

## The well-baby vision examination



Françoise Rateau  
Australia

## The challenges

- Span of concentration
- Best management
- Communication
- Equipment



## Casual Inspection

- Look well?
- Developmental normal?
- Structural defects
- Head posture; strabismus; nystagmus
- Healthy eyes & ocular adnexa
- Discharge
- Photophobia; eye rubbing
- Visually aware; eye contact



## The aim of the examination

- Prevention of strabismus/amblyopia
- Prevention of vision problems that can affect development & learning; quality of life issues
- Detection of pathology (primary and secondary), neurological disorders (eg nystagmus, ptosis) and congenital malformations

## What could we measure?

- Casual inspection
- Cover test and motilities; NPC
- Pupils
- Vision - FPL
- Refractive status: dry, wet
- Fusional ranges
- Accommodation: near ret,
- Stereo
- Visual fields
- Slit lamp
- Internal
- Developmental tests; reflexes

## My baby examination

- Casual inspection
- Visually aware
- Fix & Follow
- Equal avoidance to cover
- Motilities FROM
- Pupils
- Ortho to cover test
- Near ret
- Cycloplegic ret
- External
- DFE

## History

- Presenting complaint and who notices this?
- Well?
- Development wnl?
- Birth history; Apgar score
- Medications
- FOH

## FOH of strabismus and amblyopia

Ingram & Walker 1979: Siblings of strabismus/amblyopia children

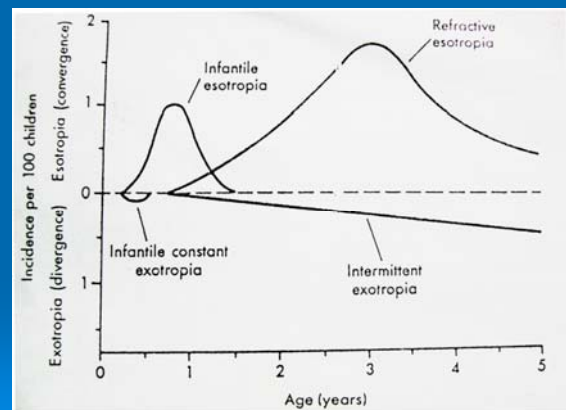
- N=215 preschool siblings of children who presented with strabismus/amblyopia
- If no hyperopia/astigmatism/anisometropia present in sibling at age 1, they have 10% chance of developing strab/amb.
- If  $\geq +2.00D$  sph in both eyes and/or  $\geq 1.5D$  of astigmatism, now have 40% chance of being found later to have strab/amb
- (CT, VA  $< 6/12$  linear or  $> 1$ line IOD)

## FOH of strabismus and amblyopia

Aurell and Norsell 1990

A longitudinal study of children with a family history of strabismus

- If 1 parent or sibling has ET then 17% chance of child getting ET and 38% chance of being  $> +4.00D$  at 1 year
- If  $> +4.00D$  and FOH of ET then 46% chance of ET





### Case History- JB, IB

- JB May 2000; 8 mo.
- ?Intermittent ET; CTO
- Near ret +0.25OU
- Cyclo +4.50D
- June 2003
- Dry dist +2.00 +1.50
- Near ret +1.00/-0.50
- Cyclo +4.50;Rx near
- 2004 dry+4.25 4.00
- IB May 2002; 9 mo
- Near ret +0.75 +1.75
- Cyclo +7.00 +7.50
- 20BO fused and released
- Oct 2002
- Dist dry ~+4.00 OU
- Near ret 1.00→+2.00
- +8.00/-1D +9.50/-1D

### Case history DB

- Sept 2005; 7 mo.
- Dist dry +2.00 OU
- Near ret +0.50 to +2.00
- Cyclo +6.50 +7.00/-0.75
- Mum: pl/-4.00 +0.75/-4.75
- Dad +8.25/-1.25 +7.75/-1.25
- Strab Sx age 3 yrs
- Orthotrope
- No fly

### Referral sources to our practice

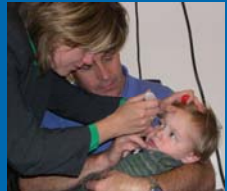
- 58% Maternal and Child Health nurses
- 30% Family in care
- 9% Friends
- 3% Other
- N=33, ages 2-19 months, median 8 months (SD4.5)

