INFANTS AND HYPEROPIA

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9mo, straight, +6 DS OU documented when examined for epiphora
What do you do?
Retinoscopy gives the answer

• Dry ret – to assess functional significance of wet ret in straight eyed baby
• Wet ret – quantitative assessment
• Use Cyclopentolate
• 0-12 months of age = 0.25% cyclo. Use a local anesthetic first. Wait 15 minutes between eyes.
  12 months- 2 years of age = 0.5% cyclo
>2 years of age = 1 % cyclo
Hyperopia in Newborn infants

- #1: Atropine gel: 30% had ≥+3DS [black = white]
- #2: mostly white 3 mo: 25% had ≥+3DS. By 9mo, 5.4% [Muti]
- #3: 6mo: 9% had ≥+3.5DS [Ingram]
- #4: 12mo: 4% had ≥+3.5DS [Ingram]
- #5: ≥+2DS @ 12m: UK 12%, US 20%
Emmetropisation

Beware: *Data has a lot of scatter*

- Mostly happens ≤ 12 mo
- Ingram: ≥+2 DS @ 12 & 40 m mo: 11%

**Muti:**
- emmetropisation proportional to refractive error ≤+4.
- ≥+4 less likely to emmetropise
- rapid growth of the eye b/w 3 - 9 mo - increases in axial length by 1.20 ± 0.51 mm and decreases in lens power by 3.62 ± 2.13 D to reach values that are 90% of the average axial length and 155% of the average lens power of a child age 6 y
HYPEROPIA IN CAMBRIDGE INFANTS

• #1: 6-9mo. Cycloplegic photorefraction. \( \geq +3.5 \text{DS} \) in any meridian. 4.6%
• #2: 7-9mo: ...5.7%
• #3: 8mo: non cyclo photorefraction. Lag \( >1.5 \text{DS} \) in any meridian: 4.5%.
Fulton: Boston

Emmetropisation
Wide scatter
Myopia 3%
CAUSES OF HYPEROPIA

1. GENETIC

Parent / sibling with ET:
Risk of $\geq+4$ @ age 6mo is 38%.
2: Environmental.
An unexpected association between Childhood Hyperopia and Parental Smoking

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Background

The association between maternal smoking in pregnancy, other early life characteristics and childhood vision: the Twins Eye Study in Tasmania.

Ponsonby AL, Brown SA, Kearns LS, MacKinnon JR, Scotter LW, Cochrane JA, Mackey DA


- N = 346 (172 multiple births)
- Mean age = 9.25 yo
- **Maternal smoking during pregnancy** – associated with poor stereo-acuity and esotropia
- Postnatal maternal smoking not associated with these factors
Background

Prevalence of hyperopia and associations with eye findings in 6- and 12-year-olds.

Ip JM, Robaei D, Kifley A, Wang JJ, Rose KA, Mitchell P

– N = 1765 (6 yo); N = 2353 (12yo)
– Maternal smoking associated with moderate hyperopia in 6 yo but not 12 yo
– Smoking during pregnancy – borderline significant with moderate hyperopia (p=0.055)
  • Not significant when controlled for ethnicity
– Moderate hyperopia is significantly associated with amblyopia, strabismus, poor stereoacuity and abnormal convergence
Pilot Smoking study

• Aim
  – To explore the relationship between hyperopia and parental smoking in a population who present to a subspecialty strabismus practice

• Methods
  – Patients between the age of 0 -12 undergoing a cycloplegic retinoscopy were recruited
  – A short questionnaire was administered to the accompanying parent[s]
    • Information regarding parental smoking status, gestational smoking status, parental refractive error and ethnicity were collected
Results

• N = 142 participants
  – Mild hyperopia (+0.25 - +1.75) = 59
  – Moderate hyperopia (+2.00 - +5.75) = 59
  – Severe hyperopia (> +6.00) = 15
  – Myopia = 8

• Mean age = 5.29, SD = 2.99, Range 0-12yo

• 52% female

• 21% mother smoke; 16% smoked during pregnancy

• 26% father smoke; 32% smoked during pregnancy

• 32% have either parent smoking now

• 38% have parent smoking during pregnancy
Results

Adjusted for age
Discussion

• Gestational smoking is NOT associated with hyperopia
• Having a mother who is smoking now increases the odds of moderate to severe hyperopia (>+3 DS) by nearly **21 fold**
• Mother with myopia is protective of a child having > moderate hyperopia
The association between passive smoking and the risk for hypermetropia in children

Methods:
• 413 children with SE refraction of +3.0 D or more and 413 age matched children with refraction between 0.0-2.75D were included.
• Smoking habits of the parents or other family members living at home with the children in both groups were compared.

Results:
• Average age in hypermetropia&control groups:6.34±3.1&6.33±3.2 y(P=0.82).
• 121 children (29.3%) with hypermetropia were exposed to passive smoking at home for an average duration of 1.84±3.49 years as opposed to 113 (27.3%) children in the control group which were exposed for an average duration of 1.68±3.1 years.
• Logistic regression revealed that longer duration of exposure to passive smoking was associated with increased risk for hypermetropia (P=0.03).

Conclusion:
• Passive smoking is associated with increase risk for hypermetropia in children.
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Dynamic retinoscopy: accommodates well & symmetrically OU:

We know this is a high risk baby –
1. Monitor with frequent flash and non-flash photos
   Look for asymmetric corneal reflexes
   Look for asymmetric red eye
2. See 3 monthly
9mo, straight, +6 DS OU documented when examined for epiphora

Threshold for giving full +:

Frequent ET on photos
ET easily precipitated in office exam
Doesn’t accommodate for near on 2 consecutive examinations
Some extra caution: High +

• Association with retinal dystrophy
• Look for paradoxical pupils
• Low threshold for ERG
• ET more difficult to manage
• Lower expectations
Age of Presentation (%)

- **Progressive Hyperopia**
- **Non-progressive Hyperopia**

Age (in years)

- <1
- ≥1<2
- ≥2<3
- ≥3<4
- ≥4<5

- 0%
- 5%
- 10%
- 15%
- 20%
- 25%
- 30%
- 35%
BCVA better eye

Progressive hyperopia
Non-progressive hyperopia

Age of Presentation & Best Sensory Fusion

Lang stereo or better only seen in kids who present age 2 or older
Does + prevent devpt of accomm ET?

Ingram: 2 studies

• #1: $\geq +2$ age 12mo: ~15% have ET by age 3.5y, gls $\sim$ non-gls

• #2: $\geq +3.5$ age 6mo : ~25% develop ET, gls $\sim$ non-gls
Does + prevent devpt of accomm ET? #2

Atkinson:
• #3: ≥ +3.5 age 8 mo : ~10% develop ET with gls, 23% no gls!
• Benefit NOT confirmed in 2nd study

*Overall: uncertain benefit*
Does + prevent devpt of accomm ET?

• Both Ingram & Atkinson –
• Giving gls did not interfere with emmetropisation
Why you can do it better

• You’re seeing one patient, not 100’s
• You can review frequently to assess significance of +
• Dry ret is a good guide to adequacy of accommodation through the +, & to amblyopia
• Infrequent transient ET: probably give full+
• ET > infrequent / transient: full+ [or a little more]
Thank you