of head and body

CASE #2: PATIENT JB

Ocular Alignment	
Observation	Left head tilt
Distance cover test	Ortho
Distance alternate cover test	1 PD right hyperphoria, comitant 3 PD esophoria, comitant
Near cover test	Ortho
Near alternate cover test	1 PD right hyperphoria, comitant 3 PD esophoria, comitant
Maddox Rod Testing	Primary gaze: right hyperphoria Right gaze: > right hyperphoria Left head tilt: equal Right head tilt: equal
Excyclotortion (double Maddox rod)	Excyclotortion of the LEFT EYE

CASE #2: PATIENT JB

Vergence Results	
Distance step vergence	BI: X/6/4 BO: X/8/6
Distance vertical fusional amplitude	3/2 BD OD 2/1 BD OS
Near step vergence	BI: X/13/10 BO: X/19/14
Near point of convergence (accomm. Target)	Initial: TTN Fifth trial: TTN
Vergence facility (3BI/12BO)	15 cpm

CASE #2: PATIENT JB

Phoropter Results	
Subjective refraction	OD: +0.50-1.00X105 20/15 OS: +0.25-0.50X080 20/15 ADD: +2.00
Distance vertical phoria	1 PD right hyperphoria
Distance horizontal phoria	3 PD esophoria
Negative relative accommodation	+2.50
Positive relative accommodation	-2.50
Near vertical phoria	1 PD right hyperphoria
Near horizontal phoria	3 PD esophoria

CASE #2: PATIENT JB

- Trial frame: manifest Rx with 1 BD OD
- Rechecked vergence testing with trial frame:
 - Distance step vergence:
 - BI: X/7/4
 - BO: X/11/7
 - Vertical fusional amplitude: 2/1 BD OD, OS (balanced)
 - Near step vergence: (+2.00 ADD, 1 BD OD)
 - BI: X/13/10
 - BO: X/19/14
 - Vertical fusional amplitude: 2/1 BD OD, OS
 - Suppression acuity check: difficulty clearing OS line without 1PD BD OD, improved recognition of OD and OS lines with prisms
 - Subjective: patient able to report improvements greater at near with prisms

CASE #2: PATIENT JB

- Slit lamp examination: unremarkable OU
- IOP: 14 mmHg OD, OS @ 1330
- Dilated fundus exam: Unremarkable OU

CASE #2: PATIENT JB

Assessment	Plan
Refractive error, Hyperopic astigmat, Presbyopia	Rx: Single vision, distance, ARC, Polycarb OD: +0.50-1.00x105 0.50 BD OS: +0.25-0.50X080 0.50 BU Rx: Single vision, near, ARC, Polycarb OD: +2.50-1.00x105 0.50 BD OS: +2.25-0.50X080 0.50 BU
Right hyperphoria consistent with a skew deviation	Rx 1 BD total prism OD, recommend vision rehab to improve binocular stability
Basic esophoria	Rx low plus at distance, near ADD, recommend vision rehab to improve binocular stability

CASE #2: PATIENT JB

- Vision rehab sequence:
 - Phase I: Visual input stability
 - Develop a working relationship with patient
 - Discuss awareness of various feedback mechanisms
 - Optimize head orientation at midline
 - Improve accuracy of fixation, pursuits, saccades: letter and symbol tracking, hart chart, pegboard rotator
 - Brock string activities : kinesthetic awareness of convergence/divergence, voluntary convergence

CASE #2: PATIENT JB

- Vision rehab sequence:
 - Phase II: Binocular integration
 - Improve speed of binocular fixation, pursuits, saccades
 - Binocular accommodative facility with suppression check using red/green glasses: plus and minus lens flippers
 - Voluntary convergence: Barrel cards/Lifesavers
 - Normalize positive fusional vergence (PFV) and negative fusional vergence (NFV) amplitudes: Quoits → Spirangle → Clown
 - Clinical Pearls: for cyclo-deviation, more important to use red/green glasses versus polaroid materials because lenses are not influenced by head position

