Comitant Esotropia

In this context, what does the word *comitant* mean?
Comitant Esotropia

*In this context, what does the word *comitant* mean?*
It means the ET is the same in all fields of gaze.
Comitant Esotropia

~50PD of comitant esotropia
Comitant Esotropia

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What common cause of ET is effectively ruled out by comitancy?
Comitant Esotropia

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What common cause of ET is effectively ruled out by comitancy?
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What is spread of comitance?
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Which is more common: comitant ET, or comitant XT?
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ET is significantly more common
Comitant Esotropia

Comitant esotropia

Comitant ETs are divvied into two groups—what are they?
Comitant Esotropia

Comitant esotropia

Congenital    Acquired

*Comitant ETs are divvied into two groups—what are they?*
Comitant Esotropia

With regards to comitant ETs, ‘congenital’ doesn’t mean congenital, rather, it means ‘before a certain age.’ What age is used as the cutoff between congenital and acquired ETs?
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With regards to comitant ETs, ‘congenital’ doesn’t mean congenital, rather, it means ‘before a certain age.’ What age is used as the cutoff between congenital and acquired ETs?
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m) Acquired (onset > age 6 m)

*Why is the term congenital a misnomer here?*
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

Why is the term congenital a misnomer here?
Technically, a congenital disorder must be present at birth—it can’t show up 6 months later
Comitant Esotropia

Comitant esotropia

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*For this reason, some clinicians refer to these ETs not as ‘congenital,’ but as what?*
Why is the term congenital a misnomer here? Technically, a congenital disorder must be present at birth—it can’t show up 6 months later.

For this reason, some clinicians refer to these ETs not as ‘congenital,’ but as what? Infantile esotropia.
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)   Acquired (onset > age 6 m)

Worried parents call your office to say they observed their two-month-old child’s eyes cross briefly. Should you be concerned?
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

Worried parents call your office to say they observed their two-month-old child’s eyes cross briefly. Should you be concerned? Not necessarily. Brief strabismic episodes are commonly seen in the first few months of life. Tell them it’s probably nothing, but to keep an eye on it (so to speak).
Worried parents call your office to say they observed their two-month-old child's eyes cross briefly. Should you be concerned?
Not necessarily. Brief strabismic episodes are commonly seen in the first few months of life. Tell them it's probably nothing, but to keep an eye on it (so to speak).

They call back a week later to report they observed his eyes “turning out [going XT] for a second.” As this represented a change from the transient ET they saw previously, they were concerned. Should you be?
Comitant Esotropia

Comitant esotropia

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Worried parents call your office to say they observed their two-month-old child ‘s eyes cross briefly. Should you be concerned?
Not necessarily. Brief strabismic episodes are commonly seen in the first few months of life. Tell them it’s probably nothing, but to keep an eye on it (so to speak).

They call back a week later to report they observed his eyes “turning out [going XT] for a second.” As this represented a change from the transient ET they saw previously, they were concerned. Should you be?
Probably not. It’s not uncommon for the same infant to display brief episodes of both ET and XT (it’s referred to as ocular instability of infancy).
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

Given that episodic strabismus is common in infancy, at what **should** make you worry that the infant has a congenital ET?

If the ET is…

--

--

--

…it probably represents a congenital ET needing treatment
Comitant Esotropia

Given that episodic strabismus is common in infancy, at what **should** make you worry that the infant has a congenital ET? If the ET is…

--present after age $\#$ months;
--constant; and
--large (defined as greater than $\#\Delta$),

…it probably represents a congenital ET needing treatment
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

Given that episodic strabismus is common in infancy, at what **should** make you worry that the infant has a congenital ET?

If the ET is…

--present after age 2 months;
--constant; and
--large (defined as greater than $30^\Delta$),

…it probably represents a congenital ET needing treatment
Comitant Esotropia

Congenital (onset < age 6 m) Acquired (onset > age 6 m)

Congenital ET puts the infant at significant risk of suffering what (very broad) category of non-ophthalmic disease as an adult?
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

*Congenital ET puts the infant at significant risk of suffering what (very broad) category of non-ophthalmic disease as an adult?*

Mental illness. Congenital ET confers a risk ratio of 2.6! (How or why, I have no idea).
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

Two basic forms of congenital ET

?  ?
Comitant Esotropia

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Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

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With Nystagmus  Without Nystagmus
Comitant Esotropia

Comitant esotropia

Congenital (onset < \textbf{age 6 m})  Acquired (onset > \textbf{age 6 m})

- With Nystagmus
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Comitant Esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus  Without Nystagmus

- Nystagmus blockage syndrome
- Latent nystagmus
- Ciancia syndrome
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus

Nystagmus blockage syndrome
--Arises in pts with… [a nystagmus syndrome]

Nystagmus blockage syndrome
-Latent nystagmus
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Comitant Esotropia

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Congenital (onset < age 6 m) | Acquired (onset > age 6 m)

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Nystagmus blockage syndrome
--Arises in pts with...congenital motor nystagmus (CMN)

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Comitant Esotropia

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Congenital (onset < age 6 m)

Acquired (onset > age 6 m)

Nystagmus blockage syndrome
--Arises in pts with congenital motor nystagmus (CMN)

Briefly, what is congenital motor nystagmus?

A nystagmus arising in the first few months of life that is not secondary to either sensory or CNS pathology

Is the nystagmus vertical, horizontal or both/either?

It is virtually always horizontal

Do CMN pts usually have good vision, or poor?

Good (rule of thumb: If a pt has nystagmus + good VA, it’s CMN)

CMN has a unique finding related to an exam maneuver you’re familiar with but don’t perform very often. What is this finding?

A paradoxical OKN response
Comitant Esotropia

**Comitant esotropia**

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Comitant Esotropia

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**Acquired (onset > age 6 m)**

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What does ‘OKN’ stand for in this context?

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Optokinetic nystagmus

A paradoxical OKN response

What does ‘OKN’ stand for in this context?
Optokinetic nystagmus

To what does ‘optokinetic nystagmus response’ refer?
To the phenomenon in which the presentation of a series of visual stimuli moving rapidly through the visual field induces the eyes to pursue (ie, follow) a stimulus, then engage in a rapid return saccade to pick up the next stimulus
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A paradoxical OKN response

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How is OKN testing performed?
Usually with an OKN drum that is spun about its axis

A paradoxical OKN response
A phenomenon that occurs when a CMN pt is presented with an OKN drum spinning in the direction congruent with the pt's nystagmus. Spinning in this direction would be expected to amplify (ie, worsen) the pt's nystagmus. However, in a CMN pt the presentation of congruent OKN movement produces a dampening or even reversal of the nystagmus—hence the term paradoxical OKN response.
Comitant Esotropia

#OldSchoolCool: OKN drum
Comitant Esotropia

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Comitant esotropia

Congenital (onset < age 6 m) Acquired (onset > age 6 m)

With Nystagmus

Nystagmus blockage syndrome
--Arises in pts with...congenital motor nystagmus (CMN)
--Pt ‘learns’ that their nystagmus is decreased (and thus acuity is increased) when their eyes are...['direction' of gaze]

Nystagmus blockage syndrome
- Latent nystagmus
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What does it mean to say the pt ‘eats up’ prism?

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### Comitant Esotropia

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What does it mean to say the pt ‘eats up’ prism?

It means that, when attempting to quantify the size of the esotropia with prisms, the clinician finds the pt needs progressively more prism to neutralize the ET.

---

**Nystagmus blockage syndrome**

- Latent nystagmus
- Ciancia syndrome

--Pt ‘learns’ that their nystagmus is decreased (and thus acuity is increased) when their eyes are...converged

--Key exam finding: **Pt ‘eats up’ prism** when deviation is being measured

---

(You can see how such a child is being said to ‘eat up’ prism.)

Why do NBS pts eat up prism?

Recall we said these pts often see better in the converged state, and that this improvement in VA is why their visual system adopts an esotropic orientation in the first place. Apparently, if their ET is neutralized with prism, this short-circuits the VA benefit they gained from converging. Thus, if their ET is neutralized with prism, re-acquiring improved VA requires the system to crank in even more convergence, and thus the child becomes clinically more esotropic. And if/when that ET is neutralized, the child will crank in even more convergence. In this manner the prism gets ‘eats up.’
**Comitant Esotropia**

*What does it mean to say the pt ‘eats up’ prism?*

It means that, when attempting to quantify the size of the esotropia with prisms, the clinician finds the pt needs progressively more prism to neutralize the ET. So, eg, a child who initially requires 20PD might shortly thereafter be found to need 35, and after receiving 35 is found to need 50. (You can see how such a child is being said to ‘eat up’ prism.)

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---Nystagmus blockage syndrome
Comitant Esotropia

**What does it mean to say the pt ‘eats up’ prism?**

It means that, when attempting to quantify the size of the esotropia with prisms, the clinician finds the pt needs progressively more prism to neutralize the ET. So, eg, a child who initially requires 20PD might shortly thereafter be found to need 35, and after receiving 35 is found to need 50. (You can see how such a child is being said to ‘eat up’ prism.)

**Why do NBS pts eat up prism?**

Recall we said these pts often see better in the converged state, and that this improvement in VA is why their visual system adopts an esotropic orientation in the first place. Apparently, if their ET is neutralized with prism, this short-circuits the VA benefit they gained from converging.

--Pt ‘learns’ that their **nystagmus is decreased (and thus acuity is increased)** when their eyes are...**converged**

--Key exam finding: **Pt ‘eats up’ prism** when deviation is being measured
**Comitant Esotropia**

*What does it mean to say the pt ‘eats up’ prism?*
It means that, when attempting to quantify the size of the esotropia with prisms, the clinician finds the pt needs progressively more prism to neutralize the ET. So, eg, a child who initially requires 20PD might shortly thereafter be found to need 35, and after receiving 35 is found to need 50. (You can see how such a child is being said to ‘eat up’ prism.)

*Why do NBS pts eat up prism?*
Recall we said these pts often see better in the converged state, and that this improvement in VA is why their visual system adopts an esotropic orientation in the first place. Apparently, if their ET is neutralized with prism, this short-circuits the VA benefit they gained from converging. Thus, if their ET is neutralized with prism, re-acquiring improved VA requires the system to crank in even more convergence, and thus the child becomes clinically more esotropic. And if/when that ET is neutralized, the child will crank in even more convergence. In this manner the prism gets ‘et up.’