## Why do they present

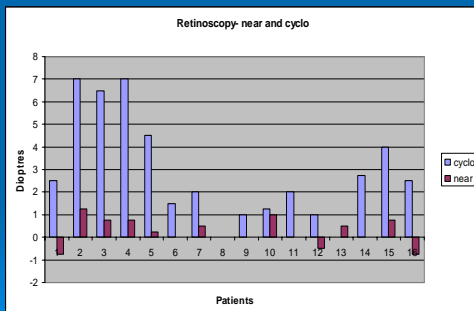
- 64% ET/XT (usually ET)
- 9% routine
- 9% presumed ptosis
- 6% eyes don't move together
- 3% (1/33) nystagmus; photophobia; rubbing eyes; poor awareness of environment; roving eyes; watery eyes; FOH ref error

## Cycloplegic refraction

- Term to 12 months 0.5% cyclopentolate (Hatch); punctal occlusion
- (also toddlers with heart arrhythmias, Down syndrome, hepatic problems etc)
- Preterm 0.2%; after 4 months 1% (Repka)



## Near and cycloplegic retinoscopy data from our practice



## Comparing noncycloplegic with cycloplegic retinoscopy in Pre-School children

- Maino J et al Noncycloplegic vs cycloplegic retinoscopy in Pre-School children 1984 "little agreement between the two findings" (Mohindra)
- Gwiazda:1996 Half the children with infantile sph equiv's  $< +0.50D$  are myopic at age 9to16 years (vs 20%)
- Atkinson 1996 Videorefractive images without cycloplegia Accommodative lag strongly predictive of hyperopia ( $\geq +3.50$ ) under cycloplegia

## Why do they present

- 64% ET/XT (usually ET)
- 9% routine
- 9% suspected ptosis
- 6% eyes don't move together
- (3%) 1/33 photophobia; rubbing eyes; poor awareness of environment; roving eyes; watery eyes; FOH ref error; nystagmus

## Nystagmus

- CIN jerk, conjugate, autosomal dominant
- SDN albinism, cataract, aniridia, coloboma, achromatopsia, Leber's, optic chiasmal glioma
- Vertical, seesaw, pendular
- Triangular, then pendular then jerk

## Assessing the vision of an infant

- Awareness of & interest in environment
- Brisk pupil reaction direct & consensually to light
- Good eye contact (vs looking through faces)
- Beware nystagmus or roving eye movements



## Assessing the vision of an infant

- Fix and follow
  - thumb
  - Target: distance/near; face/toy
- Equal avoidance of cover
- Fixation preference if strabismus present
- Induced strabismus- 10BD/ 15BI



## Assessing the vision of an infant

- Preferential looking
- Sweep VEP, ERG
- Age 2 months follow past midline
- Age 3 months vertical eye movements
- CSM: Central (vs eccentric), steady (not nystagmoid/roving), maintained (when other eye uncovered i.e. no strab)

## External examination

- Lid ptosis, colour, oedema
- Eyelid/iris coloboma
- Ocular melanosis, naevus of Ota; café au lait
- Dermoids (conj or periocular)
- Cutaneous haemangioma
- Pupils; heterochromia; transillumination
- Clear cornea & lens; corneal diameter
- Leukocoria
- Proptosis

## Dilated Fundus Examination

- Retinoschisis or RD
- PHPV
- Retinoblastoma
- Albinism
- Toxoplasmosis
- ON flat, pink, size, cupping, developmentally normal

## Cycloplegic refractions in healthy children aged 1 to 48 months

Mayer, Hansen, Moore and Fulton, 2001

- Normal population
- N=514
- Median N=43 per group (range 32-52)
- 85% white
- Gestational age  $\geq 37w$
- Apgar score  $\geq 8$
- Uncomplicated neonatal period
- No medical problems
- Parents report developmentally normal

## Cycloplegic refractions in healthy children aged 1 to 48 months

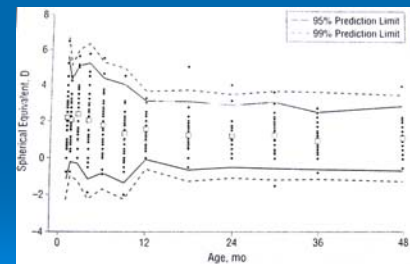
Mayer, Hansen, Moore and Fulton, 2001

- 1 drop 1% cyclopentolate + punctal occlusion
- Retinoscopy by BM optom & AF ophthal
- Masked as to other refractionist's results

