VERTICAL IMBALANCE REFRACTIVE MANAGEMENT

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Signs and Symptoms
- Intermittent blur of vision
- Loss of place when reading
- Skipping lines when reading
- Pulling sensation of eyes
- Occipital headaches, with possible nausea
- Head tilt

CAUSES
- Muscle imbalance
- Anatomical position
- After strabismus surgery
- After head trauma
- Neurological insult
- After deep anesthesia
- Substance abuse
- Old age with loss of muscle tone

MEASUREMENT OF VERTICLALS
- Von Graefe vertical phoria / duction
  - If done in the phoropter, prescribe about ¾ of the value determined
  - Mid-point of duction range is more critical than actual phoria measurement
  - Example: OD S: 3  
                OS S: 1
                I: 1  
                I: 3
                Midpoint would be 1\(^\circ\) BD OD or 1\(^\circ\) BU OS

MEASUREMENT OF VERTICLALS
- Latent Hyperphoria
  - Orthophoria with unbalanced ductions
- Prescribing considerations emphasis should be from ductions, not phoria alone
- Can occlude one eye for about 30 minutes, and then repeat phoria measurement

MEASUREMENT OF VERTICLALS
- Cover test
  - Done out of the phoropter, prescribe close to full amount of deviation
  - Consider vertical deviation first, if lateral deviation also present
  - Prism Bar very helpful
MEASUREMENT OF VERTICALS

- Maddox Rod
  - If done in the phoropter, prescribe about ¾ of the value determined
  - If done out of phoropter, alignment amount prescribable
  - Dissimilar targets good for patient responses
  - Good for determining cyclophorias or cyclotropias (red and white Maddox rod)

- Vectograph, fixation disparity
  - Measure retinal slip, similar to associated phoria
  - Safe to prescribe close to what is measured

- Red Lens Test Procedure
  - With Manifest Refraction in place, expose the muscle light on the projector at 6m
  - Occlude one eye
  - Ask the patient the color of the light seen; the response should be “white”
  - Place the red lens in front of the open eye and ask the color of the light seen; the response should be “red”

- Red Lens Test Procedure
  - Un-occlude the fellow eye and ask how many lights seen by the patient and the respective colors
  - ONE PINK light indicates a binocular response with no prism needed
  - ONE WHITE light or ONE RED light indicates a suppression of the corresponding eye
  - TWO LIGHTS seen indicate a phoria or tropia; add prism until ONE PINK light seen

- Example #1, red lens in front of the OS
  - Patient View: Right Hyper response; Neutralize with BDOD

- Example #2, red lens in front of the OD
  - Patient View: Left Hyper with an eso response. Neutralize with BDOS
MEASUREMENT OF VERTICALS

- Red Lens Test: End Result
  - FUSED RESPONSE

Advantages of Red Lens Test

- Test done out of phoropter, therefore peripheral fusion in play
- Minimum amount of prism utilized for fusion
- Prescribable amount of prism achieved
- Can reveal uncompensated heterophoria, fragile binocularity, or questionable fusion, all in real space

Advantages of Red Lens Test

- Test can easily be done over patient's habitual Rx or in trial frame

General Prescribing Guidelines for Vertical Heterophorias

- Compensate for the vertical misalignment problem first, if the patient also manifests a lateral problem
- Anatomical hypers of long standing duration: be cautious to compensate if the patient is asymptomatic
- Be cautious in compensating in the elderly, unless forced blinking

General Prescribing Guidelines for Vertical Heterophorias

- When prescribing for vertical problems, prescribe the least amount of vertical prism that will get the job done.

Patient #1, Vertical Hyperphoria Secondary to Multiple Head Traumas
Patient #1, History, 40 WM

- History of high school head injuries during football with subsequent diplopia
  - Twice “blackened out” after trauma
  - No follow-up management
- History of several blows to the head in 20's while boxing
  - No follow-up management
  - Subsequent periodic disorientation and being clumsy

Patient #1, History

- History of care by several eye doctors with numerous spectacle prescriptions with poor adaptation
- CVC of reading blur and diplopia
  - Closes one eye when diplopia a problem
  - Works at a computer 8-10 hours daily
  - Wants “invisible” bifocals

Patient #1, Eye Health Data

- Pupils: negative
- EOM: in tact
- Visual Fields: OD negative; OS superior depression
- External Eye: negative
- Internal Eye: OS slight ONH sectoral atrophy

Patient #1, Refractive Data

- 6mVAsc: OD 20/20  OS 20/20
- 40cmVAsc: OD 20/25  OS 20/25
- Cover Test: far 10∆ alternating esotrope
  - 4∆ right hypertrope
- Cover Test: near 10∆ alternating esotrope
  - 4∆ right hypertrope
- MR OD: +0.50  20/20
- MR OS: +0.75-0.50x010  20/20
- Von Graeffe Phorias: 8∆ eso; 4∆ RH
- Near Addition: +1.00D
  - OPRA net: -1.00
  - ONRA net +1.25
- Red Lens Test: 10∆ BO and 2∆ BDOD for fusion