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**With Nystagmus**

- Latent nystagmus
- Ciancia syndrome

---

_Nystagmus blockage syndrome_

--Pt ‘learns’ that their nystagmus is decreased (and thus acuity is increased) when their eyes are...**converged**

--Key exam finding: Pt ‘**eats up**’ prism when deviation is being measured
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus

With Nystagmus

Latent nystagmus

--No nystagmus when vision is… [status]
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  
With Nystagmus
  - Nystagmus blockage syndrome
  - Latent nystagmus
  - Ciancia syndrome

Without Nystagmus

Acquired (onset > age 6 m)

Latent nystagmus
-- No nystagmus when vision is... binocular
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)           Acquired (onset > age 6 m)

With Nystagmus               Without Nystagmus

- Nystagmus blockage syndrome
- Latent nystagmus
- Ciancia syndrome

*Latent nystagmus*

-- No nystagmus when vision is... *binocular*

-- When one eye occluded, jerk nystagmus occurs with the fast phase toward the *fixating eye*
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

- With Nystagmus
  - Nystagmus blockage syndrome
  - Latent nystagmus
  - Ciancia syndrome

- Without Nystagmus

Acquired (onset > age 6 m)

Latent nystagmus
-- No nystagmus when vision is...binocular
-- When one eye occluded, jerk nystagmus occurs with the fast phase toward the fixating eye
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus  Without Nystagmus

-Nystagmus blockage syndrome
-Latent nystagmus
- Ciancia syndrome

**Latent nystagmus**
-- No nystagmus when vision is...binocular
-- When one eye occluded, jerk nystagmus occurs with the fast phase toward the fixating eye

**Manifest latent nystagmus**
-- Sounds like an oxymoron...
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)
- With Nystagmus
  - Nystagmus blockage syndrome
  - Latent nystagmus
  - Ciancia syndrome
- Without Nystagmus

Acquired (onset > age 6 m)

Latent nystagmus
-- No nystagmus when vision is...binocular
-- When one eye occluded, jerk nystagmus occurs
  with the fast phase toward the fixating eye

Manifest latent nystagmus
-- Sounds like an oxymoron...
-- Nystagmus present when both eyes are open but
  one is...[temporary vision status]
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

Without Nystagmus

With Nystagmus

- Nystagmus blockage syndrome
- Latent nystagmus
- Ciancia syndrome

Acquired (onset > age 6 m)

Latent nystagmus
-- No nystagmus when vision is... binocular
-- When one eye occluded, jerk nystagmus occurs with the fast phase toward the fixating eye

Manifest latent nystagmus
-- Sounds like an oxymoron...
-- Nystagmus present when both eyes are open but one is... suppressed
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

- With Nystagmus
  - Latent nystagmus
  - Ciancia syndrome

- Without Nystagmus

Acquired (onset > age 6 m)

Latent nystagmus and manifest latent nystagmus are sometimes referred to by what single name?

Latent nystagmus --No nystagmus when viewing
--When one eye occluded, latent nystagmus occurs
with the fast phase toward the fixating eye

Manifest latent nystagmus
--Sounds like an oxymoron...
--Nystagmus present when both eyes are open but one is...suppressed
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus  Without Nystagmus

Latent nystagmus

- Nystagmus blockage syndrome
- Latent nystagmus
- Ciancia syndrome

Manifest latent nystagmus

- Sounds like an oxymoron...
- Nystagmus present when both eyes are open but one is...suppressed

Latent nystagmus and manifest latent nystagmus are sometimes referred to by what single name? Fusion maldevelopment nystagmus syndrome (FMNS)
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)
- With Nystagmus
  - Nystagmus blockage syndrome
  - Latent nystagmus
  - Ciancia syndrome

Without Nystagmus

Acquired (onset > age 6 m)

Ciancia syndrome
-- Deviation tends to be... [magnitude]
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)
With Nystagmus
- Nystagmus blockage syndrome
- Latent nystagmus
  - Ciancia syndrome
    -- Deviation tends to be…very large

Without Nystagmus

Acquired (onset > age 6 m)
Comitant Esotropia

Ciancia syndrome
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m) Acquired (onset > age 6 m)

With Nystagmus Without Nystagmus

- Nystagmus blockage syndrome
- Latent nystagmus
- Ciancia syndrome

Ciancia syndrome
-- Deviation tends to be... very large

How large is 'very large'?
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus  Without Nystagmus

- Nystagmus blockage syndrome
- Latent nystagmus

Ciancia syndrome
-- Deviation tends to be... very large

How large is 'very large'? Greater than 50Δ
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus  Without Nystagmus

- Nystagmus blockage syndrome
- Latent nystagmus

Ciancia syndrome
-- Deviation tends to be... very large
-- Nystagmus increases when the fixating eye... [abducts vs adducts]
  decreases when it... [abducts vs adducts]
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus  Without Nystagmus

-Nystagmus blockage syndrome
-Latent nystagmus

Ciancia syndrome
--Deviation tends to be...very large
--Nystagmus increases when the fixating eye...abducts;
decreases when it...adducts
Comitant Esotropia

Note that both NBS and Ciancia syndrome present with ET and nystagmus on attempted abduction. Given this, how can you differentiate between these?

- **Nystagmus blockage syndrome**
  - Damped when the eyes are converged
  - *Nystagmus appears upon attempted* abduction

- **Ciancia syndrome**
  - Deviation tends to be very large
  - *Nystagmus increases when the fixating eye* abducts;
  - decreases when it adducts
Comitant Esotropia

Note that both NBS and Ciancia syndrome present with ET and nystagmus on attempted abduction. Given this, how can you differentiate between these?

Think of these disorders this way:
--The NBS is a type of [two words] for which the null point is located in convergence (i.e., the ET is in a sense caused by the nystagmus)

**Nystagmus blockage syndrome**
--Damped when the eyes are...converged
--Nystagmus appears upon attempted...abduction

**Ciancia syndrome**
--Deviation tends to be...very large
--Nystagmus increases when the fixating eye...abducts;
decreases when it...adducts
Comitant Esotropia

Note that both NBS and Ciancia syndrome present with ET and nystagmus on attempted abduction. Given this, how can you differentiate between these? Think of these disorders this way:

--The NBS is a type of congenital nystagmus for which the null point is located in convergence (ie, the ET is in a sense *caused* by the nystagmus)

**Nystagmus blockage syndrome**
--Damped when the eyes are...converged
--*Nystagmus appears upon attempted...abduction*

**Ciancia syndrome**
--Deviation tends to be...very large
--*Nystagmus increases when the fixating eye...abducts; decreases when it...adducts*
Comitant Esotropia

Note that both NBS and Ciancia syndrome present with ET and nystagmus on attempted abduction. Given this, how can you differentiate between these?

Think of these disorders this way:
--The NBS is a type of congenital nystagmus for which the null point is located in convergence (ie, the ET is in a sense *caused* by the nystagmus). In contrast,
--The Ciancia syndrome is a type of *two words* in which the ET *just happens* to be associated with a nystagmus that manifests in attempted abduction.

Nystagmus blockage syndrome
--Damped when the eyes are...converged
--Nystagmus appears upon attempted...abduction

Ciancia syndrome
--Deviation tends to be...very large
--Nystagmus increases when the fixating eye...abducts;
decreases when it...adducts
Comitant Esotropia

Note that both NBS and Ciancia syndrome present with ET and nystagmus on attempted abduction. Given this, how can you differentiate between these? Think of these disorders this way:

--The NBS is a type of congenital nystagmus for which the null point is located in convergence (ie, the ET is in a sense *caused* by the nystagmus). In contrast,

--The Ciancia syndrome is a type of congenital esotropia in which the ET *just happens* to be associated with a nystagmus that manifests in attempted abduction.

**Nystagmus blockage syndrome**
--Damped when the eyes are…converged

**Nystagmus appears upon attempted…abduction**

**Ciancia syndrome**
--Deviation tends to be…very large

**Nystagmus increases when the fixating eye…abducts**; decreases when it…adducts
Comitant Esotropia

Note that both NBS and Ciancia syndrome present with ET and nystagmus on attempted abduction. Given this, how can you differentiate between these? Think of these disorders this way:

--The **NBS** is a type of **congenital nystagmus** for which the null point is located in convergence (i.e., the ET is in a sense caused by the nystagmus). In contrast,

--The Ciancia syndrome is a type of **congenital esotropia** in which the ET just happens to be associated with a nystagmus that manifests in attempted abduction.

So, **NBS** is a congenital nystagmus _pretending_ to be a congenital esotropia, whereas **Ciancia syndrome** is a congenital esotropia with an _overlay_ of congenital nystagmus.

---

**Nystagmus blockage syndrome**
--Damped when the eyes are...converged
--**Nystagmus appears upon attempted...abduction**

---

**Ciancia syndrome**
--Deviation tends to be...very large
--**Nystagmus increases when the fixating eye...abducts; decreases when it...adducts**
Comitant Esotropia

Note that both NBS and Ciancia syndrome present with ET and nystagmus on attempted abduction. Given this, how can you differentiate between these? Think of these disorders this way:

--The NBS is a type of congenital nystagmus for which the null point is located in convergence (i.e., the ET is in a sense caused by the nystagmus). In contrast,

--The Ciancia syndrome happens to be associated with a nystagmus that manifests in attempted abduction.

What is a null point?

Nystagmus blockage syndrome
--Damped when the eyes are...converged
--Nystagmus appears upon attempted...abduction

Ciancia syndrome
--Deviation tends to be...very large
--Nystagmus increases when the fixating eye...abducts; decreases when it...adducts
Comitant Esotropia

Note that both NBS and Ciancia syndrome present with ET and nystagmus on attempted abduction. Given this, how can you differentiate between these?

Think of these disorders this way:
--The NBS is a type of congenital nystagmus for which the null point is located in convergence (i.e., the ET is in a sense caused by the nystagmus). In contrast,
--The Ciancia syndrome happens to be associated with ET.

What is a null point?
A direction of gaze in which the intensity of the nystagmus is minimized.

With Nystagmus

Nystagmus blockage syndrome
--Damped when the eyes are...converged
--Nystagmus appears upon attempted...abduction

Ciancia syndrome
--Deviation tends to be...very large
--Nystagmus increases when the fixating eye...abducts; decreases when it...adducts
Comitant Esotropia

Note that both NBS and Ciancia syndrome present with ET and nystagmus on attempted abduction. Given this, how can you differentiate between these? Think of these disorders this way:

--The NBS is a type of congenital nystagmus for which the null point is located in convergence (ie, the ET is in a sense caused by the nystagmus). In contrast, the ET in NBS stems from convergence, what other signs **may** be present to clue you in that you're dealing with NBS and not Ciancia syndrome?

With Nystagmus

--Damped when the eyes are...converged

--Nystagmus appears upon attempted...abduction

Nystagmus blockage syndrome

- Latent nystagmus
- Ciancia syndrome

Ciancia syndrome

--Deviation tends to be...very large

--Nystagmus increases when the fixating eye...abducts; decreases when it...adducts
Note that both NBS and Ciancia syndrome present with ET and nystagmus on attempted abduction. Given this, how can you differentiate between these?

Think of these disorders this way:

--The NBS is a type of congenital nystagmus for which the null point is located in convergence (ie, the ET is in a sense caused by the nystagmus). In contrast,

Given that the ET in NBS stems from convergence, what other signs **may** be present to clue you in that you’re dealing with NBS and not Ciancia syndrome?

