Overview of decompensated heterophoria & binocular instability

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OVERVIEW: CAVEAT
- Always look for pathology:
  - Neuro-optometric checks
    - Pupils, discs, fields, strabismus, incomitancy, accommodation
  - Check these things regularly
- Don’t forget refraction
- Change management if not improving significantly
- Refer if still not improving
- Appropriate re-exam intervals (frequent)

Optometry & orthoptics
- 5% of YOUR patients will have BV problems
- 83-100% of eye exams by community optometrists include an orthoptic assessment

HETEROPHORIA
- FD present
  - Mallet OXO test
  - no FD
- Test of foveal suppression
  - no foveal suppression
  - symptoms
- Treat
  - Monitored

DEFINITION OF DECOMP. PHORIA
- Term first used in German paper by Jonkers et al. (1960)
- A heterophoria that produces symptoms - “symptomatic heterophoria”
- A heterophoria that produces signs
  - Rushton et al, 1994
    - depends on tests used
- A heterophoria that requires treatment
- Treat BVA if the patient is “likely to be significantly disadvantaged by the continued presence of the anomaly”

Dwyer (1991)
FACTORS AFFECTING COMPENSATION (a)

- Stress on the visual system
  - (1) Excessive use of vision under adverse circumstances
    - (a) Work held too close to the eyes for long periods.
    - (b) A sudden increase in the amount of close work.
    - (c) Poor illumination or contrast
    - (d) Increased use of the pursuit reflexes
    - (e) Tasks which dissociate accommodation and convergence.
  - (2) Accommodative anomalies.
  - (3) Refractive error.
  - (4) Imbalanced and/or low fusional reserves.

FACTORS AFFECTING COMPENSATION (b)

- Stress on the well-being of the patient
  - (1) Poor general health.
  - (2) Worry and anxiety.
  - (3) Old age.
  - (4) Emotional and temperamental problems.
  - (5) Adverse effect of medicines.

KEY SIGNS OF DECOMP. PHORIA

- Symptoms
  - Convergence insufficiency symptom survey (CISS)
  - Validated & reliable for CI in children aged 9-18y (Borsting et al., 2003)
  - Used in 14 other studies
  - Criticised for non-ocular questions & found to have low sensitivity for detecting CI (Horwood et al., 2014)

Symptoms of decomp phoria are non-specific

- Skeedy et al. (2003): principal factor analysis of symptoms of asthenopia show them to be multifactorial with 2 main factors:
  - External symptom factors (ESF): induced by holding eyes open, glare, upgaze, small font, flicker – dry eye
  - Internal symptom factors (ISF): induced by close viewing, lens flipper, mixed astigmatism –vergence & accomm stress
- Cognitive load increases both internal & external symptoms (Gowrisankaran et al., 2012)
- Symptoms from the CISS questionnaire show a higher correlation with CLDEQ-8 than correlation of CLDEQ-8 with OSDI (Sheedy et al., 2015)

Potential signs of decompensated phoria

- Symptoms
  - Poor cover test recovery
  - Magnitude of heterophoria

- Size of phoria is not significantly associated with symptoms (Yekta et al., 1996)
- No value for dissociated heterophoria was found that would discriminate between the symptomatic and asymptomatic patients (Hovinen et al., 1995)
- “Heterophoria measurement is not useful as a routine procedure”

Potential signs of decompensated phoria

- Symptoms
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  - Magnitude of heterophoria
Potential signs of decompensated phoria

- Symptoms
- Poor cover test recovery
- Magnitude of heterophoria
- Sheard’s criterion
  - Sheard’s criterion is better than phoria at discriminating symptomatic patients, correctly discriminating 82% of patients. Sheedy & Saladin (1977)
  - In later research Sheard’s criterion had a weaker F-value (authors did not give the % discriminated). Sheedy & Saladin (1978)
  - Sheard’s criterion best for exophorias
  - Percival’s criterion best for esophorias
  - To achieve best discrimination had to combine with FD test parameters in stepwise discriminant analysis, A...
  - FD classifies differently to phoria...which leads to a consideration of FD

KEY SIGNS OF DECOMP. PHORIA

- Symptoms
- Poor cover test recovery
- Aligning prism (FD test)
  - Low fusional reserve opposing phoria
  - Sheard’s criterion
  - Particularly useful for exophorias
  - For esophorias, size and imbalanced fusional reserves are relevant
  - For hyperphorias, size matters

