Orthoptics for the busy optometrist: a user-friendly guide

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DISCLOSURE
- 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
INTRODUCTION
INVESTIGATION OF INCOMITANCY
INVESTIGATION OF HETEROPHORIA
INVESTIGATION OF HETEROTROPIA
TREATMENT
CONCLUSIONS

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

For regular tweets on optometric research:
@BruceAEvans

Yorkshire Optical Society & Owen Aves
- Yorkshire Optical Society (YOS)
  - Established late 1890s
  - Predated only by Worshipful Company of Spectacle Makers
- Owen Aves
  - Brother of Ernest Aves
  - Pre-eminent optometrist of 1920s
  - Owen Aves was due to give a lecture to YOS in 1929 but died, and when Mr W Green took over the lecture he started the tradition of the Owen Aves Memorial Lecture

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Optometry & orthoptics

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


**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)

**PLAN**

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**INVESTIGATION OF INCOMITANCY**

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**TREATMENT**

**CONCLUSIONS**

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**CAUSES OF PARESES**

- Diabetes
- Hypertension
- Stroke
- Aneurysms
- Temporal arteritis
- Tumours
- Multiple sclerosis
- Myasthenia gravis
- Migraine
- Trauma
- Thyrotoxicosis
- Toxic
- Iatrogenic
- Idiopathic

Underlined = more likely in elderly

Image courtesy of John O’Donnell
Motility test

- Use reliable pen torch
- Check nose not occluding
- Really, three tests, so do three times:
  1) Observe corneal reflexes
  2) Cover test in peripheral gaze
  3) Ask about diplopia
- Beware of reports of diplopia
  - May break down (in view of target, distance, fus. res.)
  - May be variable
  - May be confused
- Know the muscle actions (RADSIN)

SO palsy

- Usually:
  - Hyper-deviation of affected eye, worse in down-gaze
  - Under-action of affected eye when looking down and in
  - More likely to have symptoms with reading than with distance
- But, may have secondary sequelae
- Avoid fitting multifocal spectacles or monovision

Duane’s syndrome

- Retraction of the globe on attempted adduction
- Contraction of medial and lateral recti
- Not all cases exhibit retraction
- Limitation of abduction and/or adduction in one or both eyes
  - Can look like a lateral or medial rectus palsy
  - May also be elevation or depression of affected eye
- Convergence is very often abnormal, even when adduction appears to be intact

Brown’s syndrome

- Mechanical restriction of the superior oblique
- Looks like inferior oblique (IO) palsy
- But IO palsy is much rarer & has:
  - Secondary sequela
  - Incyclodeviation in primary position
  - Positive Parks three-step test
Incomitancies: conclusions

- Some incomitancies are difficult to detect
  - 2/3 of diplopic hypertropic pxs OK on motility
  - Tamhankar et al (2011)
- If symptoms are suspicious, do cover testing in peripheral gaze
- Testing for cyclo-deviations detects SO palsies
- Refer new or changing incomitancies
- In some long-standing cases, prescribing the prism required in the primary position may help

**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 FD
- good foveal and peripheral fusion lock
- question set is important
  - ask if a line ever moves
- for symptomatic phoria:
  - sensitivity 75%
  - specificity 78%
  - Jenkins, Pickwell, & Yekta (1989)

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Orthoptics: stereoptests
- Lang works well with infants: look at eye movements
- Frisby makes a good game with squeaky toy
- Recommended from age 2y is Randot
  - Random dot
  - Contoured
- Norms vary from test to test and even between editions of the same test
  van Doorn, Evans, Edgar, Fortuin (2014)

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Strabismus: the bottom line for the busy optometrist

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TREATMENT OF AMBLYOPIA (a)