- Pupillary constriction **may** accompany the convergence

With Nystagmus

--Damped when the eyes are...converged

--Nystagmus appears upon attempted...abduction

Nystagmus blockage syndrome

- Latent nystagmus

Ciancia syndrome

--Deviation tends to be...very large

--Nystagmus increases when the fixating eye...abducts; decreases when it...adducts
Comitant Esotropia

Note that both NBS and Ciancia syndrome present with ET and nystagmus on attempted abduction. Given this, how can you differentiate between these? Think of these disorders this way:

--The NBS is a type of congenital nystagmus for which the null point is located in convergence (ie, the ET is in a sense *caused* by the nystagmus). In contrast,

**Given that the ET in NBS stems from convergence, what other signs **may** be present to clue you in that you’re dealing with NBS and not Ciancia syndrome?**

- Pupillary constriction **may** accompany the convergence

**May**? Why the hedging?

With Nystagmus

--Damped when the eyes are...converged

--Nystagmus appears upon attempted...abduction

- Nystagmus blockage syndrome
- Latent nystagmus
- Ciancia syndrome

Ciancia syndrome

--Deviation tends to be...very large

--Nystagmus increases when the fixating eye...abducts;
decreases when it...adducts
Comitant Esotropia

Note that both NBS and Ciancia syndrome present with ET and nystagmus on attempted abduction. Given this, how can you differentiate between these?

Think of these disorders this way:

--The NBS is a type of congenital nystagmus for which the null point is located in convergence (i.e., the ET is in a sense caused by the nystagmus). In contrast,

--Given that the ET in NBS stems from convergence, what other signs **may** be present to clue you in that you’re dealing with NBS and not Ciancia syndrome?

  - Pupillary constriction **may** accompany the convergence

  **May**? Why the hedging?

  Some infants with NBS ‘learn’ to decouple their near-response triad, so miosis (as well as accommodation) are not a universal finding in NBS

With Nystagmus

--Damped when the eyes are...converged

--Nystagmus appears upon attempted...abduction

Nystagmus blockage syndrome

---Latent nystagmus

---Ciancia syndrome

Ciancia syndrome

--Deviation tends to be...very large

--Nystagmus increases when the fixating eye...abducts

decreases when it...adducts
Comitant Esotropia

**Note that both NBS and Ciancia syndrome present with ET and nystagmus on attempted abduction. Given this, how can you differentiate between these?**

Think of these disorders this way:

--The NBS is a type of congenital nystagmus for which the null point is located in convergence (i.e., the ET is in a sense *caused* by the nystagmus). In contrast,

--The Ciancia syndrome is a type of congenital esotropia in which the ET just *happens* to be associated with a nystagmus that manifests in attempted abduction.

Finally, note also that the magnitude of the ET tends to be much larger in Ciancia syndrome than the NBS. So for purposes of the Boards and/or OKAP, an infant with nystagmus and ≤35PD of congenital ET probably has NBS, whereas an infant with nystagmus and ≥55PD of congenital ET likely has Ciancia syndrome.

---

**Nystagmus blockage syndrome**

--Latent nystagmus

--Ciancia syndrome

**Ciancia syndrome**

--Deviation tends to be... *very* large

--Nystagmus increases when the fixating eye... abducts; decreases when it... adducts

*Prior to ‘eating up prism’
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus

Without Nystagmus

Congenital ET without nystagmus
--Family history usually...[present vs absent]

- Nystagmus blockage syndrome
- Latent nystagmus
- Ciancia syndrome

Management:
--Prescribe full...cycloplegic refraction
--Perform bilateral...MR recession
--Best if by age...24 months
--If IO overaction present, consider...weakening
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus  Without Nystagmus

With Nystagmus

- Nystagmus blockage syndrome
- Latent nystagmus
- Ciancia syndrome

Congenital ET without nystagmus

-- Family history usually present

Management:

- Prescribe full cycloplegic refraction
- Perform bilateral MR recession
- Best if by age 24 months
- If IO overaction present, consider weakening
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus  Without Nystagmus

Congenital ET without nystagmus
--Family history usually present
--Deviation tends to be [magnitude]

With Nystagmus blockage syndrome
--Latent nystagmus
--Ciancia syndrome

Management:
--Prescribe full cycloplegic refraction
--Perform bilateral MR recession
--Best if by age 24 months
--If IO overaction present, consider weakening
Comitant Esotropia

Comitant esotropia

Congenital (onset < **age 6 m**)  Acquired (onset > **age 6 m**)

With Nystagmus  Without Nystagmus

--- Nystagmus blockage syndrome
--- Latent nystagmus
--- Ciancia syndrome

**Congenital ET without nystagmus**
-- Family history usually...present
-- Deviation tends to be...large

Management:
-- Prescribe full...cycloplegic refraction
-- Perform bilateral...MR recession
-- Best if by age...24 months
-- If IO overaction present, consider...weakening
Comitant Esotropia

**Comitant esotropia**

### Congenital (onset < age 6 m)
- **With Nystagmus**
  - Nystagmus blockage syndrome
  - Latent nystagmus
  - Ciancia syndrome
- **Without Nystagmus**

### Acquired (onset > age 6 m)

**Congenital ET without nystagmus**
- Family history usually present
- Deviation tends to be large

**How large is 'large'?**

- Greater than 30°
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus

Without Nystagmus

Congenital ET without nystagmus
--Family history usually present
--Deviation tends to be large

How large is ‘large’?
Greater than 30Δ
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus  Without Nystagmus

Congenital ET without nystagmus
--Family history usually...present
--Deviation tends to be...large

If a congenital ET is subtle, what should you infer?

If a congenital ET is subtle, what should you infer?
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

Without Nystagmus
- Nystagmus blockage syndrome
- Latent nystagmus
- Ciancia syndrome

With Nystagmus

Congenital ET without nystagmus
-- Family history usually present
-- Deviation tends to be large

Acquired (onset > age 6 m)

If a congenital ET is subtle, what should you infer?
It’s not a congenital ET (ie, they’re not subtle)
Comitant Esotropia

**Comitant esotropia**

- **Congenital (onset < age 6 m)**
  - With Nystagmus
  - Without Nystagmus
    - Nystagmus blockage syndrome
    - Latent nystagmus
    - Ciancia syndrome
- **Acquired (onset > age 6 m)**

**Congenital ET without nystagmus**
-- Family history usually...present
-- Deviation tends to be...large

*If a congenital ET is subtle, what should you infer?*
*It's not a congenital ET* (ie, they’re not subtle)

*What is the exception to this?*
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

With Nystagmus

Without Nystagmus

Acquired (onset > age 6 m)

Congenital ET without nystagmus

--Family history usually...present
--Deviation tends to be...large

If a congenital ET is subtle, what should you infer? It's not a congenital ET (ie, they're not subtle)

What is the exception to this? ET in preemies—their congenital ET can be small-angle
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m) Acquired (onset > age 6 m)

With Nystagmus

Without Nystagmus

Congenital ET without nystagmus
--Family history usually...present
--Deviation tends to be...large
--Cross fixation...[may be present?]

- Nystagmus blockage syndrome
- Latent nystagmus
- Ciancia syndrome

Management:
--Prescribe full...cycloplegic refraction
--Perform bilateral...MR recession
--Best if by age...24 months
--If IO overaction present, consider...weakening
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus  Without Nystagmus

Congenital ET without nystagmus
-- Family history usually…present
-- Deviation tends to be…large
-- Cross fixation…may be present

Nystagmus blockage syndrome
Latent nystagmus
Ciancia syndrome

Management:
-- Prescribe full…cycloplegic refraction
-- Perform bilateral…MR recession
-- Best if by age…24 months
-- If IO overaction present, consider…weakening
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

With Nystagmus

Without Nystagmus

Acquired (onset > age 6 m)

Congenital ET without nystagmus

--Family history usually...present
--Deviation tends to be...large
--Cross fixation...may be present

What does this imply about VA?

It tends to be equal OU

Is amblyopia common?

No
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

With Nystagmus

Without Nystagmus

With Nystagmus

Congenital ET without nystagmus
--Family history usually…present
--Deviation tends to be…large
--Cross fixation…may be present

What does this imply about VA?
It will be equal OU

Acquired (onset > age 6 m)

- Nystagmus blockage syndrome
- Latent nystagmus
- Ciancia syndrome

Is amblyopia common?
No
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m) Acquired (onset > age 6 m)

With Nystagmus

Without Nystagmus

Congenital ET without nystagmus
--Family history usually...present
--Deviation tends to be...large
--Cross fixation...may be present

What does this imply about VA?
It will be equal OU

What exam finding is key to determining whether the infant’s vision is equal bilaterally?
Comitant Esotropia

Congenital (onset < age 6 m)
- Without Nystagmus
  - Nystagmus blockage syndrome
  - Latent nystagmus
  - Ciancia syndrome
- With Nystagmus
  - Ciancia syndrome

Acquired (onset > age 6 m)

**Congenital ET without nystagmus**
-- Family history usually...present
-- Deviation tends to be...large
-- Cross fixation...may be present

What does this imply about VA?
It will be equal OU

What exam finding is key to determining whether the infant’s vision is equal bilaterally?
If it isn’t, the infant will display a gaze preference for the better-seeing eye.
Comitant Esotropia

Congenital (onset < age 6 m) Acquired (onset > age 6 m)

With Nystagmus

Without Nystagmus

- Nystagmus blockage syndrome
- Latent nystagmus
- Ciancia syndrome

Congenital ET without nystagmus
-- Family history usually...present
-- Deviation tends to be...large
-- Cross fixation...may be present

What does this imply about VA?
It will be equal OU

What exam finding is key to determining whether the infant’s vision is equal bilaterally?
If it isn’t, the infant will display a gaze preference for the better-seeing eye.

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Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus  Without Nystagmus

Congenital ET without nystagmus
--Family history usually...present
--Deviation tends to be...large
--Cross fixation...may be present

What does this imply about VA?
It will be equal OU

Is amblyopia common?
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

With Nystagmus
- Nystagmus blockage syndrome
- Latent nystagmus
- Ciancia syndrome

Without Nystagmus

Acquired (onset > age 6 m)

Congenital ET without nystagmus
-- Family history usually present
-- Deviation tends to be large
-- Cross fixation may be present

What does this imply about VA?
It will be equal OU

Is amblyopia common?
Yes

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Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus

Without Nystagmus

Congenital ET without nystagmus
--Family history usually...present
--Deviation tends to be...large
--Cross fixation...may be present

If amblyopia is present:
--will vision be equal OU?

If amblyopia is present:
--will vision be equal OU?

If amblyopia is common?

Is amblyopia common?

Yes

What does this imply about VA?
It tends to be equal OU?