ALIGNING PRISM: Mallett Unit

- Aligning prisms/spheres to eliminate FI
- Good foveal and peripheral fusion lock
- Question set is important
  - Ask if a line ever moves
    - Karania & Evans (2006)
  - For symptomatic phoria:
    - Sensitivity 75%
    - Specificity 78%
    - Jenkins, Pickwell, & Yekta (1989)

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FUSIONAL RESERVES

Can be measured with:

- Loose prisms
- Prism bar
- Rotary prisms
**FUSIONAL RESERVES**
- Measure the reserve that opposes the phoria first
  - Rosenfield et al. (1995)
- Often the blur point cannot be measured (Horwood & Toor, 2014)

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**STEREOTESTS**
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**BINOCULAR INSTABILITY:** (FUSIONAL VERGENCE DYSFUNCTION) DIFFERENTIAL DIAGNOSIS

<table>
<thead>
<tr>
<th>SIGN</th>
<th>BI</th>
<th>DECOMP. PHORIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>phoria variability of phoria cover test recovery fusional reserves</td>
<td>may/may not be present &gt; ±1.75 Δ</td>
<td>must be present &lt; ±1.75 Δ</td>
</tr>
<tr>
<td>fusional reserves</td>
<td>low, worse as tired</td>
<td>usually slow &amp; hesitant low reserve opposing phoria</td>
</tr>
<tr>
<td>aligning prism</td>
<td>unstable FO, may be aligned “on average”</td>
<td>misaligned, may/may not be unstable</td>
</tr>
<tr>
<td>dyslexia</td>
<td>significant correlate</td>
<td>non-significant correlate</td>
</tr>
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**CONVENTIONAL ANALYSIS**
- If: P = size of phoria, V = opposing fusional reserve, N is the normal value of fusional reserves:
  - method of comparing with norms: V>N
  - method of Sheard’s criterion: V>2P

**ALTERNATIVE HYPOTHESIS**
- If: P = size of phoria, V = opposing fusional reserve, N is the normal value of fusional reserves: V>2P
- vergence errors during saccades of >20’
- SO, will need some reserve just to overcome vergence errors
  - hence: V>MP + C (M=multiplier, C=constant)
- formula to be applied to the opposing reserve
- the non-opposing fusional reserve would simply need to exceed C
BINOCULAR INSTABILITY:
MANAGEMENT

- treat any sensory factors interfering with fusion.
- train the fusional reserves.
- if temporary poor health, can use prisms or spheres to correct any aligning prism.

Combining tests in an intelligent way

- “A normal patient is...a patient who has not been tested enough”
- Algorithm found to be useful in studies of migraine (Harle & Evans, 2006) and in research on 3-D displays (Lambooij et al., 2010)

Optometric correlates of dyslexia: Meares-Irlen Syndrome/Visual Stress (MISViS)

PREVALENCE: 720% of people with dyslexia
AETIOLOGY: cortical hyperexcitability causing pattern glare from text
SYMPTOMS: asthenopia, headaches, perceptual distortions (words move)
SIGNS: coloured overlays alleviate symptoms and improve rate of reading
TREATMENT: Precision Tinted lenses

Differential diagnosis:
Binocular vision anomaly or MISViS

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<tr>
<th>Sign</th>
<th>Binocular vision anomaly</th>
<th>Meares-Irlen Syndrome</th>
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<tbody>
<tr>
<td>Significant phoria</td>
<td>May be present (not if binocular instability)</td>
<td>Unlikely</td>
</tr>
<tr>
<td>Low fusional reserves</td>
<td>Present</td>
<td>May be present</td>
</tr>
<tr>
<td>Symptoms alleviated by occlusion</td>
<td>Yes</td>
<td>Unlikely</td>
</tr>
<tr>
<td>Pattern glare</td>
<td>Unlikely</td>
<td>Present</td>
</tr>
<tr>
<td>Photophobia</td>
<td>Yes, but not colour specific</td>
<td>Yes, colour specific</td>
</tr>
<tr>
<td>Symptoms alleviated by coloured filters</td>
<td>Unlikely</td>
<td>Yes</td>
</tr>
</tbody>
</table>

In the CITT RCT of VT for CI (2008) ONLY 56% of those receiving optimal VT were asymptomatic at the end of 12 weeks of treatment (CITT, 2008).

Allen, Evans, Wilkins (2010) Vision & Reading Difficulties

CONCLUSIONS

- Decompensated heterophoria & binocular instability are best diagnosed with a combination of tests
- BUT more tests increase the risk of a false positive
- Combine tests in an intelligent way
- Patients of any age can have symptomatic heterophoria

Some famous people who were dyslexic