CASE #2: PATIENT JB

- Vision rehab sequence:
 - Phase III: Output stability
 - Vergence facility training (ability to change from convergence to divergence demand): Spirangle/Clown jump ductions
 - Integrate vergence procedures with changes in accommodative demand: BOP/BIM, RDS jump ductions
 - Integrate vergence procedures with versions/saccades: eccentric circles, aperture rule
 - Integrate visuo-motor and vestibular demands: all mentioned procedures with added motion

CASE #2: PATIENT JB

- Completed total of twenty three 50-minute in office vision rehab training sessions
- Self- directed home exercises:
 - Brock String activities
 - Barrel cards/lifesavers/eccentric circles
 - HTS system included disc and red/blue glasses

CASE #2: PATIENT JB

- Optometry reassessment at 3 months post vision rehab (8 months from initial date of injury)
- Reassessment through trial frame without prisms
 - Distance and near cover test: Ortho
 - Distance step vergence: BI X/6/4
BO X/8/6
 - Near step vergence: BI X/14/12
BO X/35/30
 - Vertical fusional amplitudes at distance/near: 3/2 BD OD and OS
 - NPC: TTN (initial and 5th trial)

CASE #2: PATIENT JB

- Repeat Maddox rod testing: (without prisms)
 - Primary gaze: ortho
 - Right and left gaze: ortho
 - Right and left head tilt: ortho
 - Excyclotortion: none

CASE #2: PATIENT JB

- Case summary:
 - Patient made significant improvements in all areas addressed
 - Skew deviation resolved (8 months post initial date of injury)
 - Binocularity now maintained and sustained without need of vertical prism correction
 - Now being followed at 3, 6, and 12 months post discharge

CASE #3: PATIENT CM

- 45 yo male active duty flight engineer
- 2004 – helicopter crash after being hit by an RPG attack
- (+) loss of consciousness x30 min
- (+) altered consciousness x 30 min
- (+) post- traumatic amnesia x 24hrs
- Injuries sustained:
 - (+) skull, maxillofacial, left orbit fractures as well as shrapnel peppered all over his face, neck, shoulders and trunk.
 - (+) shrapnel penetrating both eyes resulting in left globe rupture, left eye lid complete laceration, right vitreous hemorrhage and complete retinal detachment of the eye

CASE #3: PATIENT CM

- Complaints since injury:
 - Difficulties with glare (outdoors>indoors)
 - Difficulty seeing in low light setting
 - Difficulty managing rapid changes in focusing
 - Challenges with glasses (safety polycarb glasses and sunglasses)
 - Balance issues
 - Memory and concentration difficulties

CASE #3: PATIENT CM

- Past Medical/Surgical History:
 - Vision loss OS 2/2 trauma, retinal detachment repair OD, now following private retinal specialist
- Medications: None
- Social History:
 - Married x24 yrs, lives with wife, two daughters
 - Social tobacco/alcohol use, denies illicit drug use
- Family History: unremarkable

CASE #3: PATIENT CM

Sensory Examination Results	
Mental status	Alert & orientated x 3
VA (distance, uncorrected)	20/15 OD, Light Perception OS
Fixation	Central, unsteady
Color vision (Ishihara)	6/6 OD, unable OS
Confrontation fields	Full to finger counting OD Unable OS
Pupils	Round, reactive OD, traumatic OS
Light sensitivity/visual discomfort	Moderate

CASE #3: PATIENT CM

Extra ocular Motilities	
Voluntary ductions	Full in 9 positions of gaze OD, OS
Smooth pursuits	Smooth, frequent re-fixations , no movement of head and body
Saccades:	Inaccurate, consistent under or over shoot , no movement of head and body

CASE #3: PATIENT CM

Phoropter Results		
Subjective refraction	OD: PLANO-0.25X100 OS: BAL ADD: +1.50	20/15 LP

