MANAGEMENT OF STRABISMUS & AMBLYOPIA 2010

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Overview  Part 1

- Why strabismus happens
- When / why to treat
- How to treat
Overview Part 2

- Amblyopia: Causes and treatment
CORE SLIDE:
Requirements of a perfect visual system

1. Straight eyes
2. Good & equal vision
3. No or low-&-symmetric refractive error
4. Normal EOM anatomy / physiology
5. Normal occipital lobe physiology required for normal motor fusion, normal sensory fusion
6. Normal visual pathways
7. Normal early visual development
Abnormalities in one / more of…
- Sensory development
- Refraction
- Orbital anatomy
- EOM anatomy / physiology
- Cortical / supranuclear anatomy, function and development
- Accommodation / convergence
..either cause or are caused by strabismus
TIME DEPENDENT RESULTS:  
IF YOU HAVEN’T FIXED IT IN 3 MONTHS, REFER

- You WILL in your career see children with visual loss that is reversible only with timely & effective treatment
- Delay in starting effective treatment can have negative life-long outcomes
2 STEP MANAGEMENT OF STRABISMUS

1. Straighten the eyes
   - Optically
   - Botox – infrequent option
   - Surgically

2. Improve /equalize acuity
WHY Straighten the eyes?

Age < 6mo:
- Best chance for some sensorimotor fusion
- Normal appearance
- ↓ risk of amblyopia
WHY Straighten the eyes?

Age 3-7:
- Best chance for sensorimotor fusion
- Normal appearance & psychosocial devpt
- Better motor skills
- ↓ risk of amblyopia
Age 3-7: Better motor skills

Motor coordination in children with congenital strabismus: Effects of late surgery


... surgical correction of strabismus after age 4 improves general motor function & coordination.

- Poor catchers with good (N = 8; Stereo+) and weak (N = 6; Stereo-) stereo participated in an intensive training program over 2w, during which they caught >1,400 tennis balls.
- Stereo+ : improved 18% to 59%
- Stereo- : 10 to 31% - not significant - similar to control group (N = 9) that did not practice at all.
MAXIMUM READING SPEED

- better with straight eyes
WHY Straighten the eyes?

Age >10:
- Best chance to regain some sensory fusion
- Normal appearance / social interactions
- Better field [if ET; worse if XT]

See AAPOS website www.aapos.org
‘Adult Strabismus’
Opinions of dating agents about strabismic subjects’ ability to find a partner

S M Mojon-Azzi, W Potnik, D S Mojon

ABSTRACT
Aims: To determine the influence of strabismus on the ability to find a partner.

Methods: We interviewed Swiss dating agents retrieved from two Swiss online telephone directories using a validated questionnaire to determine whether strabismus has any impact on the ability to find a partner. During the interviews, subjects with internet access could view downloadable, digitally altered photographs of a strabismic man and women, as well as images of other computer-generated facial anomalies.

Results: Of the 40 dating agents, 92.5% judged that strabismic subjects have more difficulty finding a partner (p<0.001). Such difficulty was not associated with either gender or age but was perceived as being greater in exotropic than in esotropic persons (p<0.001). Among the seven facial disfigurements, strabismus was believed to have the third largest negative impact on finding a partner, after strong acne and a visible missing tooth. Dating agents also believed that potential partners perceive persons with strabismus as significantly less attractive (p<0.001), erotic (p<0.001), likeable (p<0.001), interesting (p<0.001), successful (p<0.001), intelligent (p=0.001) and sporty (p=0.01).

Conclusions: Visible strabismus negatively influences the ability to find a partner. Because strabismus surgery in adults restores a normal functioning condition and reduces not only physical but also psychosocial difficulties, it cannot be considered a cosmetic procedure.

distress, particularly during social interactions that expose the disfigurement to others’ gaze and can result in displays of ignorance and negative comments.