Is amblyopia common?
Yes
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

Without Nystagmus

With Nystagmus

Congenital ET without nystagmus
--Family history usually...present
--Deviation tends to be...large
--Cross fixation...may be present

If amblyopia is present:
--will vision be equal OU? No

Acquired (onset > age 6 m)

Ciancia syndrome

Latent nystagmus

Ciancia syndrome

Management:
--Prescribe full...cycloplegic refraction
--Perform bilateral...MR recession
--Best if by age...24 months
--If IO overaction present, consider...weakening

What does this imply about VA?
It tends to be equal OU?
No

Is amblyopia common?
Yes
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus  Without Nystagmus

Congenital ET without nystagmus
--Family history usually...present
--Deviation tends to be...large
--Cross fixation...may be present

If amblyopia is present:
--Will vision be equal OU? No
--Will a gaze preference be present?

If amblyopia common?

Yes

This implies about VA?
--Will vision be equal OU? No

Is amblyopia common?
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

- Without Nystagmus
  - Congenital ET without nystagmus
    -- Family history usually present
    -- Deviation tends to be large
    -- Cross fixation may be present

- With Nystagmus
  - Latent nystagmus
  - Ciancia syndrome

Acquired (onset > age 6 m)

Management:
- Prescribe full cycloplegic refraction
- Perform bilateral MR recession
- Best if by age 24 months
- If IO overaction present, consider weakening

VA:
- It tends to be equal OU?
  - No

Is amblyopia common?
- Yes

If amblyopia is present:
- will vision be equal OU?
  - No
- Will a gaze preference be present?
  - Yes
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus

Without Nystagmus

- Nystagmus blockage syndrome
- Latent nystagmus
- Ciancia syndrome

**Congenital ET without nystagmus**

-- Family history usually... present
-- Deviation tends to be... large
-- Cross fixation... may be present
-- 2/3 with concomitant... [strabismic conditions]
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus  Without Nystagmus

Without Nystagmus

- Nystagmus blockage syndrome
- Latent nystagmus
- Ciancia syndrome

**Congenital ET without nystagmus**
-- Family history usually...present
-- Deviation tends to be...large
-- Cross fixation...may be present
-- 2/3 with concomitant...DVD and IO overaction

Management:
-- Prescribe full...cycloplegic refraction
-- Perform bilateral...MR recession
-- Best if by age...24 months
-- If IO overaction present, consider...weakening
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

- With Nystagmus
  - Nystagmus blockage syndrome
  - Latent nystagmus
  - Ciancia syndrome

- Without Nystagmus

Acquired (onset > age 6 m)

Congenital ET without nystagmus
-- Family history usually...present
-- Deviation tends to be...large
-- Cross fixation...may be present
-- 2/3 with concomitant...DVD and IO overaction

In this context, what do DVD and IO stand for?

**DVD:**

**IO:**
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

Without Nystagmus

- Nystagmus blockage syndrome
- Latent nystagmus
- Ciancia syndrome

With Nystagmus

Acquired (onset > age 6 m)

Congenital ET without nystagmus
-- Family history usually... present
-- Deviation tends to be... large
-- Cross fixation... may be present
-- 2/3 with concomitant... DVD and IO overaction

In this context, what do DVD and IO stand for?

**DVD**: Dissociated vertical deviation

**IO**: Inferior oblique (muscle)
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

Acquired (onset > age 6 m)

With Nystagmus

- Nystagmus blockage syndrome
- Latent nystagmus
- Ciancia syndrome

Congenital ET without nystagmus

What is the classic clinical finding in DVD?

In this context, what do DVD and IO stand for?

**DVD**: Dissociated vertical deviation

**IO**: Inferior oblique (muscle)
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

Acquired (onset > age 6 m)

With Nystagmus

- Nystagmus blockage syndrome
- Latent nystagmus
- Ciancia syndrome

What is the classic clinical finding in DVD?
An eye will slowly elevate and exert, either spontaneously (manifest DVD) or when occluded (latent DVD).

In this context, what do DVD and IO stand for?
**DVD**: Dissociated vertical deviation
**IO**: Inferior oblique (muscle)
Comitant Esotropia

DVD
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus

- Nystagmus blockage syndrome
- Latent nystagmus
- Ciancia syndrome

Congenital ET without nystagmus

**What is the classic clinical finding in DVD?**
An eye will slowly elevate and extort, either spontaneously (manifest DVD) or when occluded (latent DVD). A crucial finding occurs when the drifting eye reorients downward, and it is this--the fellow eye does not move downward simultaneously (as would normally be the case).

**In this context, what do DVD and IO stand for?**

**DVD:** Dissociated vertical deviation

**IO:** Inferior oblique (muscle)
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

With Nystagmus

Without Nystagmus

With Nystagmus

Congenital ET without nystagmus
--Family history usually…present
--Deviation tends to be…large
--Cross fixation…may be present
--2/3 with concomitant…DVD and IO overaction

Acquired (onset > age 6 m)

Both DVD and IO overaction involve elevation and extorsion. How can they be differentiated?
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus

Without Nystagmus

Congenital ET without nystagmus
--Family history usually...present
--Deviation tends to be...large
--Cross fixation...may be present
--2/3 with concomitant...DVD and IO overaction

Both DVD and IO overaction involve elevation and extorsion. How can they be differentiated?
DVD violates Hering’s law; IO overaction doesn’t
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m) Acquired (onset > age 6 m)

With Nystagmus Without Nystagmus

Congenital ET without nystagmus
--Family history usually...present
--Deviation tends to be...large
--Cross fixation...may be present
--2/3 with concomitant...DVD and IO overaction

Both DVD and IO overaction involve elevation and extorsion. How can they be differentiated?
DVD violates Hering’s law; IO overaction doesn’t

What does this mean, exactly?
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

- Without Nystagmus
  - Nystagmus blockage syndrome
  - Latent nystagmus
  - Ciancia syndrome

Without Nystagmus

- Congenital ET without nystagmus
  -- Family history usually… present
  -- Deviation tends to be… large
  -- Cross fixation… may be present
  -- 2/3 with concomitant… DVD and IO overaction

Acquired (onset > age 6 m)

Management:

-- Prescribe full… cycloplegic refraction
-- Perform bilateral… MR recession

-- Best if by age… 24 months
-- If IO overaction present, consider… weakening

Both DVD and IO overaction involve elevation and extorsion.

How can they be differentiated?

DVD violates Hering’s law; IO overaction doesn’t

What does this mean, exactly?

When an eye that is elevated by IO overaction depresses, the fellow eye obeys Hering’s law and depresses as well. This doesn’t happen in DVD.
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m) Acquired (onset > age 6 m)

With Nystagmus

- Nystagmus blockage syndrome
- Latent nystagmus
- Ciancia syndrome

Congenital ET without nystagmus

Management:
- Prescribe full...cycloplegic refraction
- Perform bilateral...MR recession
- Best if by age...24 months
- If IO overaction present, consider...weakening

Both DVD and IO overaction involve elevation and extorsion. How can they be differentiated?
DVD violates Hering’s law; IO overaction doesn’t

What does this mean, exactly?
When an eye that is elevated by IO overaction depresses, the fellow eye obeys Hering’s law and depresses as well. This doesn’t happen in DVD.

For more on DVD and IO overaction, see slide-set P7; for Hering’s law, see FELT3.
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With

Without

Nystagmus

Nystagmus

Nystagmus blockage syndrome

Latent nystagmus

Ciancia syndrome

**Congenital ET without nystagmus**

--Family history usually…present

--Deviation tends to be…large

--Cross fixation…may be present

--2/3 with concomitant…DVD and IO overaction

**Management:**

--Prescribe full…
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)       Acquired (onset > age 6 m)

With Nystagmus

Without Nystagmus

- Nystagmus blockage syndrome
- Latent nystagmus
- Ciancia syndrome

Congenital ET without nystagmus
-- Family history usually... present
-- Deviation tends to be... large
-- Cross fixation... may be present
-- 2/3 with concomitant... DVD and IO overaction

Management:
-- Prescribe full... cycloplegic refraction

Management:
-- Prescribe full... cycloplegic refraction

Management:
-- Perform bilateral... MR recession
-- Best if by age... 24 months
-- If IO overaction present, consider... weakening
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus  Without Nystagmus

Congenital ET without nystagmus
--Family history usually…present
--Deviation tends to be…large
--Cross fixation…may be present
--2/3 with concomitant…DVD and IO overaction

Management:
--Prescribe full…cycloplegic refraction

Why prescribe the full CR?

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Comitant Esotropia

Comitant Esotropia

Congenital (onset < age 6 m) Acquired (onset > age 6 m)

With Nystagmus

| Nystagmus blockage syndrome |
| Latent nystagmus |
| Ciancia syndrome |

Without Nystagmus

Congenital ET without nystagmus

- Family history usually...present
- Deviation tends to be...large
- Cross fixation...may be present
- 2/3 with concomitant...DVD and IO overaction

Management:
- Prescribe full...cycloplegic refraction

Why prescribe the full CR?
In case the ET has an accommodative component
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m) Acquired (onset > age 6 m)

- Congenital ET without nystagmus
  - Family history usually...present
  - Deviation tends to be...large
  - Cross fixation...may be present
  - 2/3 with concomitant...DVD and IO overaction

Management:
- Prescribe full...cycloplegic refraction
- Perform bilateral...[surgery]
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus

Without Nystagmus

Nystagmus blockage syndrome

Latent nystagmus

Ciancia syndrome

**Congenital ET without nystagmus**

-- Family history usually present
-- Deviation tends to be large
-- Cross fixation may be present
-- 2/3 with concomitant DVD and IO overaction

**Management:**

-- Prescribe full cycloplegic refraction
-- Perform bilateral MR recession
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus

- Nystagmus blockage syndrome
- Latent nystagmus
- Ciancia syndrome

Without Nystagmus

Congenital ET without nystagmus
-- Family history usually…present
-- Deviation tends to be…large
-- Cross fixation…may be present
-- 2/3 with concomitant…DVD and IO overaction

Management:
-- Prescribe full…cycloplegic refraction
-- Perform bilateral…MR recession
-- Best if by age…
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus  Without Nystagmus

**Congenital ET without nystagmus**
--Family history usually…present
--Deviation tends to be…large
--Cross fixation…may be present
--2/3 with concomitant…DVD and IO overaction

**Management:**
--Prescribe full…cycloplegic refraction
--Perform bilateral…MR recession
--Best if by age…24 months
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus  Without Nystagmus

- Nystagmus blockage syndrome
- Latent nystagmus
- Ciancia syndrome

**Congenital ET without nystagmus**
- Family history usually present
- Deviation tends to be large
- Cross fixation may be present
- 2/3 with concomitant DVD and IO overaction

**Management:**
- Prescribe full cycloplegic refraction
- Perform bilateral MR recession
  - Best if by age 24 months
- If IO overaction present, consider [surgery]
Comitant Esotropia

Comitant Esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus  Without Nystagmus

- Nystagmus blockage syndrome
- Latent nystagmus
- Ciancia syndrome

**Congenital ET without nystagmus**
- Family history usually...present
- Deviation tends to be...large
- Cross fixation...may be present
- 2/3 with concomitant...DVD and IO overaction

**Management:**
- Prescribe full...cycloplegic refraction
- Perform bilateral...MR recession
  - Best if by age...24 months
  - If IO overaction present, consider...weakening
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

- With Nystagmus
  - Nystagmus blockage syndrome
  - Latent nystagmus
  - Ciancia syndrome
- Without Nystagmus

Acquired (onset > age 6 m)

What is the realistic goal of treatment?

