Workshop: diagnosis of binocular vision anomalies

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- Paid lectures & KOL/product feedback programmes:
- Lecture content always my own
- Author of Pickwell’s Binocular Vision Anomalies, editions 3-5
- i.O.O. Sales Ltd markets IFS orthoptic exercises, which the speaker designed, and for which he receives a small royalty
- Community optometric practice in Brentwood, Essex

PLAN

COVER TEST
INCOMITANCY
FUSIONAL RESERVES

Cover testing – main varieties

- Cover-uncover test
- Diagnose phoria/tropia
- Grade recovery movement in phoria
- Measure deviation
  - Estimation
  - Prism cover test
- Alternating cover test
- Measure deviation
  - Estimation
  - Prism cover test
- Combined cover-uncover & alternating
  - All the above, and
  - c.f., habitual angle with total angle

Grade 1

Grade 3
Grade 5

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Estimating the movement seen in cover testing

- Why estimate instead of measure with prism bar?
  - Needs minimal patient co-operation
  - Measures situation under natural viewing conditions
    - "the first cover is the purest cover"
  - It is easy for the practitioner to do accurately
  - Practitioner can "calibrate" their measurements by
    comparing the movement seen in the cover test with a
    version movement of a known size
  - i.e., compare a cover test movement of unknown size
    with a version movement of known size

More detailed explanation

- 1° is the angle subtended by 1cm at 1m
  - At 10m, 1cm subtends 3°, 2cm subtends 6°, etc.
- Work in pairs: optom & patient
- Optom holds ruler 33cm away from patient
- Optom watches patient’s eyes
- Patient looks at 0, then at 2: the eyes have moved through 6°
- Patient looks at 0, then at 4: the eyes have moved through 12°
- Practical session: practice estimating version movements, then
  apply to cover testing

SIGNS OF DECOMPENSADED PHORIA

- Poor cover test recovery
- Grading system has reasonable repeatability
- Cover test dynamics are
  complex

Grade

4 slow/jerky and breaks down with repeat
3 definitely slow/jerky but not breaking down
2 slightly slow/jerky
1 rapid and smooth

Description

- Covers

Signs of decompensated phoria

- Prism cover test
  - Estimation
  - Measure deviation
  - Prism cover test

PLAN

COVER TEST

INCOMITANCY

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Full handout of slides from www.bruce-evans.co.uk
Incomitant Deviations

Quiz 1

Quiz 5

RSO palsy & secondary LSR palsy

LSO palsy: motility & Hess test

SO palsy: typical symptoms & test results

- History
  - Commonly congenital, with head tilt since infancy
- Symptoms
  - May decompensate in adult life
  - Can be newly acquired, particularly after trauma
- Cover test
  - Small hyper-deviation of affected eye, worse for near fixation
- Dissociation tests
  - A cyclo-deviation and positive Bielschowsky test help diagnose SO palsy
  - See Appendix B
- Refractive correction
  - Avoid or be cautious in prescribing multifocals

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Case study 1

- Superior oblique palsy (old)
- Decompensated
- Optom prescribed VF
- Patient decompensated
  - Sued optom for causing decompensation

Case study 2

- Optometrist saw at age 5, 6, 7 y
- R +0.75DS=6/5   L+3.00/- 3.50x180
- Optometrist decided not to treat
- Age 8 hospital treated
- No benefit
- Legal case against optometrist

Amblyopia: when to treat

- Strabismic: under age of 7-8
- Anisometropic: any age

Quiz 3

LR palsy: symptoms & test results of case in video clip

- History
  - High blood pressure, at one time poorly controlled when horizontal diplopia started
- Symptoms
  - Horizontal diplopia in distance vision, not at near, worse when looking to affected side
- Cover test
  - Distance: 15 s left esotropia
  - Near: orthophoric
- Comments
  - A small vertical deviation may be present
**Inferior oblique (IO) palsy**
- An IO palsy is the rarest of all extra-ocular muscle palsies and no video clips were available.
- When the diagnosis of an IO palsy is made it is very often a mis-diagnosis of a Brown’s syndrome.
- Differential diagnosis is discussed in the slides on Brown’s syndrome.

**RSR palsy: motility & Hess test**
- Motility testing suggests right double elevator palsy, but the Hess chart, from some years before, suggests RSR.
- Sometimes, a superior rectus palsy can “spread” in this way.

**SR palsy: typical symptoms & test results**
- History:
  - Typically congenital, can be acquired.
- Symptoms:
  - May be diplopia in upgaze.
  - Sometimes with ptosis, especially if congenital.
- Cover test:
  - Hypotropia of affected eye, worse for distance fixation, often with small excyclotropia.
  - A SR palsy can sometimes occur as a sequel to a SO palsy in the other eye (see Appendix B).