The psychosocial problems experienced by strabismic individuals are similar to those of persons with other craniofacial anomalies. Jackson et al measured anxiety and depression, social anxiety and QoL 6 weeks before and 3 months after strabismus surgery. The researchers found not only that strabismic individuals experience greater social anxiety and use more social avoidance strategies but that these subject’s scores reduce to normal levels following surgery. This finding of strabismus negative impact was confirmed by Satterfield et al, who found evidence of problems related to strabismus during school, work, play or sports in subjects over age 14. Nonetheless, the authors identified no difference in the amount of psychosocial impairment between esotropic and exotropic subjects. In a similar study, Menon et al showed that patients aged 15–25 who had had a constant squint since childhood had difficulties with self-image and interpersonal relationships, faced ridicule at school and work, and generally avoided activities that brought attention to their defect. Burke et al showed that strabismus surgery reduced the psychosocial difficulties reported before surgery and improved the quality of psychosocial functioning. Beauchamp et al also...
Figure 1: Photographs of a man and woman with and without seven computer-generated facial anomalies. Subject consent has been obtained for publication of this figure.
WHEN to straighten the eyes?

**Kids:** should be realigned within **4mo** of constant misalignment to regain best sensorimotor fusion

**Adults:** …≤ **12mo** of constant misalignment to frequently regain measurable sensorimotor fusion
Clues to the causes of strabismus

1 genetic

Frequent strabismus:

- William’s syndrome 75% have congenital ET Chrom 7

⇒ genetic factor
Frequent strabismus:

1. Neonatal brain injury [IVH / HC] 75% → acquired/ neurological factors

2. Developmental delay of any sort: [genetic / acquired] 25%
Clues to the causes of strabismus
3
genetic & orbital

Comitant Horizontal Strabismus: an Asian perspective. Chia A, et al. BJO. 2007 May 2; Singapore.

2ce as many Singaporean children present with XT than ET
Caucasians ET >> XT.

Within the XT and ET groups, the distribution and characteristics and treatment responses of various strabismus subtypes are similar to Caucasians.
CORE SLIDE: Non-syndromic / non-neurological causes of strabismus

Strabismus develops due to an imbalance between two groups of factors

- Factors which increase the demands on fusion
- Factors which improve the quality of fusion

If this side is heavier, there will be strabismus
If this side is heavier, there will be no strabismus
Factors which increase the demands on fusion

- Hyperopia
- Abnormal AC / A
Hyperopia is present in a small proportion of children age 6-12 mo... ethnicity affects prevalence...higher in certain subgroups...esp. family history of hyperopia or accommodative ET.

**20% of hyperopic infants → esotropia**
Ingram UK

- $\geq +3.50$ DS in one axis @ age 12 mo:
- 50% risk of strabismus / amblyopia
Early prophylactic spectacle correction of hyperopia:

- fails to prevent strabismus in 3/4 studies
- ↓ incidence of strabismus in 1 study
- improves acuity outcomes in 2 studies [by 1 investigator].
Factors which increase the demand on fusion 2

Abnormal Accom - Conv relationship

- Accom → too much convergence, or
- Conv → too much accommodation
- The types of abn Accom- Conv relationship [high AC/A ratio, abn CA/C ratio, proximal convergence, proximal fusion,..] do not have precise definitions, but common usage is not precise.
- USA: high AC/A = near eso > distance eso by ≥10Δ
- All these subtypes have same ‘final common pathway’.
- LK preference: convergence excess as synonym for all of these terms.
Abnormal Accom - Conv relationship

- Presbyopia
  Another age where accomm ET can be seen
- Drugs which interfere with accommodation e.g. Ditropan
  Parents don’t think of mentioning an enuresis [bed wetting] tablet to the eye Dr
Factors which decrease the quality of fusion

- Strabismus develops due to an imbalance between two groups of factors.