Management:
- Prescribe full cycloplegic refraction
- Perform bilateral MR recession
  - Best if by age 24 months
- If IO overaction present, consider weakening
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m) Acquired (onset > age 6 m)

With Nystagmus

Without Nystagmus

Nystagmus blockage syndrome

Latent nystagmus

Ciancia syndrome

What is the realistic goal of treatment?
Monofixation syndrome, or a small-angle esophoria

Management:
--Prescribe full…cycloplegic refraction
--Perform bilateral…MR recession
--Best if by age…24 months
--If IO overaction present, consider…weakening

What about high-grade stereopsis?
It’s not gonna happen
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus  Without Nystagmus

What is the realistic goal of treatment? Monofixation syndrome, or a small-angle esophoria

What about high-grade stereopsis?

Management:
- Prescribe full… cycloplegic refraction
- Perform bilateral… MR recession
  - Best if by age… 24 months
- If IO overaction present, consider… weakening
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

- With Nystagmus
  - Nystagmus blockage syndrome
  - Latent nystagmus
  - Ciancia syndrome

- Without Nystagmus

Acquired (onset > age 6 m)

What is the realistic goal of treatment?
Monofixation syndrome, or a small-angle esophoria

What about high-grade stereopsis?
It’s not gonna happen

Management:
-- Prescribe full…cycloplegic refraction
-- Perform bilateral…MR recession
  -- Best if by age…24 months
-- If IO overaction present, consider…weakening
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus
- Nystagmus block
- Latent nystagmus
- Ciancia syndrome

What is the realistic goal of treatment?
- Monofixation syndrome

Monofixation syndrome is one of the three adaptations the immature visual system makes in response to misalignment. What are the other two?
- Anomalous retinal correspondence
- Monofixation syndrome

Mnemonic is...

Management:
- Prescribe full cycloplegic refraction
- Perform bilateral MR recession
- Best if by age...24 months
- If IO overaction present, consider...weakening

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Monofixation syndrome
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus
- Nystagmus block
- Latent nystagmus
- Ciancia syndrome

Monofixation syndrome

Monofixation syndrome is one of the three adaptations the immature visual system makes in response to misalignment. What are the other two?

Mnemonic is…SAM

- S
- A
- Monofixation syndrome

Management:
- Prescribe full cycloplegic refraction
- Perform bilateral MR recession
- Best if by age…24 months
- If IO overaction present, consider…weakening

What is the realistic goal of treatment?

Monofixation syndrome

What about high-grade stereopsis?

It’s not gonna happen
**Comitant Esotropia**

- **Comitant esotropia**
  - Congenital (onset < age 6 m)
  - Acquired (onset > age 6 m)
  - With Nystagmus
    - Nystagmus block
    - Latent nystagmus
    - Ciancia syndrome
  - Without Nystagmus

**Congenital ET without Nystagmus**
-- Family history usually present
-- Deviation tends to be large
-- Cross fixation common
-- 2/3 with concomitant DVD and IO overaction

**Management**
-- Prescribe full cycloplegic refraction
-- Perform bilateral MR recession
-- Best if by age 24 months
-- If IO overaction present, consider weakening

**Monofixation syndrome** is one of the three adaptations the immature visual system makes in response to misalignment. What are the other two?
-- Suppression
-- Anomalous retinal correspondence
-- Monofixation syndrome

Mnemonic is... **SAM**

What is the realistic goal of treatment?
**Monofixation syndrome or a small-angle esophoria**

Monofixation syndrome is one of the three adaptations the immature visual system makes in response to misalignment. What are the other two?
-- Suppression
-- Anomalous retinal correspondence
-- Monofixation syndrome

Mnemonic is... **SAM**

-- Best if by age... 24 months
-- If IO overaction present, consider... weakening
Comitant Esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus
- Nystagmus block
- Latent nystagmus
- Siamese twin

Without Nystagmus

Comitant esotropia

What is the realistic goal of treatment? Monofixation syndrome, or a small-angle esophoria

Monofixation syndrome is one of the three adaptations the immature visual system makes in response to misalignment. What are the other two?
- Suppression
- Anomalous retinal correspondence
  - Mnemonic is...SAM

For more on sensory responses in strabismus, see slide-set P14
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus  Without Nystagmus

Nystagmus blockage syndrome
Latent nystagmus
Ciancia syndrome

Two basic forms of acquired ET
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus  Without Nystagmus

Nystagmus blockage syndrome
Latent nystagmus
Ciancia syndrome

Two basic forms of acquired ET

Accommodative  Nonaccommodative
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus  Without Nystagmus

Accommodative  Nonaccommodative

Accommodative
--Onset between ages 6 months and 7 years; average age 2.5 years

Accommodative
--Initially intermittent, eventually becoming constant--Amblyopia is common--c/o diplopia early, but stops after developing a facultative suppression scotoma
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)
- With Nystagmus
- Without Nystagmus

Acquired (onset > age 6 m)
- Accommodative
  --Onset between ages 6 months and 7 years; average age 2.5 years
- Nonaccommodative
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

Without Nystagmus

With Nystagmus

Acquired (onset > age 6 m)

Accommodative

Nonaccommodative

Accommodative

--Onset between ages 6 months and 7 years; average age 2.5 years
--Initially... , eventually becoming...
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

With Nystagmus

Without Nystagmus

Acquired (onset > age 6 m)

Accommodative

Nonaccommodative

Accommodative

--Onset between ages 6 months and 7 years; average age 2.5 years

--Initially...intermittent, eventually becoming...constant
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

Without Nystagmus  With Nystagmus

Accommodative  Nonaccommodative

Accommodative
--Onset between ages 6 months and 7 years; average age 2.5 years
--Initially...intermittent, eventually becoming...constant
--Amblyopia is...[common vs uncommon]
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus  Without Nystagmus

Accommodative  Nonaccommodative

Accommodative
--Onset between ages 6 months and 7 years; average age 2.5 years
--Initially...intermittent, eventually becoming...constant
--Amblyopia is...common
Comitant Esotropia

- Comitant esotropia
  - Congenital (onset < age 6 m)
    - With Nystagmus
    - Without Nystagmus
  - Acquired (onset > age 6 m)
    - Accommodative
    - Nonaccommodative

**Accommodative**
- Onset between ages 6 months and 7 years; average age 2.5 years
- Initially...intermittent, eventually becoming...constant
- Amblyopia is...common
- c/o diplopia early, but stop after developing a...
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus  Without Nystagmus

Accommodative  Nonaccommodative

**Accommodative**

--Onset between ages 6 months and 7 years; average age 2.5 years
--Initially...intermittent, eventually becoming...constant
--Amblyopia is...common
--c/o diplopia early, but stop after developing a...facultative suppression scotoma
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus  Without Nystagmus

Accommodative
--Onset between ages 6 months
--Initially...intermittent, eventually
--Amblyopia is...common
--c/o diplopia early, but stop after developing a...facultative suppression scotoma

What is ‘suppression’ in this context?

It is the prevention of an image in one eye from reaching conscious awareness.

It is one of three sensory adaptations the visual system employs to avoid the occurrence of visual confusion and/or diplopia.
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)
With Nystagmus
Without Nystagmus

Acquired (onset > age 6 m)

What is ‘suppression’ in this context?
It is the prevention of an image in one eye from reaching conscious awareness

Accommodative
--Onset between ages 6 months
--Initially...intermittent, eventually
--Amblyopia is...common
--c/o diplopia early, but stop after developing a...facultative scotoma
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  
With Nystagmus  
Without Nystagmus

Acquired (onset > age 6 m)  

What is ‘suppression’ in this context?
It is the prevention of an image in one eye from reaching conscious awareness

How does the phenomenon of suppression come about?
It is one of three sensory adaptations the visual system employs to avoid the occurrence of visual confusion and/or diplopia.

Accommodative
--Onset between ages 6 months
--Initially...intermittent, eventually
--Amblyopia is...common
--c/o diplopia early, but stop after developing a...facultative scotoma
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m) Acquired (onset > age 6 m)

With Nystagmus Without Nystagmus

Accommodative
--Onset between ages 6 months
--Initially...intermittent, eventually
--Amblyopia is...common
--c/o diplopia early, but stop after developing a...facultative suppression scotoma

What is ‘suppression’ in this context?
It is the prevention of an image in one eye from reaching conscious awareness

How does the phenomenon of suppression come about?
It is one of the three sensory adaptations to strabismus that was mentioned previously
Comitant Esotropia

Comitant esotropia

- Congenital (onset < age 6 m)
  - With Nystagmus
  - Without Nystagmus

- Acquired (onset > age 6 m)

What is 'suppression' in this context?
It is the prevention of an image in one eye from reaching conscious awareness.

What does it mean to say a suppression scotoma is 'facultative'?
Facultative suppression

Accommodative
- Onset between ages 6 months and 7 years; average age 2.5 years
- Initially...intermittent, eventually constant
- Amblyopia is...common
- c/o diplopia early, but stop after developing a facultative suppression scotoma
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)
- With Nystagmus
- Without Nystagmus

Acquired (onset > age 6 m)

What is ‘suppression’ in this context?
It is the prevention of an image in one eye from reaching conscious awareness.

What does it mean to say a suppression scotoma is ‘facultative’?
It means suppression occurs only while the eye is deviated.