Patient #1, Management

- Neurological consult
  - History of no evaluation post trauma
  - ONA OS
  - OS superior field depression
  - History of disorientation
- Neurological consult was negative
Patient #1, Management

- Bifocal prescription
  - Patient adamant concerning progressive add
- Rx OD +0.25 1ΔBDOD / 5Δ BO /+1.00 add
- RX OS +0.25-0.50x010 1Δ BUOS / 5Δ BO/ +1.00 add
  - Progressive addition
  - Press-on prisms, because I was a “coward”
  - Counseled heavily on adaptation
  - RTC 2 weeks

Patient #1, Management

- 2 week follow-up:
  - Initially some unease, but now no problems
  - Negative diplopia, headaches
  - RTC one month
- 8 week follow-up
  - No problems
  - Negative subsequent adaptation
  - RTC 6 months follow-up; negative in 6 months

Patient #2, Vertical Hyperphoria

Post Heart Cath vs CVA vs Diabetes

Patient #2, History 07/29/04, 57 WM

- CVC: Diabetic, Type II, with blood sugar running 195-225
  - Irritated eyes
  - No other vision complaints
- Assessment / Plan:
  - Diabetes per history with no ocular complications / yearly follow up; counsel
  - Exposure Keratitis / artificial tears PRN
  - Presbyopia / continue with reading Rx

Patient #2, History 09/17/04, 2 months later

- CVC: diplopia, binocular, x 3 weeks, constant
  - 08/29/04 Heart Cath
  - Later that day patient reported two-eyed double vision
  - OCAT scan 3 days later, negative
  - OCP ordered MRI to rule out CVA, to take place in 3 days

Patient #2, Eye Health, 09/17/04

- Pupils: negative
- EOM: OD: restricted abduction, adduction
  - OS: negative restrictions
- Visual Fields: full to finger count
- CN testing: negative except for #3 and #6
- Lancaster Nine Fields: inconsistent responses, but suggestive of OD #6 and OD #3 palsy
Patient #2, Eye Health, 09/17/04

- External Eye: bilateral ptosis
- Internal Eye: mild background diabetic retinopathy OU

Patient #2, Refractive Data, 09/17/04

- VA6msc: OD 20/15  OS 20/15
- Cover Test: far and near, 35\(^\Delta\) constant alternating esotrope with 4\(^\Delta\) OD hypertrope
- Manifest Refraction: plano OD/OS
- Presbyopic addition: +2.25 OU

Patient #2, Assessment, 09/17/04

- Diabetic per history with ocular complications
- Mild non-proliferative diabetic retinopathy OU
- Possible #3 and #6 palsy, OD

Patient #2, Management, 09/17/04

- Counseled heavily concerning blood sugar control
- Counseled concerning tropia and need for follow-up evaluation; use patch OD intermittently
- RTC 2 weeks for follow up evaluation of tropia and to review MRI results from PCP

Patient #2, History, 10/08/04

- CVC: intermittent diplopia x 5 weeks; wears patch when driving
- MRI results negative
- Continuing care for diabetes
  - Last blood sugar 184 x 1 day

Patient #2, Follow Up, 10/08/04

- Eye Health: no change from last visit
  - Decrease in ptosis
- EOM: OD restriction on abduction and adduction; negative OS
- Pupils: negative OD/OS
- Visual fields: full to finger count OD/OS
- 6mVasc: OD 20/20  OS 20/20
Patient #2, Follow Up, 10/08/04

- Manifest Refraction: plano OU
- Presbyopic add: +2.25
- Red Lens Test: fusion with 4Δ BD OD and 10Δ BO
- Positive trial frame response to prism

Patient #2, Assessment / Management

- Assessment:
  - Diplopia
  - Presbyopia
- Plan:
  - OD plano 2Δ BD 5Δ BO / +2.25 add
  - OS plano 2Δ BU 5Δ BO / +2.25 add
  - 1 month follow-up

Patient #2, Follow-up one month

- No change in measured tropia
- Positive acceptance to spectacles
- Minimal adaptation to spectacles
- Follow-up 6 months
- Six month follow-up adequate and stable
- Follow-up one year, PRN

“Take-Home Messages”

- Judgment when to prescribe needed prism post- neurological insult
  - Determine causal etiology, if possible
  - When objective measurement are not getting worse; amounts are leveling off
  - Repeatability of responses
  - Patient responses are certain
  - Quality of life concerns

“Take-Home Messages”

- Press-on prism an option
- Can give more prism later, if needed
  - Patient adaptation a key factor
- Relieve vertical deviation first
- Out of phoropter tests preferable
- Prism is not a “4 letter word”