Factors which increase the demands on fusion

If this side is heavier, there will be strabismus

Factors which improve the quality of fusion

If this side is heavier, there will be no strabismus
Factors which decrease the quality of fusion

**Mechanical**
- Abnormal oblique anatomy / function
- Abnormal orbital pulleys
- Abnormal orbit - torted or shallow

**Neurological**
- Abnormal innervation
- Abnormal cortical factors
- Amblyopia
- Organic visual loss
- Head injury
Abnormal oblique anatomy / function

R IO OA

R SO UA

TIGHT RSR RIR ‘UA’
Mechanical Factors which decrease the quality of fusion 1

Abnormal oblique anatomy / function

These 4 complex muscles need to be *built*, *grow* and *work in perfect 3D symmetry*. At BEST they are very finely tuned with little room for error, hence vertical fusional range only ± 2-3 Δ.

Any imperfection will interfere with motor fusion, and predispose to tropia
Abnormal oblique anatomy / function

1. Atrophic superior oblique

   It never developed or
   Damaged by falling off change table / bike …
Mechanical Factors which decrease the quality of fusion 1

Superior oblique atrophy

LSO OK    RSO ?absent
Abnormal oblique anatomy / function

2. Plagiocephaly & other craniostenoses - misshapen foreheads - result in asymmetry of oblique muscle geometry
2. Plagiocephaly, other craniostenoses, and posteroplaced trochlea

Postero-placed trochlea $\rightarrow$ abn mechanical action of LSO

Fig. 1.3. Failure of the trochlea to advance anterior to the equator in a patient with unilateral coronal synostosis may result in reduction of depressing action on the globe with contraction of the superior oblique muscle.
Strabismus in Unicoronal Synostosis: Ipsilateral or Contralateral?


Unicoronal synostosis [ premature fusion of a coronal suture] : **looks like a slightly misshapen forehead** → increased prevalence of strabismus.

**Manifest strab in primary position 58%**
ET with vertical was most common - 61% of all strabs

**Apparent IOOA 51%, bilateral 24%**
Mechanical Factors which decrease the quality of fusion - subtle abnormalities in orbital anatomy

- Orbital pulley heterotopy
  Changes muscle actions

- Intorted / extorted orbit
  More prone to alphabet patterns
Extreme myopia: Huge globe distorts the surrounding muscle pulleys and changes muscle function → esotropia / hypotropia

Preoperative LE: LR pulley displaced down, SR displaced nasally

Postoperative LE: LR & SR pulleys repositioned
Extorted orbit

- Extorted right orbit and globe will cause a V-pattern and apparent IO-OA
Mechanical Factors which decrease the quality of fusion 4

- **Shallow / deep orbit**
  Shallow: more prone to exotropia

Orbital shape differences might explain [part of] difference between Caucasian and ...

- Oriental strabismus: XT more common
- South American Indian strabismus: Alphabet patterns more common
Factors which decrease the quality of fusion

Mechanical
- Abnormal oblique anatomy / function
- Abnormal orbital pulleys
- Extreme myopia
- Abnormal orbit - torted or shallow

Neurological
- Abnormal innervation
- Abnormal cortical factors
- Amblyopia
- Organic visual loss
- Head injury
Factors which decrease the quality of fusion - abnormal innervation

- **Duane's**
  
  LR supplied by both 6th and 3rd

Subtle variations may be more common than suspected
Duane’s Retraction on adduction

Retraction R on L gaze
Restricted aDduction R
Restricted aBduction L

Retraction L on R gaze
Restricted aDduction L

Co-firing Lateral rectus on aDuction
Cortical Factors which decrease the quality of fusion

Poor Sensorimotor Fusion

- ↓ motor fusion
  oculomotor ‘shock absorber’ / ‘glue’ that tries to keep eyes straight despite attempts to misalign them

- ↓ sensory fusion
  stereopsis

- Abnormal binocular columns
Cortical Factors 2: New kid on the block: **PVL**

Peri Ventricular Leukomalacia

Stroke @ 32 weeks gestation.