Accommodative
--Onset between ages 6 months and 7 years; average age 2.5 years
--Initially...intermittent, eventually becoming...constant
--Amblyopia is...common
--c/o diplopia early, but stop after developing a...facultative suppression
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus  Without Nystagmus

Nystagmus blockage syndrome  Latent nystagmus  Ciancia syndrome

Accommodative  Nonaccommodative

Two basic forms

? ?
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)
- With Nystagmus
  - Nystagmus blockage syndrome
  - Latent nystagmus
  - Ciancia syndrome
- Without Nystagmus

Acquired (onset > age 6 m)
- Accommodative
- Nonaccommodative

Two basic forms
- Refractive
- Nonrefractive
Comitant Esotropia

Comitant esotropia

Accommodative: Refractive
--Combo of uncorrected hyperopia and inadequate divergence

Acquired (onset > age 6 m)

Accommodative
Nonaccommodative

Refractive
Nonrefractive

Latent nystagmus
Ciancia syndrome
Comitant Esotropia

**Comitant esotropia**

**Acquired (onset > age 6 m)**

- **Accommodative**
  - **Refractive**
    - Combo of uncorrected hyperopia and inadequate divergence
    - Latent nystagmus
    - Ciancia syndrome

- **Nonaccommodative**

- **Refractive**

- **Nonrefractive**
Comitant Esotropia

Comitant esotropia

Acquired (onset > age 6 m)

Accommodative

Refractive

--Combo of uncorrected hyperopia and inadequate divergence
--Average refractive error: +4 ET

Management

--Prescribe full CR
--If residual ET' with full CR: Rx bifocal --Try to wean off plus over time

Nonaccommodative

Refractive

Nonrefractive

Latent nystagmus
Ciancia syndrome
Comitant Esotropia

Comitant esotropia

Acquired (onset > age 6 m)

Accommodative

Compo of uncorrected hyperopia and inadequate divergence

Average refractive error: +4

Latent nystagmus
Ciancia syndrome

Refractive

Nonrefractive

Nonaccommodative
Comitant Esotropia

Comitant esotropia

Accommodative: **Refractive**
- Combo of uncorrected hyperopia and inadequate divergence
- Average refractive error: +4
- Strabismus usually measures ET ≈ ET’

Management
- Prescribe full CR
- If residual ET’ with full CR: Rx bifocal — Try to wean off plus over time

Accommodative

Nonaccommodative

Refractive

Nonrefractive

Acquired (onset > age 6 m)

Latent nystagmus
Ciancia syndrome
Comitant Esotropia

Comitant esotropia

Accommodative: **Refractive**
--Combo of uncorrected hyperopia and inadequate divergence
--Average refractive error: +4
--Strabismus usually measures ET ≈ ET'

Acquired (onset > **age 6 m**)

Accommodative

Nonaccommodative

Refractive

Nonrefractive

Latent nystagmus
Ciancia syndrome
Comitant Esotropia

Comitant esotropia

Acquired (onset > age 6 m)

Accommodative
- Combo of uncorrected hyperopia and inadequate divergence
- Average refractive error: +4
- Strabismus usually measures ET ≈ ET'

Management
- Prescribe…[refraction]

Nonaccommodative

Refractive

Nonrefractive

Latent nystagmus
Ciancia syndrome

Accommodative: Refractive
- Combo of uncorrected hyperopia and inadequate divergence
- Average refractive error: +4
- Strabismus usually measures ET ≈ ET'
Comitant Esotropia

Comitant esotropia

Acquired (onset > age 6 m)

Accommodative

Nonaccommodative

Accommodative: Refractive
--Combo of uncorrected hyperopia and inadequate divergence
--Average refractive error: +4
--Strabismus usually measures ET ≈ ET'

Management
--Prescribe…full CR

Latent nystagmus
Ciancia syndrome

Refractive

Nonrefractive
**Comitant Esotropia**

- **Comitant esotropia**
  - **Accommodative:** *Refractive*
    - Combo of uncorrected hyperopia and inadequate divergence
    - Average refractive error: +4
    - Strabismus usually measures ET ≈ ET'
  - **Management**
    - Prescribe…full CR
    - If residual ET’ with full CR: Rx…

- **Acquired (onset > age 6 m)**
  - **Accommodative**
  - **Nonaccommodative**
    - **Refractive**
    - **Nonrefractive**

- Latent nystagmus
- Ciancia syndrome
Comitant Esotropia

Comitant esotropia

Acquired (onset > age 6 m)

Accommodative

Management

Prescribe...full CR

If residual ET' with full CR: Rx...bifocal

Latent nystagmus

Ciancia syndrome

Refractive

Nonrefractive

Nonaccommodative
Comitant Esotropia

**Comitant esotropia**

- **Accommodative: Refractive**
  - Combo of uncorrected hyperopia and inadequate divergence
  - Average refractive error: +4
  - Strabismus usually measures ET $\approx$ ET'
  - **Management**
    - Prescribe…full CR
    - If residual ET’ with full CR: Rx…bifocal
    - Try to wean off plus over time

- **Acquired (onset > age 6 m)**
  - Accommodative
  - Nonaccommodative

  - **Refractive**
    - Latent nystagmus
    - Ciancia syndrome

  - **Nonrefractive**
Comitant Esotropia

Comitant esotropia

Compliance is often an issue with spectacle wear in this population—why?

Management
--Prescribe...full CR
--If residual ET' with full CR: Rx...bifocal
--Try to wean off plus over time

Latent nystagmus
Ciancia syndrome

Accommodative
Nonaccommodative
Refractive
Nonrefractive

Compliance is often an issue with spectacle wear in this population—why?

Patients who have become accustomed to maintaining a constant accommodative effort are often intolerant of full-CR spectacles (they can't relax accommodation enough to see clearly through them), and will refuse to wear them—hence the compliance issue. To improve compliance, some clinicians will 'cut sphere'; ie, prescribe less than the full CR. Alternatively and perhaps more frequently, the clinician will prescribe topical atropine to paralyze accommodation, thereby making the child more accepting of the full-CR spectacles.
Comitant Esotropia

Compliance is often an issue with spectacle wear in this population—why? Patients who have become accustomed to maintaining a constant accommodative effort are often intolerant of full-CR spectacles (they can’t relax accommodation enough to see clearly through them), and will refuse to wear them—hence the compliance issue. To improve compliance, some clinicians will ‘cut sphere,’ ie, prescribe less than the full CR.

Management

- Prescribe...**full CR**
- If residual ET’ with full CR: Rx...**bifocal**
- Try to wean off plus over time

Latent nystagmus
Ciancia syndrome

Accommodative
Nonaccommodative
Refractive
Nonrefractive
Comitant Esotropia

**Compliance is often an issue with spectacle wear in this population—why?** Patients who have become accustomed to maintaining a constant accommodative effort are often intolerant of full-CR spectacles (they can’t relax accommodation enough to see clearly through them), and will refuse to wear them—hence the compliance issue. To improve compliance, some clinicians will ‘cut sphere;’ ie, prescribe less than the full CR. Alternatively and perhaps more frequently, the clinician will prescribe topical [drug] to paralyze accommodation, thereby making the child more accepting of the full-CR spectacles.

**Management**
- Prescribe...**full CR**
  - If residual ET’ with full CR: Rx...**bifocal**
  - Try to wean off plus over time

Latent nystagmus
Ciancia syndrome

---

Comitant esotropia

Accommodative
Nonaccommodative

Refractive
Nonrefractive
Comitant Esotropia

Compliance is often an issue with spectacle wear in this population—why? Patients who have become accustomed to maintaining a constant accommodative effort are often intolerant of full-CR spectacles (they can’t relax accommodation enough to see clearly through them), and will refuse to wear them—hence the compliance issue. To improve compliance, some clinicians will ‘cut sphere,’ i.e., prescribe less than the full CR. Alternatively and perhaps more frequently, the clinician will prescribe topical atropine to paralyze accommodation, thereby making the child more accepting of the full-CR spectacles.

Management
--Prescribe...full CR
--If residual ET’ with full CR: Rx...bifocal
--Try to wean off plus over time

- Latent nystagmus
- Ciancia syndrome

Accommodative

Nonaccommodative

Refractive

Nonrefractive
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

Accommodative: Nonrefractive
--ET secondary to...

Acquired (onset > age 6 m)

Accommodative

Nonaccommodative

Nonrefractive

Nonrefractive
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

Accommodative: Nonrefractive
--ET secondary to... high AC/A ratio

Acquired (onset > age 6 m)

Accommodative

Nonaccommodative

Nonrefractive

Refractive

Nonrefractive

Management
--No consensus on optimum treatment--Give bifocal of about...+3--Reasonable treatment goals:
--Distance: Fusion
--Near: <10 Δ ET
Comitant Esotropia

What is the AC/A ratio?

Accommodative: Nonrefractive
--ET secondary to high AC/A ratio

Accommodative

Nonaccommodative

Nonrefractive

Accommodative

Nonaccommodative

Nonrefractive

What is the AC/A ratio?

Accommodative: Nonrefractive
--ET secondary to high AC/A ratio
What is the AC/A ratio?
The near triad consists of convergence, accommodation and miosis. The act of convergence induces a certain amount of accommodation (this is why your vision gets blurry when you intentionally cross your eyes). Likewise, the act of accommodation induces a certain degree of convergence. The quantitative relationship between the amplitude of convergence (AC) and the amount of accommodation (A) is represented by the AC/A ratio.
Comitant Esotropia

**What is the AC/A ratio?**

The *near triad* consists of convergence, accommodation, and miosis. The act of convergence induces a certain amount of accommodation (this is why your vision gets blurry when you intentionally cross your eyes). Likewise, the act of accommodation induces a certain degree of convergence. The quantitative relationship between the amplitude of convergence (AC) and the amount of accommodation (A) is represented by the **AC/A ratio**. For some individuals, the ‘factory setting’ of the AC/A ratio is too high—their eyes converge so much when they accommodate that their fusional and divergence mechanisms are overwhelmed, and an ET results. (Because near vision elicits more accommodation than distance vision, the ET is greatest at near.)

![Diagram](image.png)
What is the AC/A ratio?
The near triad consists of convergence, accommodation and miosis. The act of convergence induces a certain amount of accommodation (this is why your vision gets blurry when you intentionally cross your eyes). Likewise, the act of accommodation induces a certain degree of convergence. The quantitative relationship between the amplitude of convergence (AC) and the amount of accommodation (A) is represented by the AC/A ratio. For some individuals, the ‘factory setting’ of the AC/A ratio is too high—their eyes converge so much when they accommodate that their fusional and divergence mechanisms are overwhelmed, and an ET results. (Because near vision elicits more accommodation than distance vision, the ET is greatest at near.)
Comitant Esotropia

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What are the units for:
--AC? Prism diopters
--A? Diopters

what is the AC/A ratio?
Comitant Esotropia

What is the AC/A ratio?
The near triad consists of convergence, accommodation and miosis. The act of convergence induces a certain amount of accommodation (this is why your vision gets blurry when you intentionally cross your eyes). Likewise, the act of accommodation induces a certain degree of convergence. The quantitative relationship between the amplitude of convergence (AC) and the amount of accommodation (A) is represented by the AC/A ratio. For some individuals, the ‘factory setting’ of the AC/A ratio is too high—their eyes converge so much when they accommodate that their fusional and divergence mechanisms are overwhelmed, and an ET results. (Because near vision elicits more accommodation than distance vision, the ET is greatest at near.)

