Orthoptics for the 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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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)
**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

**Plan**

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Investigation of incomitancy

Investigation of heterophoria

Investigation of heterotropia

**Treatment**

**Conclusions**

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**Key signs of decompression 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, & Yokta (1989)

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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

Strabismus: the bottom line for the busy optometrist

- is it new or changing?
  - yes
  - no
  - refer

- do I know the cause?
  - yes
  - refer
  - no
  - refer

- can I correct it?
  - yes
  - e.g., hypermetropia
  - refer
  - no
  - refer

- any treatment needed? (probably not)
  - yes
  - refer
  - no
  - refer

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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 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-Too, 1998)

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:
MYTH

- patient might “eat up prisms”
- prism adaptation usually abnormal in orthoptic anomalies (North & Henson, 1981)
- exceptions can occur
  - e.g., myopes with decompensated esophoria

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)
MOTOR DEVIATION: FUSIONAL RESERVE EXERCISES

SPECIFICS
- haploscopic instruments / anaglyphs / vectograms / free-space methods
  - feedback helps, as in computer-orthoptics
  - varying targets & conditions helps
  - a key factor is practitioner & patient enthusiasm
  - better to train convergence & accommodation separately rather than together
    - (Horwood & Toor, 2014)
  - with a PC & printer anyone can design their own exercises

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

DEVELOPMENT OF IFS: Card 1
- Teaches physiological diplopia & introduces 3-D perception
  - Card 1: Learning How to Use Double Vision to Develop 3-D Vision
    - The type of picture on Cards 1 and 2 is called an autostereogram. Recently, the autostereogram method of seeing 3-D images has become very popular, and you have probably heard of them before. This is because, for the first time, people were able to see images that were not already experienced with real images, and you may even have experienced them in TV sets.
    - With this type of picture there are two cards of viewing this image in 3D. The way most people are to make converge the eyes. Because your eyes naturally under-converge, this method will work for you. If you are not already see 3D images, then this type of picture from it is almost certainly because you have not made a method of training to make the eyes converge to what they naturally do. These exercises are not just for patients with convergence problems. The image described below will teach you how to see the 3-D images, by your convergence. This method is similar to that used on Sheets 1 and 2 and will help your eyes to become better at working together.

DEVELOPMENT OF IFS: Card 3
- Builds fusional reserves
- Controls for suppression
- Card 4 similar, but different autosterogram
  - Card 3: Now to Magic!
    - Unlike Cards 1 and 2, Card 3 should be turned on its side to be viewed, so the heading is at the top. When you look at Card 3 you will probably see little to see a little, except for a few eyes looking out near the top of the picture. Believe it or not, when you do this exercise you will be able to see the words on this sheet. Why? This means, these letters will appear in 3-D.

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)
**PLAN**

**SYMPTOMS**

**INVESTIGATION OF INCOMITANCY**

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**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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