& congenital nystagmus [both types]
& optic n hypoplasia
& reading problems
& reduced acuity for cortical reasons
& …..
Non-mechanical Factors which decrease the quality of fusion 3

- **Amblyopia**
  - e.g. anisometropic amblyopia, amblyopia from congenital cataract, strabismic amblyopia

- **Decreased vision from organic causes**
  - Retinal disease - any visual pathway disease

- **Head injury**
Strabismus develops due to an imbalance between two groups of factors.

Factors which increase the demands on fusion

Factors which improve the quality of fusion

If this side is heavier, there will be strabismus

If this side is heavier, there will be no strabismus
IMPAIRED SENSORIMOTOR FUSION:
ET happens more readily [with lower or no +]

- Chromosomal defect / devptl delay
- Amblyopia
- Orbital anomaly
- PVL etc

Factors which increase the demands on fusion

Factors which improve the quality of fusion

If this side is heavier, there will be strabismus

If this side is heavier, there will be no strabismus

THIS SIDE NOW LIGHTER
TYPES OF STRABISMUS

1. Derived from refractive disorders: ESOTROPIA

2. ... from abnormal early visual development

3. Orbital causes

4. Neurological
Pseudo-ET:
Beware of dismissing an ? ET (not present during your testing) as a pseudo-ET

- Demonstrate to parents how to interpret light reflexes
- Offer email follow up of any suspicious photos
- UK study: 10% will end up with strabismus – 2-3 TIMES THE BACKGROUND RATE
Do a thorough search for strabismogenic and amblyogenic factors
MUST include cycloplegic retinoscopy for latent hyperopia
Pseudo-ET

Determine if $6^\circ$ BI will $\Rightarrow$ ET [poor fusional divergence = ‘almost ET’]

- MUST check for oblique dysfunction - predisposes to ET in a hyperope

- Every ‘ET by history, normal by exam’ could have the rare cyclic ET: one day ET, one day straight
Developing an esotropia...

THE UNCORRECTED HYPEROPE

Prolonged accommodation → tendency to prolonged inappropriate convergence and increased tone in medial recti [vergence tonus]
Developing an esotropia...2

- Increased tone will lead to changes in Tension / Length ratio and eventually to structural changes in muscle that eventually exceed motor fusional reserve and → esotropia!
- Then muscle starts to permanently shorten
‘OPTOMETRIC’ ESOTROPIA

- e.g. +4: Abnormal [& appropriate!] degree of accommodation required to see clearly
- Abnormal amount of accommodative convergence is generated
- Glasses required to make the child normal
‘OPTOMETRIC’ ESOTROPIA

- Exactly the same can happen with low + and abnormal accommodative - convergence relationship = convergence excess
Developing an esotropia...

- Initially reversible with glasses
- If correction is inadequate, eventually the medial rectus shortens so much that the mechanical part of the misalignment now becomes the main problem.
- Reversing the refractive part of the esotropia will no longer be sufficient to straighten the eyes - botox or surgery are now required to change the mechanical properties of the muscle[s].
- Glasses still required to prevent recurrence [and, when older, for clear vision]
Accommodative esotropia

- Usually 2-5 yrs old
  Second small peak in middle age
- Usually moderate +
- Sometimes low / normal + with convergence Xs
- Background of **normal** visual devpt in first 6mo of life - normal sensorimotor fusion can be regained
Esotropia  ET

- ET: core problem is [or becomes] a **tight medial rectus**, often driven by accom convergence

Fixing the medial rectus length & tension should return the alignment & mechanics to normal
TYPES OF STRABISMUS

1. Derived from refractive disorders
   ESOTROPIA

2. Derived from abnormal early visual development

3. Orbital causes

4. Neurological
CONGENITAL ESOTROPIA
ASSOCIATIONS OF Congenital ET

- Down’s 30%
- Severe neonatal course IVH / HC >>50%
- PVL it’s a radiological diagnosis : need prospective series to know %
PRINCIPLES OF TREATMENT OF ANY ET

1. **Give full** [cyclo if young, manifest if older].