What are the units for:
--AC? **Prism diopters**
--A? **Diopters**

What is a normal AC/A?
Comitant Esotropia

What is the AC/A ratio?
The *near triad* consists of convergence, accommodation and miosis. The act of convergence induces a certain amount of accommodation (this is why your vision gets blurry when you intentionally cross your eyes). Likewise, the act of accommodation induces a certain degree of convergence. The quantitative relationship between the amplitude of convergence (AC) and the amount of accommodation (A) is represented by the AC/A ratio. For some individuals, the ‘factory setting’ of the AC/A ratio is too high—their eyes converge so much when they accommodate that their fusional and divergence mechanisms are overwhelmed, and an ET results. (Because near vision elicits more accommodation than distance vision, the ET is greatest at near.)

What are the units for:
--AC? Prism diopters
--A? Diopters

What is a normal AC/A? Around 3:1 to 5:1
Comitant Esotropia

What is the AC/A ratio?

How is the AC/A ratio measured?

Accommodative: Nonrefractive
--ET secondary to high AC/A ratio

Nonaccommodative

Accommodative: Nonrefractive
--ET secondary to high AC/A ratio

What are the units for:
--AC? Prism diopters
--A? Diopters

What is a normal AC/A?
Around 3:1 to 5:1

AC/A ratio = (ET' without add - ET' with add)/3

If the result is greater than 5, the child has a high AC/A ratio.
Comitant Esotropia

How is the AC/A ratio measured?
The gradient method is probably the most commonly-employed technique in clinical practice. The child’s deviation is measured while gazing at a near (33 cm) target. The child is then re-measured while wearing a +3D add, the addition of which should obviate any accommodative effort on the child’s part to see a target at 33 cm. The change in ET is divided by 3 (the power of the add); the result is the child’s AC/A ratio.

\[ \text{AC/A ratio} = \frac{(\text{ET’ without add} - \text{ET’ with add})}{3} \]

If the result is greater than 5, the child has a high AC/A ratio.

What are the units for:
- AC? Prism diopters
- A? Diopters

What is a normal AC/A? Around 3:1 to 5:1
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

Acquired (onset > age 6 m)

Accommodative: Nonrefractive
--ET secondary to…high AC/A ratio
--ET > ET'

Accommodative
Nonaccommodative

Nonrefractive
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

Acquired (onset > age 6 m)

Accommodative: Nonrefractive
--ET secondary to... high AC/A ratio
--ET < ET’

Accommodative

Nonaccommodative

Nonrefractive
Comitant Esotropia

What is the AC/A ratio?
The near triad consists of convergence, accommodation and miosis. The act of convergence induces a certain amount of accommodation (this is why your vision gets blurry when you intentionally cross your eyes). Likewise, the act of accommodation induces a certain degree of convergence. The quantitative relationship between the amplitude of convergence (AC) and the amount of accommodation (A) is represented by the AC/A ratio. For some individuals, the ‘factory setting’ of the AC/A ratio is too high—their eyes converge so much when they accommodate that their fusional and divergence mechanisms are overwhelmed, and an ET results. (Because near vision elicits more accommodation than distance vision, the ET is greatest at near.)

Accommodative: Nonrefractive
--ET secondary to high AC/A ratio
--ET < ET’

Accommodative
Nonaccompanidative
Refractive
Nonrefractive
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

Acquired (onset > age 6 m)

Accommodative:

- Nonrefractive
  -- ET secondary to... high AC/A ratio
  -- ET < ET'

- Nonaccommodative

How much greater is the ET at near?

Management

- No consensus on optimum treatment
- Give bifocal of about... +3

Reasonable treatment goals:

- Distance: Fusion
- Near: <10 ∆
Comitant Esotropia

Comitant esotropia

- Congenital (onset < age 6 m)
  - Accommodative: Nonrefractive
    - ET secondary to high AC/A ratio
    - ET < ET'
  - Nonrefractive

- Acquired (onset > age 6 m)
  - Accommodative
  - Nonaccommodative
  - Nonrefractive

Management:
- No consensus on optimum treatment
- Give bifocal of about +3
- Reasonable treatment goals:
  - Distance: Fusion
  - Near: <10 △

How much greater is the ET at near?
At least 10△
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

Accommodative: Nonrefractive
--ET secondary to...high AC/A ratio
--ET < ET'
--Average refractive error #, but can be anything, even myopic

Acquired (onset > age 6 m)

Accommodative

Nonaccommodative

Nonrefractive
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

Acquired (onset > age 6 m)

Accommodative: Nonrefractive
--ET secondary to...high AC/A ratio
--ET < ET'
--Average refractive error +2, but can be anything, even myopic

Nonaccommodative

Accommodative

Nonrefractive
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

Acquired (onset > age 6 m)

Accommodative: Nonrefractive
- ET secondary to... high AC/A ratio
- ET < ET’
- Average refractive error +2, but can be anything, even myopic

Management
- No consensus on optimum treatment
- Give bifocal of about...

Nonaccommodative

Accommodative

Nonrefractive
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

Acquired (onset > age 6 m)

Accommodative: Nonrefractive
-- ET secondary to...high AC/A ratio
-- ET < ET'
-- Average refractive error +2, but can be anything, even myopic

Management
-- No consensus on optimum treatment
-- Give bifocal of about...+3

Accommodative
Nonaccommodative

Nonrefractive
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

Acquired (onset > age 6 m)

Accommodative: Nonrefractive
--ET secondary to high AC/A ratio
--ET < ET'
--Average refractive error +2, but can be anything, even myopic

Management
--No consensus on optimum treatment
--Give bifocal of about +3
--Reasonable treatment goals:
  --Distance:
  --Near:

Nonaccommodative

Accommodative

Nonrefractive
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

Accommodative: **Nonrefractive**
--ET secondary to...high AC/A ratio
--ET < 'ET'
--Average refractive error +2, but can be anything, even **myopic**

Management
--No consensus on optimum treatment
--Give bifocal of about...+3
--Reasonable treatment goals:
  --Distance: **Fusion**
  --Near: <10° ET

Nonaccommodative

Accommodative

Nonrefractive
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m) Acquired (onset > age 6 m)

Accommodative: Nonrefractive
--ET secondary to high AC/A ratio
--ET < ET'
--Average refractive error +2, but can be anything, even myopic

Management
--No consensus on optimum treatment
--Give bifocal of about...+3
--Reasonable treatment goals:
  --Distance: Fusion
  --Near: <10Δ ET

Can a high AC/A ratio be a component of an exotropia?
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m) Acquired (onset > age 6 m)

Accommodative: Nonrefractive
--ET secondary to high AC/A ratio
--ET < ET'
--Average refractive error +2, but can be anything, even myopic

Management
--No consensus on optimum treatment
--Give bifocal of about...+3
--Reasonable treatment goals:
  --Distance: Fusion
  --Near: <10Δ ET

Nonrefractive

Can a high AC/A ratio be a component of an exotropia? Yes
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m) Acquired (onset > age 6 m)

Accommodative: Nonrefractive
- ET secondary to high AC/A ratio
- ET < ET'
- Average refractive error +2, but can be anything, even myopic

Management
- No consensus on optimum treatment
- Give bifocal of about...+3
- Reasonable treatment goals:
  -- Distance: Fusion
  -- Near: 10Δ ET

Can a high AC/A ratio be a component of an exotropia? Yes

Is high AC/A ratio more likely to be associated with ET, or with XT?
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

Accommodative: Nonrefractive
- ET secondary to high AC/A ratio
- ET < ET'
- Average refractive error +2, but can be anything, even myopic

Management
- No consensus on optimum treatment
- Give bifocal of about...+3
- Reasonable treatment goals:
  - Distance: Fusion
  - Near: <10Δ ET

Can a high AC/A ratio be a component of an exotropia? Yes

Is high AC/A ratio more likely to be associated with ET, or with XT? ET (by a lot)
Comitant Esotropia

**Comitant esotropia**

- **Congenital (onset < age 6 m)**
- **Acquired (onset > age 6 m)**

**Accommodative:**
- Nonrefractive
  - ET secondary to low AC/A ratio
  - ET < ET'
- Average refractive error +2, but can be anything, even myopic

**Management**
- No consensus on optimum treatment
- Give bifocal of about +3
- Reasonable treatment goals:
  - Distance: Fusion
  - Near: <10Δ ET

**Is low AC/A ratio a thing?**
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m) Acquired (onset > age 6 m)

Accommodative: Nonrefractive
-- ET secondary to low AC/A ratio
-- ET < ET'
-- Average refractive error +2, but can be anything, even myopic

Management
-- No consensus on optimum treatment
-- Give bifocal of about...+3
-- Reasonable treatment goals:
  -- Distance: Fusion
  -- Near: <10Δ ET

Is low AC/A ratio a thing?
Yes

Nonrefractive
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

Acquired (onset > age 6 m)

Accommodative: Nonrefractive
--ET secondary to low AC/A ratio
--ET < ET'
--Average refractive error +2, but can be anything, even myopic

Management
--No consensus on optimum treatment
--Give bifocal of about...+3
--Reasonable treatment goals:
  --Distance: Fusion
  --Near: <10Δ ET

Is low AC/A ratio a thing?
Yes

Is low AC/A ratio more likely to be associated with ET, or with XT?
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

Accommodative: Nonrefractive
--ET secondary to low AC/A ratio
--ET < ET’
--Average refractive error +2, but can be anything, even myopic

Management
--No consensus on optimum treatment
--Give bifocal of about...+3
--Reasonable treatment goals:
  --Distance: Fusion
  --Near: <10° ET

Is low AC/A ratio a thing?
Yes

Is low AC/A ratio more likely to be associated with ET, or with XT?
XT (by a lot)
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)
- With Nystagmus
  - Nystagmus blockage syndrome
  - Latent nystagmus
  - Ciancia syndrome
- Without Nystagmus

Acquired (onset > age 6 m)
- Accommodative
- Nonaccommodative
  - Refractive
  - Nonre refractive
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus  Without Nystagmus

Accommodative  Nonaccommodative

- Nystagmus blockage syndrome
- Latent nystagmus
- Ciancia syndrome

Refractive  Nonrefractive

- Basic
- Acute
- Deprivation
- Divergence insufficiency
- Spasm of the near
- Consecutive
- Cyclic
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)
  - With Nystagmus
  - Without Nystagmus

Acquired (onset > age 6 m)
  - Accommodative
  - Nonaccommodative
    - Basic
    - Acute
      - Ciancia syndrome
      - Latent nystagmus
      - Nystagmus blockage syndrome

Nonaccommodative: Basic
--In essence, is the acquired version of...
Comitant Esotropia

**Congenital** (onset < age 6 m)
- Without Nystagmus
  - Nystagmus blockage syndrome
  - Late onset
  - Ciancia syndrome

**Acquired** (onset > age 6 m)
- Comitant esotropia
  - Accommodative
  - Nonaccommodative
    - Basic
    - Acute

Nonaccommodative: **Basic**
-- In essence, is the acquired version of… ‘congenital ET w/o nystagmus’

