



Q: Picture of child with esotropia, Primary, left + right gaze – does not abduct either eye

- What is DDX?
- How would you examine ptn?
- How would you differentiate between bilateral 6<sup>th</sup> and cross fixation?
- How would you manage if esotropia?
- How would you explain and how would you get informed consent?

A: Congenital esotropia

- Ddx congenital esotropia
  - Pseudo vs Neurogenic vs Restrictive
  - P: Epicanthal folds vs accommodative spasm

- N: Congenital vs Accomodative vs Cong Sixth vs Duane's vs nystagmus  
blockage vs **sensory deprivation**
- R: medial wall # vs thyroid vs myasthenia
- Examine – Fhx/PMHx? onset? Photographs? Vision/Amblyopia check? Muscle light pupil reflex? Versions – ductions? Cover – uncover test? Cross Cover test? Distance vs near? Up and down gaze? Cyclo refraction? Full SLE + DFE exam esp ON/Macula
- Perform Doll's head manouver in office vs Patch one eye for several days to diff. from bilat 6<sup>th</sup>.
- Treat amblyopia first if any, give best refraction, BMR recession vs MR recess/LR resect if amblyopic eye
- Explain that the goal is 1) best Va, 2) binocular vision or at least monofixation with increased binoc VF, 3) cosmesis – explain that even with surg perfect results only 80% of time and may need reop, also natural course of this is that at age 2 may have IOOA +/- DVD 75%; latent nystagmus 50% toward non-occluded eye.

## Esodeviations

### **A—Congenital**

#### **1—Comitant**

- a—classic **infantile**/congenital
- b—**NBS**
- c—**early onset accommodative**
- d—**Mobius** syndrome
- e—microtropia/monofixation syndrome

#### **2—Incomitant**

- a—**Duane's** type I
- b—**VI** palsy d/t birth trauma

### **B—Acquired**

#### **1—Comitant**

- a—**accommodative**
  - i—**refractive** (hyperopic)
  - ii—**non-refractive** (high AC/A)
- b—**sensory deprivation**
- c—**divergence insuff** =  $ET > ET'$
- d—**convergence excess** =  $ET < ET'$

#### **2—Incomitant**

- a—**medial restrictive**
  - i—thyroid
  - ii—medial wall #
  - iii—excessively resected MR
- b—**lateral paretic**
  - i—**VI** palsy
  - ii—excessively recessed LR

## Infantile ET

—onset before **6 months**

—often **+ve FHx**

—large angle > **40-50** with **cross-fixation**

—**refraction** usually **nr1** (+1.00 to +2.00)

—**ET = ET'**

—assoc. ocular features

—**latent nystagmus** 30%

—**DVD** 75%

—**overacting IO's** 75%

—asymmetric **OKN**

—**DDx**

—**VI palsy**

—**Mobius synd**

—**Ciancia synd**

—**Duane's**

—**congen. fibrosis synd.**

—**myasthenia**

—**NBS**

—**Ciancia syndrome**

—**early onset ET**

—**large deviation**

—**limited abduction OU**

—**nystagmus increase on abduction**

—**torticollis**

—**Sx before 18 months**

—**success depend on timing**

—before 2 yo = 83-87% fusion

—after 2 yo = 31% fusion

—**BMR 4-5 mm ou**

—can delay to 18-24 mo and still get good results --> advantage of waiting is other features (eg. IO o/a) may appear by then --> can correct all at once

### DIFFERENTIAL DIAGNOSIS OF CONGENITAL ESOTROPIA

Early-onset accommodative esotropia

Nystagmus blockage (compensation) syndrome

Möbius' syndrome

Duane's syndrome

Cyclic esotropia

Esotropia associated with visual loss in one eye, neurologic impairment, or increased intracranial pressure

Strabismus fixus and other fibrosis syndromes

- advantages** of early Sx
- better **binocular** fn
- better **fusional** amplitudes
- avoid contractures**
- parental** stress
- if **ET recurs** after Sx, consider **acomodative** component previously misdiagnosed
- if recess accomodative ET, will get contractures of MR
- can rarely get ET before 6 mo which is d/t accomodation instead of garden variety infantile ET

### **Nystagmus blockage syndrome (NBS)**

- variable ET**
- nystagmus **dampened** by **convergence**
- nystagmus when eye **abducted**
- coarse
- fast** beating **towards covered** eye
- manifest in abducting eye when turn head to fixate with eye in adduction (less nystagmus)
- a.k.a. Ciancia syndrome