- + for amblyopic eye is to optimise vision in the amblyopic eye
- + for fixing eye is optimise alignment of the amblyopic eye

2. Rx any amblyopia

3. Consider realignment for any residual ET after best amblyopia result and + has been re-checked
BENEFITS OF REALIGNMENT OF ET

- Normal appearance
- Better peripheral field
- Chance for sensory fusion
- Better chance to treat resistant amblyopia
TECHNIQUES FOR REALIGNMENT OF ET SURGERY
BIMEDIAL RECESSION or RECESS / RESECT ONE EYE
Conv Xs: BMR
Amblyopia: R-R
<35Δ same results
AIM: perfect early alignment
- Expectation: 80-90%

Medium term expectations:
Depends on:
- Sensorimotor fusion
- 1st 12 mo: 10% reoperation – issues with healing, bell curve for surgical doses
- Subsequent: 1% per year consec XT – the operation that has repositioned the muscles doesn’t ‘grow with the patient’
TECHNIQUES FOR REALIGNMENT OF ET: 2

MEDIAL RECTUS BOTOX
- 50+% success for 10-20° ET
- 15% temporary ptosis
- 1% permanent acquired vertical

Small number of Drs get GREAT results
- LK 40 p.a. [= 40% of country]
Alignment **has** to be mechanically perfect.

- Expectation of alignment: 80-90%

Poor motor fusion: insufficient ‘capture range’ to ‘collect’ a near-perfect mechanical realignment.

The repositioned muscles may not grow in perfect mechanical balance with growth in the eye & orbit; recurrent tropia more common
ACQUIRED ET:

- Expectation of alignment: 80-90%

Alignment has to be CLOSE. Presence of motor fusion: sufficient ‘capture range’ to ‘collect’ a near-perfect mechanical realignment. If a large tropia is improved to a small phoria: success*. The repositioned muscles may not grow in perfect mechanical balance with growth in the eye & orbit, and motor fusion will often look after that.

*if there was no motor fusion, this would be tropia= failure
TYPES OF STRABISMUS

1. Derived from refractive disorders: ESOTROPIA
2. Derived from abnormal early visual development
3. Orbital causes: EXOTROPIA
4. Neurological
Esotropia & Exotropia
ET & XT

- **ET:** core problem is [or becomes] a **tight medial rectus**, usually driven by normal or Xs accom convergence

- **XT:** core problem is usually **subtle anomaly in orbital anatomy** [*not a tight lateral rectus*]

- **ET / XT ARE NOT MIRROR IMAGE CONDITIONS**
Exotropia  XT

- XT: core problem is usually **subtle anomaly in orbital anatomy** [not a tight lateral rectus]
- Fixing the lateral rectus length & tension tries to compensate for the XT and improve the alignment & mechanics, but will not return the mechanics of this abnormal orbit to normal
EXOTROPIA - BASICS

- Abnormal mechanical balance of orbital tissues vs. motor fusion

If this side is heavier, there will be exotropia
If this side is heavier, there will be no exotropia
TYPES OF XT

- Intermittent XT, D > N
-Usu 2-7 yo *
- Little / no amblyopia
  Because often straight
- Motor fusion better for N, so XT worse for D

*but can deteriorate to ‘clinically significant’ @ any later age
INTERMITTENT XT:
Mayo Clinic study

- Very high incidence of myopia
- Higher incidence of psychiatric disease
Basics of treatment of XT

- Check manifest / cyclo refraction
- High +: give full + to improve peripheral fusion
- Treat any amblyopia
Basics of treatment of XT

- < 4y: patching
- 4-8: minus lenses
- > 6: surgery
Basics of treatment: **Minus lens treatment**…to promote accomm convergence

