Orthoptics for the busy optometrist: a user-friendly guide

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PLAN
INTRODUCTION
INVESTIGATION OF INCOMITANCY
INVESTIGATION OF HETEROPHORIA
INVESTIGATION OF HETEROTROPIA
TREATMENT
CONCLUSIONS

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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-orthoptic 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)

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CAUSES OF PARESES

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

Underlined = more likely in elderly

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)

Actions of superior muscles
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
- Co-contraction of medial and lateral recti
- Not all cases exhibit retraction

- Limitation of adduction and/or abduction 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 sequelae
  - Incyclodeviation in primary position
  - Positive Parks three step test

Incomitancies: conclusions

- Some incomitancies are difficult to detect
- 2/3 of diplopia hypertropic pts OK on motility
- Taymankan 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

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DISSOCIATED HETEROPHORIA

fusional reserves

motor fusion

sensory fusion

fusion lock

COMPENSATED or NOT

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
    - Karania & Evans (2006)
    - for symptomatic phoria:
      - sensitivity 75%
      - specificity 78%
    - Jenkins, Pickwell, & Yekta (1989)

Orthoptics: stereotests

- 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

Strabismus: the bottom line for the busy optometrist

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
  - If 6/6 or 6/9, 2h oc. or 6th
  - 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
- Penalisation is a viable alternative to occlusion
  - West & Williams (2011)
  - There is a dose-response relationship in patching (Stewart et al., 2004)
- Eye patch is best but compliance poor & they will cheat!
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

MOTOR DEVIATION:
REFRACTIVE CORRECTION
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

MOTOR DEVIATION:
REFRACTIVE CORRECTION
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, 1988)

MOTOR DEVIATION:
REFRACTIVE CORRECTION
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
  ∆
  SOP N: 10
  ∆
  RSOT
  – with +2.00 add: N 4
  ∆
  RSOT with +2.50 add: N ortho

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)

There I was, asleep in this little
cave here, when suddenly I was
attacked by this hideous thing with
five heads!
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 stereoacuity
- Prism prescribed using Sheard's criterion is no better than placebo for children with CI
- RCT: Mallett prism improves reading speed
- Presbyopes with CI have fewer symptoms with BI prism
- Prismatic glasses (8BI) as effective as computer orthoptics at improving reading
- Vertical prism improves postural stability, especially if chronic lower back pain

MOTOR DEVIATION: FUSIONAL RESERVE EXERCISES

- OVERVIEW
  - preferred treatment in small/moderate horizontal deviations, if co-operative
  - Work well in those aged 11-19y, even if strabismic (Pickwell & Jenkins, 1982)
  - In eso-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
    - 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"
  - "Convergence exercises independent of accommodation were the most effective treatment" - Horwood & Toor (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 constant 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 2
• Builds fusional reserves (step & ramp)
• Controls for & treats suppression

DEVELOPMENT OF IFS:
Card 3
• Builds fusional reserves
• Controls for suppression
• Card 4 similar, but different autostereogram

DEVELOPMENT OF IFS:
Card 4

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)

OPEN TRIAL: Effect of treatment on compensation

3-D displays are popular but unnatural
• Vvergence 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
• People with borderline binocular vision are more likely to have problems with 3-D displays
How many people will not perceive 3-D content?

- Strabismus: 2.5-4%
- Uncorrected anisometropia: 0.5-1.5%
- Monovision: 0.4%
- Stereoblind: <0.1%
- Poor or distorted vision in one eye: very rare in young
- Total: 3.5-8%

How many people may have discomfort with 3-D?

- Under-corrected refractive error: 11-30%
- Decompensated heterophoria: possibly, 1-10%

*more common in older people

Could be reduced with better eye care

CONCLUSIONS

- Always be on the lookout for pathology
- Refer if no significant improvement
- BUT pathology is very rare
- It is possible to treat amblyopia in optometric practice
- Patients will need good instructions & regular checks
- Many comitant ocular motor anomalies are treatable
- Plus for eso and minus for exo are under-used treatments
- Vision therapy for convergence insufficiency is evidence-based, but there is a need for more research for other forms of vision therapy

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Some famous people who were dyslexic:


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