CASE #3: PATIENT CM

- Trial various tints to address indoor light glare:
 - 25% rose tint
 - 25% blue tint
 - 25% grey tint
- Out door glare:
 - #3 Grey, Polarized

CASE #3: PATIENT CM

- Slit lamp examination: normal OD, band keratopathy OS
- Dilated fundus exam: Deferred, following private retinal specialist

CASE #3: PATIENT CM

Assessment	Plan
Presbyopia, light sensitivity, Near- total blindness OS, Normal vision OD	Rx: Single vision, distance, ARC, Trivex, 25% blue tint OD: PLANO OS: PLANO Rx: Single vision, near, ARC, Trivex, 25% blue tint OD: +1.75 OS: +1.75 Rx: Single vision, distance, Trivex, #3 Grey tint, Polarized OD: PLANO OS: PLANO
Oculomotor dysfunction	Recommend vision rehab to maintain and sustain stable fixation, smooth pursuits and saccades

CASE #3: PATIENT CM

- Vision rehab sequence:
 - Phase I: Visual input stability
 - Monocular fixation, pursuits, saccadic training
 - Awareness training: need to scan from the left to the right when attending to visual stimuli from environment
 - Compensatory strategies for optimal scanning into left side
 - DynaVision H2000 for improved visuomotor processing speed, improved use of visual search strategies, and improved central-peripheral awareness and integration

CASE #3: PATIENT CM

- Vision rehab sequence:
 - Phase II: integration
 - Neuro- Vision Rehabilitator (NVR) training with focus in the following areas:
 - Ocular- Vestibular Integration (OVI): enhance peripheral awareness, saccadic fixation, visuomotor accuracy and vestibular ocular balance
 - Dynamic Oculo Motor Processing (DOMP): enhance stimulus saccadic fixation, scanning, visuomotor control, visual spatial processing speed, and visual sequencing
 - DynaVision H2000 with cognitive loading
 - Computerized CPT training
 - Peripheral awareness
 - Visuo- motor integration
 - Computerized based track and read program with emphasis on search, find, and track and cognitive loading
 - Simultaneous ball throwing and catching with cognitive loading

CASE #3: PATIENT CM

- Vision rehab sequence:
 - Phase III: Output stability
 - Compensatory strategies for optimal scanning onto the left side during dynamic environment
 - Application of learned concepts while moving around dynamic environment
 - Community integration and navigational skills training in semi-busy and unfamiliar areas of decreased lighting and illumination

CASE #3: PATIENT CM

- Completed total of twenty six 50-minute in- office and two out-of-office vision rehab training sessions
- Self- directed home exercises:
 - Integration of exercises in physical therapy program and activities of daily living

CASE #3: PATIENT CM

- Optometry reassessment at 3 months
- Reassessment of tint for indoor and outdoor use:
 - Likes blue tint for indoor and computer use but still complains of difficulty in dim illumination
 - Trial 25% Amber tint during navigational training at night time, able to report subjective improvements in functional abilities

CASE #3: PATIENT CM

- Case summary:
 - Patient made significant improvements in all areas addressed
 - Currently wearing blue tint for indoor and every day use, amber tint for dim illumination
 - Vision rehab ongoing to maintain stable input and output of visual integration

VISION REHAB GUIDELINES

- Determine level at which patient can perform easily and maintain an effective training level
- Be aware of frustration level
- Use positive reinforcement
- Emphasize that changes must occur within his or her own visual system
- Make patient aware of goals of vision rehab
- Set realistic therapy objectives and maintain flexibility with these objectives or endpoints
- Use therapy techniques that provide feedback to the patient

CLINICAL PEARLS

- Consider amblyopia and suppression therapy before beginning fusional vergence therapy
- Begin with peripheral targets with high stereopsis demand and gradually proceed to more central targets
- Train both positive fusional vergence (PFV) and negative fusional vergence (NFV) and accommodation regardless of original diagnosis
- Emphasize amplitude first and then facility
- Emphasize quality, not quantity
- Allow frequent breaks as needed

QUESTIONS?

- Thank you