LK: as much minus as will not interfere with near threshold
Typically -2 to -3.5 over the cyclo
WHY?: only good alternative is surgery ⇒ >10% persistent ET ⇒ risk of amblyopia / troublesome diplopia depending on age
Usually NOT a long term solution
Uncertain risk of promoting / exacerbating any myopic tendency. Wisconsin study: little / no risk
Useful temporising measure to age 7-8
Basics of treatment: Surgery

Kushner 1998 seminal series of articles in Archives of Ophthalmology on examination techniques and treatment protocols

Different types of XT
- Divergence Xs
- Simulated divergence Xs
- Basic
- Convergence insufficiency
Who gets XT surgery?

Better outcome if:
- not quite constant XT
- Medium angle rather than large angle
- Pre-op stereo
Basics of treatment: XT surgery

>50% early ET [5-10Δ desirable]

>10% persistent ET ⇒ risk of amblyopia / troublesome diplopia depending on age

Some sense in deferring surgery till out of the amblyogenic age, hence minus lenses & patching
TYPES OF STRABISMUS

1. Derives from refractive disorders: ESOTROPIA
2. Derives from abnormal early visual development
3. Orbital causes
4. Neurological
‘Pure’ neurological strabismus

- True cong sup obl palsy
  - 6th
- CFEOM  [hypoplasia sup div 3rd; KIF mutation]

...have 2ary effects that are dependent on age of onset and associated factors such as refraction
RED FLAGS

- ET greater for distance than near
- ET or XT greater to lateral gaze
- Strabismus that varies a lot from morning to evening
- Any vertical $> 5^\circ$
- A recently symptomatic vertical of any size
- Recent onset nystagmus / oscillopsia
- Recent / variable ptosis
Overview Part 2

• New approaches to amblyopia – causes and treatment
AMBLYOPIA

- Normal morphology
- Reversible to some degree
- ?Often ?usually very asymmetric bilateral condition

Small list of associated / causative factors:
1. Anisometropia, astigmatism
2. Strabismus
3. Any vision-reducing pathology, on which amblyopia is superimposed
Frequent findings:

- Bilaterally abnormal disc morphology
- Bilaterally abn globe morphology
- Thickened macula on OCT in eye with resistant amblyopia
Why treat amblyopia?

Better spare tyre

More accurate presurgical strabismus measurements

Better sensory fusion: \( \uparrow \) stereo \( \Rightarrow \) better function
AMBLYOPIA ACRONYMS

PEDIG [USA]:
• Large numbers of clinics / patients
• Simulates community treatment

MOTAS [UK]:
• Few clinics
• High tech electronic patch
PEDIG: Glasses alone

- 6/12 to 6/75
- 27% cured
- Another 50% ≥ 2 lines better
- Took up to 7 mo
MOTAS
Glasses alone

- 65 newly diagnosed children

- VA improved \( (p=0.001) \) from 0.67 \([6/24-]\) to 0.43 \([6/15-]\) logMAR

‘REFRACTIVE ADAPTATION’

*is this why the CAM stimulator ‘worked’?

Anisometropic Amblyopia Treated with Spectacle Correction Alone: Possible Factors Predicting Success and Time to Start Patching.


... time course of VA improvement in children 3-7y with anisometropic amblyopia treated with spectacles alone.

n=60, mean age 5.3 y, mean anisometropia 3D. Amblyopia improved by ≥2 log MAR lines in 93% and resolved in 45%; mean improvement in VA of 0.38 log MAR.

↑ VA in the amblyopic eye was considerable at 4-12 weeks then reached a plateau, after which it improved only slowly.
Anisometropic Amblyopia Treated with Spectacle Correction Alone: Possible Factors Predicting Success and Time to Start Patching.