-- Consider workup for a CNS lesion

Management
-- CR for any accommodative component
-- Consider prism adaptation prior to bilateral medial rectus recession
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)
- With Nystagmus
- Without Nystagmus

Acquired (onset > age 6 m)
- Accommodative
- Nonaccommodative
  - Basic
  - Acute
  - Chronic

Nonaccommodative: Basic
- In essence, is the acquired version of... 'congenital ET w/o nystagmus'
- Consider workup for a...
Comitant Esotropia

**Nonaccommodative:**

-- In essence, is the acquired version of... congenital ET w/o nystagmus
-- Consider workup for a... CNS lesion

**Management**

-- CR for any accommodative component
-- Consider prism adaptation prior to bilateral medial rectus recession

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**Comitant Esotropia**

- Congenital (onset < age 6 m)
  - With Nystagmus
  - Without Nystagmus
- Acquired (onset > age 6 m)
  - Accommodative
  - Nonaccommodative
    - Basic
      - Acute

**Nonaccommodative: Basic**

-- In essence, is the acquired version of... 'congenital ET w/o nystagmus'
-- Consider workup for a... CNS lesion
Comitant Esotropia

Nonaccommodative: Basic
--In essence, is the acquired version of ‘congenital ET w/o nystagmus’
--Consider workup for a…CNS lesion
Management
--CR for any accommodative component
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus
Without Nystagmus

Accommodative
Nonaccommodative

Nonaccommodative: Basic
--In essence, is the acquired version of...‘congenital ET w/o nystagmus’
--Consider workup for a...CNS lesion

Management
--CR for any accommodative component
--Consider two (non-surg proc.) prior to four (surgical procedure)
Comitant Esotropia

**Comitant esotropia**

- **Congenital (onset < age 6 m)**
  - With Nystagmus
  - Without Nystagmus

- **Acquired (onset > age 6 m)**
  - Accommodative
  - Nonaccommodative

**Nonaccommodative: Basic**

- In essence, is the acquired version of…‘congenital ET w/o nystagmus’
- Consider workup for a…CNS lesion

**Management**

- CR for any accommodative component
- Consider prism adaptation prior to bilateral medial rectus recession
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)
  - With Nystagmus
  - Without Nystagmus

Acquired (onset > age 6 m)
  - Accommodative
  - Nonaccommodative
    - Basic
      - Nystagmus blockage syndrome
    - Nonaccommodative

**What is prism adaptation?**

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**--Consider prism adaptation prior to bilateral medial rectus recession**

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Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)
- With Nystagmus
- Without Nystagmus

Acquired (onset > age 6 m)
- Accommodative
- Nonaccommodative
  - Basic
  - Ciancia syndrome

What is prism adaptation?
It is a process in which the pt is prescribed the full prism needed to nullify their ET, then re-evaluated periodically to determine whether additional ET has been ‘uncovered.’ If it has, their prescription is updated to nullify the additional ET.

--Consider prism adaptation prior to bilateral medial rectus recession
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)
- With Nystagmus
- Without Nystagmus

Acquired (onset > age 6 m)
- Accommodative
- Nonaccommodative
  - Nonaccommodative: Basic
    -- In essence, is the acquired version of ‘congenital ET w/o nystagmus’
    -- Consider workup for a CNS lesion

Management
-- CR for any accommodative component
-- Consider prism adaptation prior to bilateral medial rectus recession

What is prism adaptation?
It is a process in which the pt is prescribed the full prism needed to nullify their ET, then re-evaluated periodically to determine whether additional ET has been ‘uncovered.’ If it has, their prescription is updated to nullify the additional ET. This is repeated until the prism prescription is stable, at which time surgery is performed to correct the full final prism prescription.
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

Acquired (onset > age 6 m)

With

Without

Nonaccommodative: Other types

--Acute: Will have diplopia. Need neuro workup

Nonaccommodative

- Basic
- Acute
- Deprivation
- Divergence insufficiency
- Spasm of the near
- Consecutive
- Cyclic
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

Acquired (onset > age 6 m)

With

Without

Nonaccommodative: Other types

--Acute: Will have diplopia. Need neuro workup

How does acute acquired ET differ from a plain ol’ CN6 palsy?

Nonaccommodative

- Basic
- Acute
- Deprivation
- Divergence insufficiency
- Spasm of the near
- Consecutive
- Cyclic
Comitant Esotropia

**Comitant esotropia**

- **Congenital** (onset < age 6 m)
  - With Nystagmus
  - Without Nystagmus

- **Acquired** (onset > age 6 m)
  - With Nystagmus
  - Without Nystagmus

**Nonaccommodative**

- **Nonaccommodative: Other types**
  - **Acute**: Will have diplopia. Need neuro workup

**How does acute acquired ET differ from a plain ol' CN6 palsy?**

The acute acquired ET is **comitant**; CN6 palsy is **incomitant**

**Nonaccommodative**

- Basic
- Acute
- Deprivation
- Divergence insufficiency
- Spasm of the near
- Consecutive
- Cyclic
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)   Acquired (onset > age 6 m)

Nonaccommodative: Other types
- **Acute**: Will have diplopia. Need neuro workup
- **Deprivation**: Secondary to cataracts, corneal scars, amblyopia

Nonaccommodative
- Basic
- Acute
- **Deprivation**: Divergence insufficiency, Spasm of the near, Consecutive, Cyclic
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With Nystagmus  Without Nystagmus

Nonaccommodative: Other types
--Acute: Will have diplopia. Need neuro workup
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How does deprivation strabismus differ in children vs adults?
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With  Without

Nonaccommodative: Other types
--Acute: Will have diplopia. Need neuro workup
--Deprivation: Secondary to cataracts, corneal scars, amblyopia

How does deprivation strabismus differ in children vs adults?
In young children, deprivation produces XT and ET in approximately equal proportions. However, in older children and adults, deprivation strabismus is usually an XT.
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With  Without

Nonaccommodative: Other types
--Acute: Will have diplopia. Need neuro workup
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Comitant Esotropia

Using Categorizations: Congenital (onset < age 6m) and Acquired (onset > age 6m)

Nonaccommodative: Other Types
- **Acute**: Will have diplopia. Need neuro workup
- **Deprivation**: Secondary to cataracts, corneal scars, amblyopia
- **Divergence insufficiency**: ET > ET’. 2 forms: benign (idiopathic, transient) and 2° to trauma or pontine lesion

Nonaccommodative: With Accommodative
- Basic
- Acute
- Deprivation
- Divergence insufficiency
- Spasm of the near
- Consecutive
- Cyclic
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

Note that these conditions can be differentiated on the basis of the relative magnitude of the esotropia as a function of whether it is measured at distance vs near:

Refractive: $ET > ET'$

Nonrefractive (high AC/A ratio): $ET < ET'$

Divergence insufficiency: $ET > ET'$

Latent nystagmus
Ciancia syndrome

Re refractive
Nonrefractive
Comitant Esotropia

Note that these conditions can be differentiated on the basis of the relative magnitude of the esotropia as a function of whether it is measured at distance vs near:

Refactive: $ET \approx ET'$

Nonrefactive (high AC/A ratio): $ET < ET'$

Divergence insufficiency: $ET > ET'$
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

- With
- Without

Nonaccommodative: Other types
- **Acute**: Will have diplopia. Need neuro workup
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- **Spasm of the near**: Will demonstrate near triad

Acquired (onset > age 6 m)

- Nonaccommodative
  - Basic
  - Acute
  - Deprivation
  - Divergence insufficiency
  - Spasm of the near
  - Consecutive
  - Cyclic
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m) Acquired (onset > age 6 m)

What is the near triad?

Nonaccommodative

- Basic
- Acute
- Deprivation
- Divergence insufficiency
- Spasm of the near
- Consecutive
- Cyclic

--Spasm of the near: Will demonstrate near triad

Convergence + accommodation + miosis
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

Acquired (onset > age 6 m)

What is the near triad?
Convergence + accommodation + miosis

Nonaccommodative
- Basic
- Acute
- Deprivation
- Divergence insufficiency
- Spasm of the near
- Consecutive
- Cyclic

Spasm of the near: Will demonstrate near triad
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

Acquired (onset > age 6 m)

What is the near triad?
Convergence + accommodation + miosis

Who is the classic spasm-of-the-near patient?

Spasm of the near: Will demonstrate near triad

Nonaccommodative
- Basic
- Acute
- Deprivation
- Divergence insufficiency
- Spasm of the near
- Consecutive
- Cyclic
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)

Acquired (onset > age 6 m)

What is the near triad?
Convergence + accommodation + miosis

Who is the classic spasm-of-the-near patient?
A teenaged female

--Spasm of the near: Will demonstrate near triad

Nonaccommodative
- Basic
- Acute
- Deprivation
- Divergence insufficiency
- Spasm of the near
- Consecutive
- Cyclic
Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)
Acquired (onset > age 6 m)

What is the near triad?
Convergence + accommodation + miosis

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A teenaged female

What clinical maneuver can help make this diagnosis?
Have the patient perform monocular abductions (will be full OU)

---Spasm of the near: Will demonstrate near triad

Nonaccommodative
- Basic
- Acute
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- Spasm of the near
- Consecutive
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Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m) Acquired (onset > age 6 m)

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Comitant Esotropia

Comitant esotropia

Congenital (onset < age 6 m)  Acquired (onset > age 6 m)

With  Without

Nonaccommodative: Other types

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--Consecutive: Fancy term for XT surgery overcorrection

Nonaccommodative

--Basic
--Acute
--Deprivation
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Comitant Esotropia

Comitant esotropia

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Nonaccommodative

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Is consecutive ET an indication for immediate re-op?
No--wait several months at least, unless the ET is 2o
and/or

Nonaccommodative
--Basic
--Acute
--Deprivation
--Divergence insufficiency
--Spasm of the near
--Consecutive
--Cyclic
Comitant Esotropia

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- Spasm of the near
- Consecutive: Fancy term for XT surgery overcorrection

Is consecutive ET an indication for immediate re-op?
No--wait several months at least, unless the ET is very large and/or symptomatic

Nonaccommodative
- Basic
- Acute
- Deprivation
- Divergence insufficiency
- Spasm of the near
- Consecutive
- Cyclic
Comitant Esotropia

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--**Acute**: Will have diplopia. Need neuro workup
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--**Divergence insufficiency**: ET>ET’. 2 forms: benign (idiopathic, transient) and 2° to trauma or pontine lesion
--**Spasm of the near**: Will demonstrate near triad
--**Consecutive**: Fancy term for XT surgery overcorrection
--**Cyclic**: Initially every other day; progresses to constant

Nonaccommodative

--Basic
--Acute
--Deprivation
--Divergence insufficiency
--Spasm of the near
--Consecutive
--Cyclic

Comitant esotropia

Congenital (onset < age 6 m)

Acquired (onset > age 6 m)

With

Without