- Flow chart based on review of recent RCTs in Evans et al. (2011; OPO)
- Many cases of amblyopia can be cured by refractive correction alone:
  - 20% don’t need occlusion (Gibson, 1955; Pickwell, 1984; Stewart et al., 2004; West & Williams, 2011)
- Contact lenses are likely to be best in anisometropia (Evans, 2006)
- Many cases never require full-time occlusion
  - ≥ 6/9 to 6/25, 2h occlus. = 6h
  - If ≤ 6/30, 6h > 2h
- Avoid full time occlusion for orthotropic anisometropia
- Timings approximate
  - See patients frequently during the treatment of amblyopia, to begin with every 4-6 weeks

TREATMENT OF AMBLYOPIA (b)

- RCTs show that occlusion is unsuccessful in 17-37% (Simons, 2005)
- If treatment fails, re-evaluate your diagnosis (Evans, 2007)
- Treated amblyopic eyes on average 2 lines below fellow (Repka et al., 2005)
- Remember that the child may be partially sighted during occlusion
  - It is not always better to do something than nothing at all (Jennings, 2005)
- Record informed consent

MOTOR DEVIATION: REFRACTIVE CORRECTION

OVERVIEW

- Mandatory in accommodative esotropia
- Also possible to treat exo-deviations with negative lenses & convergence excess with multifocals
- Limited by 4 factors
  - angle of deviation
  - refractive error
  - accommodation
  - AC/A ratio

SPECIFICS

- Determine sphere that
  - eliminates strabismus (no diplopia)
  - eliminates FD on Mallett Unit
- Can check (2 mins) don’t adapt (North & Henson, 1985)
- Prescribe, try to reduce approx. every 3-6/12
- Negative adds (Chen et al., 2016) and bifocals/varifocals can work well

MYTHS

- Negative adds might cause myopia
  - Overminus lenses do not induce clinically significant myopic changes (Rutstein et al., 1989; Paula et al., 2009)
- Patient likely to adapt to the over-correction
  - If abnormal BV, tend not to adapt (North & Henson, 1985)
- Bifocals might reduce children’s ability to accommodate
  - Smooth muscle, 14D-3D=11D
  - BF don’t reduce amplitude of accommodation (Fresina et al., 2010)
- Accommodative (hyperopic) esotropia will not need glasses in later life
  - After 10 yrs, 97% still need Rx (Rutstein & Marsh-Tootle, 1998)

CASE STUDY: D1542

- 11/5/96, female, age 8y, 1 headache a fortnight
  - Wearing full cyclo plus (c. +2.00, R=L)
  - Cover test: D: 8.8, SOP: N: 10.8, RSOT: 2
  - With +2.00 add: N ortho

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MOTOR DEVIATION: PRISMATIC CORRECTION: OVERVIEW

- preferred treatment in small/moderate vertical deviations
- may also help in small/moderate horizontal deviations if not amenable to refractive modification or exercises
- limited by angle of deviation / cosmesis of prism

MOTOR DEVIATION: PRISMATIC CORRECTION: SPECIFICS

- determine prism that
  - eliminates strabismus (no diplopia)
  - eliminates FD on Mallett Unit
- unlikely to adapt to prism if abnormal BV (North & Henson, 1985)
  - But can check (2 mins) don't adapt (North & Henson, 1985)

MOTOR DEVIATION: PRISMATIC CORRECTION: EVIDENCE

- Small RCT (mostly esophoria) shows Mallett prism preferred to no prism “Based on our results, one would not expect to find a significant preference for prism prescribed according to Sheard's criterion.”
- Mallett prism improves stereoaucity
- Prism prescribed using Sheard's criterion is no better than placebo for children with CI
- RCT: Mallett prism improves reading speed (Scheiman et al., 2005)
- Presbyopes with CI have fewer symptoms with BI prism (Telebaum et al., 2009)
- Prismatic glasses (8BI) as effective as computer orthoptics at improving reading (Dunkel et al., 2011)
- Vertical prism improves postural stability, especially if chronic lower back pain (Matheron & Kapoula, 2008, 2014)

MOTOR DEVIATION: FUSIONAL RESERVE EXERCISES: OVERVIEW

- preferred treatment in small/moderate horizontal deviations, if px co-operative
- Work well in those aged 11-19y, even if strabismic (Pickwell & Jenkins, 1982)
  - in exo-deviations improve ability to converge
  - in eso-deviations improve ability to diverge
- try to assess progress using a method different to the treatment technique
- there is some supporting evidence from RCTs
  - Ciuffreda & Tannen (1995)
  - Scheiman & Gwiazda (2011)