CONCLUSIONS: With spectacle correction alone, 3-7y children with previously untreated anisometropic amblyopia achieved approximately four-line improvement and resolved in nearly half. After 4mo with no improvement in VA, occlusion therapy or atropine penalization may be considered.
6/12 - 6/24

- 2h/ d = 6h/d
- Weekend A = daily A

- 10%: change in strabismus - better or worse
6/30 - 6/120

- 6h/d = full time or FT-1h
- 6/15 usual endpoint
WHEN to treat amblyopia?
Success rates @ different ages

<table>
<thead>
<tr>
<th>Age</th>
<th>Success Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-7 y</td>
<td>75-85%</td>
</tr>
<tr>
<td>7-17 y</td>
<td>25-50%</td>
</tr>
<tr>
<td>Adult</td>
<td>≤10%</td>
</tr>
</tbody>
</table>
MOTAS …several studies

1 line gain:
- needs ~ 120h occlusion

2 line gain:
- 4y: needs 170h
- 6y: needs 236h
Dose-response @ different ages

< 4 years old:
- low dose rates (<3 h/d) are effective, with slight (p=0.54) additional gains for doses >3h/d

> 4 years old:
- significant differences between <3h/d & 3-6h/d
- no difference between 3-6h/d & 6-12h/d

> 6 years old:
- <3h/d had little effect; need >3h/d
Maybe more isn’t always better...

MOTAS:

- Higher dose rates achieve the best outcome more rapidly but at a risk of accumulating excessive non-therapeutic hours of patching....patching for all waking hours is almost certainly excessive....
Conclusions of Amblyopia Recurrence Study

- ¼ of successfully amblyopic children experience a recurrence over 1 year of f/u
- Recurrence risk similar for stopping patching and stopping atropine
- Most recurrences occur < 3 mo – early follow-up is critical, but long term follow-up is also important
- If ≥ 6h of patching stopped – recurrence risk is lower if patching is reduced to 2h/d before cessation – “weaning” is beneficial
Timing of the 35 recurrences

Weeks

Pts

14 (40%)
10 (29%)
5 (14%)
6 (17%)
When it doesn’t work for your patient: is it the Parents?

- Parents avoid parading an obviously defective child & will not patch in public
- Parents don’t like inflicting discomfort on their child
Recruiting parents to treat their children

HAVE TO TREAT THE FAMILY
Types of parents  ……

- Type A - no excuses:
on Thursday we only did 5h 20m, so we made up for it on Friday with 6h 40m

- Type B:
We’re careful to do it all the time.. but we forget sometimes when we’re busy….

- Type C - great excuses:
s/he hates it…. we haven’t managed for the last week…. s/he was sick… we were on vacation… we let the nanny look after it…. s/he only does it @ school…
Parent diaries overestimate actual patching time by a factor of 2-3 even when they know it is monitored by an electronic Occlusion Dose Monitor and will be checked!
Strabismic Amblyopia

- Does alignment result in better response to amblyopia therapy? ... or no need for amblyopia therapy?
Timing of amblyopia therapy relative to strabismus surgery

Lam GC, Repka MX, Guyton DL

*Ophthalmology.* 1993 Dec

- 47 children < 8 y with both amblyopia and esotropia.
- 26: amblyopia fully treated before surgery
- 21: surgery before completing amblyopia therapy.
- 5/21 did not require amblyopia therapy after surgery even though they were still amblyopic before operation.
Helping the parents: Therapeutic environment

- Some parents need help to maintain enthusiasm for a task which everyone finds difficult
- Keep the therapeutic environment alive / active e.g. ring daily
Post- Darwinian treatments

1. Refractive surgery
2. Drugs
   L- DOPA
   PROZAC
Refractive surgery

- Works in a significant minority of anisometropic amblyopes
- Safe in short term, probably in medium term
- Personal experience 0
I’VE MADE IT QUITE COMPLEX, BUT REMEMBER THE BASIC 2 STEP MANAGEMENT OF STRABISMUS

1. Improve /equalize acuity
2. Straighten the eyes
   - Optically
   - Botox
   - Surgically