### **Accomodative ET**

- onset** 6 mo to 7 yr, avg. **2.5 yr**
- intermittent @ onset, later constant
- often +ve FHx
- amblyopia frequent
- no diplopia** b/c develop facultative suppression scotoma

### **AC/A**

- for normal pt, to accomodate object at 1/3 m, need 18 if eyes are 6 cm apart -->  $AC/A = 18 \times 1/3 = 6:1$
- gradient method most accurate way to measure

## 1—Refractive subtype (normal AC/A)

- hyperopic  $> +3.00$  (avg  $+4.75D$ )
- $ET = ET'$
- ET **20-30**
- full cycloplegic **refraction** --> become **ortho**
- if  $> +5.00$  OU, risk for ametropic bilateral amblyopia
- Hx
  - breakdown @ 18 mo to 3 yr
  - often precipitated by illness
  - onset can be intermittent initially
  - progress EP --> intermittent ET --> manifest ET
  - often +FHx
- Rx
  - amblyopia
  - full cycloplegic refraction
  - want to maintain/restore fusion
- F/U—rerefract every 6 mo b/c hyperopia increases until age 7 yo

## 2—Non-Refractive subtype (high AC/A)

- refraction **nrl** for age (avg  $+2.25D$ )
- $ET' > ET$  with ET 0
- less  $ET'$  with +3 lenses, but still present
- test with +3.00 lenses for  $ET' > ET$  not good b/c will not immediately relax accommodation
- better to test with -1.00 over at distance --> increases ET

## 3—Decompensated high AC/A + refractive ET

- high hyperope  $> +3.00$
- $ET' > ET$
- with full cycloplegic **refraction**, still have **residual ET**
- often © delay btw onset of accommodative ET and giving cyclo refraction
- eg.  $ET(sc) = 40$ ,  $ET(cc) = 10$ ,  $ET'(cc) = 25$ 
  - ET accommodative =  $40 - 10 = 30$
  - ET(cc) = non-accomodative, decompensated portion
  - ET non-refractive high AC/A =  $25 - 10 = 15$

## **Treatment**

—**full cycloplegic refraction**

—note that hyperopia increases until 5-7 yo, then begins to decrease

—thus ET with glasses will appear to recur if undercorrected before 5-7 yo, and previous full cyclo refraction will begin to blur after 5-7 yo

—**bifocals** if  $ET' > ET$

—executive type with top of segment across visual axis

—eventually want to wean pt. off bifocals by decreasing power of add once pt. has restored fusion --> this will build up fusional divergence reserve

—long-acting **cholinesterase** inhibitors

—paralyze accommodation

—eg. 0.125% **echothiopate**

—must warn parents r/e deletion of pseudocholinesterase from blood, with high susceptibility to succinylcholine

—**surgery**

—periph fusion possible if residual ET < 10

—if one eye amblyopic, do resect-recess on that eye

—with equal vision, do BMR

## **Divergence Insufficiency**

—**ET > ET'**

—comitant

—fusional divergence reduced

—will fuse @ 25-40 cm but not further away

—no assoc. neuro abnormalities

—**Dx of exclusion**

—must DDx from divergence paralysis d/t pontine tumors, neuro trauma etc.

—Rx with **BO prisms**

## **Convergence Excess**

—**ET' > ET**

—Rx—**correct** for distance **ET** and put in **posterior fixation suture** to partially **cripple** accommodative **convergence**

—DDx V-ET --> make sure pt. not looking down when testing at near

## Divergence Paralysis

—similar findings to divergence insufficiency, but more often © CNS abnormalities

—pontine tumor

—head trauma

—other neuro conditions

## Surgical guidelines for ET

<u>ET angle</u>	<u>BMR</u>	<u>Bilat LR resect</u>
50	6.0 mm	9.0 mm
40	5.5 mm	8.0 mm
decrease 5	decrease 0.5 mm	

—R/R—same numbers as for symmetric, but appropriate number for each muscle

SURGERY FOR CONGENITAL ESOTROPIA			
Deviation ( $\Delta$ )	Symmetric	Asymmetric (one eye)	
	Recede medial rectus, both eyes (mm)	Recede medial rectus (mm)	Resect lateral rectus (mm)
35	5.0	5.0	8.0
40 or 45	5.5	5.5	9.0
50 or 55	6.0	6.0	10.0
60 or 65	6.5	6.5	10.0
$\geq 70$	7.0	7.0	10.0