**Quiz 4**
- Click here to see explanation & Hess chart.

**Quiz 8**
- Click here to see explanation & Hess chart.

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Duane's retraction syndrome

Classified in two ways:

Huber's classification

- **Type 1**: restricted abduction, adduction minimally affected
- **Type 2**: restricted adduction, abduction minimally affected
- **Type 3**: restricted abduction & adduction

Old classification

- **Type A**: restricted abduction, slightly defective adduction
- **Type B**: restricted abduction, normal adduction
- **Type C**: restricted adduction & slightly defective abduction

Click on the blue writing above to see examples of each type.

Duane's retraction syndrome: first example

Left eye only, grossly restricted abduction, adduction fairly normal, retraction LE on adduction

Huber's classification

- **Type 1**: restricted abduction, adduction minimally affected

Old classification

- **Type A**: restricted abduction, slightly defective adduction

Duane's retraction syndrome: second example

Bilateral, grossly restricted abduction, adduction slightly restricted, retraction of each eye on adduction

Huber's classification

- **Type 1**: restricted abduction, adduction minimally affected

Old classification

- **Type A**: restricted abduction, normal adduction

Duane's retraction syndrome: third example

Left eye only, grossly restricted adduction, abduction normal, slight retraction LE on adduction

Huber's classification

- **Type 2**: restricted adduction, abduction minimally affected

Old classification

- **Type C**: restricted adduction, (slightly affected) abduction

Quiz 2

Click on picture to see video.

Quiz 7

Click on picture to see video.
Duane’s retraction syndrome: fourth example
- Bilateral, mild case, slightly restricted adduction, abduction normal, retraction of each eye on adduction
- Huber’s classification
  - Type 2: restricted adduction, abduction minimally affected
- Old classification
  - Type C: restricted adduction, (slightly affected) abduction

Duane’s retraction syndrome: fifth example
- Left eye, grossly restricted abduction and adduction
- Huber’s classification
  - Type 3: restricted abduction & adduction
- Old classification
  - ? Type A or Type C

Brown’s syndrome
- Previously known as superior oblique tendon sheath syndrome
- The syndrome has the appearance of an inferior oblique (IO) palsy. For differential diagnosis, consider:
  1. IO palsy is exceptionally rare. Brown’s syndrome is, relatively speaking, much more common
  2. An incyclodeviation will be present in the primary position in IO palsy, not in Brown’s syndrome
  3. Parks three step is positive in IO palsy, not in Brown’s syndrome
  4. Secondary sequelae (overaction of: ipsilateral SO and contralateral SR) will be present in long-standing IO palsy, not Brown’s
Brown's syndrome

- Brown's syndrome left eye
- Classification: mild because no L hypo-deviation is apparent in the primary position or when the left eye looks straight to the right
- Note the V-syndrome
- Differential diagnosis: LIO palsy is ruled out because: no cyclo-deviation, no secondary sequelae, and a negative Parks three step test

Click here to see other examples of Brown's syndrome

Quiz 9

Click here to see video

Click here to see other incomitancies

Brown's syndrome: second example

- Left Brown's syndrome: the LE fails to fully elevate in adduction
- Classification: mild because no L hypo-deviation is apparent in the primary position or when the left eye looks straight to the right
- Differential diagnosis: LIO palsy is ruled out because no cyclo-deviation, no secondary sequelae, and a negative Parks three step test
- A Hess plot for the central motor field and was fairly normal, because the mechanical restriction is only apparent on extreme gaze

Click here to see other examples of Brown's syndrome

Quiz 12

Click here to see video

Click here to see other incomitancies

Brown's syndrome

- Brown's syndrome right eye: RE fails to fully elevate in adduction
- Classification: mild because no R hypo-deviation is apparent in the primary position or when the left eye looks straight to the left
- Differential diagnosis: RIO palsy is ruled out because: no cyclo-deviation, no secondary sequelae, and a negative Parks three step test

Click here to see other examples of Brown's syndrome

Quiz 6

Click here to see video

Click here to see other incomitancies
**KEY SIGNS OF DECOMP. PHORIA**

- Poor cover test recovery
- Aligning prism
- 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

**FUSIONAL RESERVES**

- Can be measured with:
  - loose prisms
  - prism bar
  - rotary prisms

- Use base out prism to measure convergent reserve
- Use base in prism to measure divergent reserve
- Measure the reserve that opposes the phoria first
  - Rosenfield et al. (1995)
- Often the blur point cannot be measured (Horwood & Toor, 2014)
- Record in Δ as:
  - blur / break / recovery
- Example:
  - Fusional reserves at 33cm with glasses
    - convergent: 20/28/26
    - divergent: -- /16/12