## Cycloplegic refractions in healthy children aged 1 to 48 months

Mayer, Hansen, Moore and Fulton, 2001

- Significant decline in hyperopia with age
- Significant ↓ in range of spherical equivalent



## Cycloplegic refractions in healthy children aged 1 to 48 months

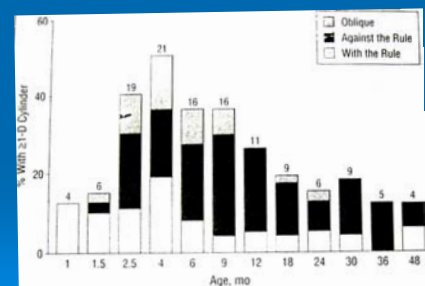
Mayer, Hansen, Moore and Fulton, 2001

- At each age spherical equivalents normally distributed
- 1% anisometropia  $\geq 1D$  (Ingram 6.5% age 1)
- 25% astigmatism  $\geq 1D$
- 3% astigmatism  $\geq 2$
- 56% ATG, 29% WTR, 14% oblique ( $>\pm 15^\circ$ ; all mirror images) (Ingram found WTR=ATR in 1 year olds)

## Cycloplegic refractions in healthy children aged 1 to 48 months

Mayer, Hansen, Moore and Fulton, 2001

Highest prevalence of subjects with astigmatism @ ages 2.5, 4, 6, 9 months





## Myopia

- 3% myopia  $\geq -0.50D$  (Mayer et al)
- Congenital/infantile myopia is usually of large magnitude ( $>5D$ ) and tends to remain stable throughout life (Repka)
- Occurs in Stickler's syndrome, RP & glauc
- Mild ROP some  $\uparrow$  in freq mild myopia
- Moderate/severe ROP have distributions clearly skewed to myopic sph equivalents

## Changes in refraction between ages 1 and 3½ years 1979

Ingram and Barr BJO 1979

- 1% Cyclopentolate; refraction by Ingram
- N=148
- 1 year olds presenting for immunisation
- Aniso both appeared and disappeared
- At age one, 12/148 aniso yet by age 3.5 only 7/12 still had aniso and 8 new children had aniso

## Changes in refraction between ages 1 and 3½ years

Ingram and Barr 1979

- If at age 1 year  $<+2.50D$ , significant trend to emmetropia
- If at age 1 year  $\geq +2.50$ , may become more or less hyperopic
- Significant decrease in both the incidence of astigmatism in individual eyes and the number of children who have  $>1.50DC$

## Changes in refraction between the ages of 1 and 3½ years

Ingram and Barr 1979

- If  $\geq+3.50$ , 48% chance of squint and 57% possibility of amblyopia
- Persistent (after intervention) severe (6/24 or worse) amblyopia had either  $\geq+3.50$  or  $\geq-4.00D$  meridional ref error at age 1yr

## Atkinson 1981-4

- 3166 infants screened by orthoptist using 1% cyclopent. & isotropic photorefracton
- 4.6%  $>+3.50D$
- Strong trend for ↓ hyperopia
- No sig difference in rate of ↓ hyperopia bw those who wore partial correction & those uncorrected
- ↓ hyperopia most marked if no marked astig

## Atkinson 1981-4

- Measured outcome at 4 years
- 21% of hyperopes who did not wear a correction became strabismic (vs 1.6% of emmetropic controls and 6.3% of the treatment compliant group)
- 68% of non-treated group achieved VA less than 6/9 (vs 11.1% of emmetropic controls and 28.6% of the treatment compliant group)

## What to prescribe & when

- Strabismus or amblyopia
- Age 1 onwards watch very carefully hyperopia over 3D and intervene if higher
- Decide on basis of age, degree & stability of hyperopia, accommodation status, binocular status, VA, developmental status
- Emmetropisation & success of intervention Ingram vs. Atkinson

## What I say to parents

- Your child's profile versus the normal profile
- What if we Rx and what if we don't
- If no intervention, when is the next assessment important

## Final notes

- Have to cycloplege 0 to 2 year olds
- Pathology can exist and be dangerous
- Think before prescribing for low/moderate cylinder & anisometropia
- Consider prescribing for +3.00 and over
- Myopia is unusual
- Work quickly, using helpers; invest in toys
- Review as often as necessary