CONVERGENCE INSUFFICIENCY: SPECIFICS

- Treatments (in order of increasing complexity)
  - simple push up (bead on string if very remote)
  - jump convergence
  - push up with physiological diplopia
  - jump convergence with physiological diplopia
  - free-space stereograms
- RCT shows intensive programme of exercises better than home push-up (Scheiman et al., 2005)
  - 15min a day + 60min weekly > 15min a day
- “Whether synoptophore or jump vergence stereocards are used...the critical variable is the length of time it is maintained” (Vaegan, 1979)
- “Convergence exercises independent of accommodation were the most effective treatment” (Harwood & Tye, 2014)

FUSIONAL RESERVE EXERCISES: COMPUTER ORTHOPTICS

- HTS
  - Wide range of vision therapy (USA)
  - For fusional reserves, amblyopia & much more (if wanted!)
  - In-office & at-home
- Orthoweb
  - Designed by Andrew Field
  - Patient “visits” web site for exercises
  - http://www.academy.org.uk
- BV Trainer
  - Designed by David Fleischmann
  - iPad or iPhone
DEVELOPMENT OF IFS: Primary goal

- To maintain the patient in an over-converged posture for 10-20 mins a day without them becoming bored
- To provide a variety of stimuli to help any benefit translate into everyday life
- Declaration of interest

IFS EXERCISES: USES

- IFS exercises can be used to treat:
  - decompensated exophoria at near
  - binocular instability
  - convergence insufficiency
  - intermittent exotropia at near
  - experienced practitioners can also use the exercises to treat constant comitant exotropia at near, usually as part of a more detailed treatment regimen.

DEVELOPMENT OF IFS:
Card 1

- Teaches physiological diplopia & introduces 3-D perception

DEVELOPMENT OF IFS:
Card 3

- Builds fusional reserves
- Controls for suppression
- Card 4 similar, but different autostereogram

DEVELOPMENT OF IFS:
Card 2

- Builds fusional reserves (step & ramp)
- Controls for & treats suppression

OPEN TRIAL: Fusional reserves & NPC (N=20)

- Divergent reserves (control) did not change significantly (p=0.6)
- Convergent reserves improved significantly (p=0.004)
- Mean NPC improved from 6 to 4 cm (p=0.015)

Evans (2000)
OPEN TRIAL: Effect of treatment on compensation

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</tbody>
</table>

Evans (2000)

3-D displays are popular but unnatural
- Vergence changes but accommodation does not
- Loss of spatial resolution (but may help) OR
- Loss of temporal resolution
- Unusual degrees of stereopsis
- Possible mismatch between various depth cues
  Howarth (2011)
- People with borderline binocular vision are more likely to have problems with 3-D displays

Lambooij, Fortuin, Ijsselsteijn, Evans, Heynderickx (2010)

How many people will not perceive 3-D content?
- Strabismus 2.5-4%
- Uncorrected anisometropia 0.5-1.5%
- Monovision 0.4%
- Stereopsis 0.1%
- Poor or distorted vision in one eye v rare in young
- Total 3.5-8%

How many people may have discomfort with 3-D?
- Under-corrected refractive error 11.0-30%
- Decompensated heterophoria possibly, 1-10%
  *more common in older people

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Dr Optometry
- In 2008 the Institute of Optometry launched a Doctor of Optometry degree in collaboration with London South Bank University
- 5 year part time professional doctorate
  - Year 1 has 13 taught days & 2 assignments
  - Year 2 has 8 taught days & 2 assignments
  - Years 3-5 are supervised doctoral research
    - Research must likely be clinical, in practice
- “the ultimate HQ for UK optometrists”
We find comfort among those who agree with us – growth among those who don’t.”

Frank A. Clark

Some famous people who were dyslexic: