Comitant Exotropia

Which is more common in children: comitant XT, or comitant ET?
Which is more common in children: comitant XT, or comitant ET? ET is significantly more common
Comitant Exotropia

*Which is more common in children: comitant XT, or comitant ET?* ET is significantly more common

*Is there a gender predilection for comitant XT?*
Which is more common in children: comitant XT, or comitant ET? ET is significantly more common.

Is there a gender predilection for comitant XT? Yes, it is more common in M v F.
Comitant Exotropia

Which is more common in children: comitant XT, or comitant ET? ET is significantly more common

Is there a gender predilection for comitant XT? Yes, it is more common in ♀
Which is more common in children: comitant XT, or comitant ET? ET is significantly more common.

Is there a gender predilection for comitant XT? Yes, it is more common in ♀.

Is there a pattern regarding its distribution worldwide?
Which is more common in children: comitant XT, or comitant ET? ET is significantly more common.

Is there a gender predilection for comitant XT? Yes, it is more common in ♀.

Is there a pattern regarding its distribution worldwide? Yes. XT is much more common in the Middle East, Africa and Asia than in the US and/or Europe. It is also more commonly found at latitudes that receive more sun vs snow.
Which is more common in children: comitant XT, or comitant ET? ET is significantly more common.

Is there a gender predilection for comitant XT? Yes, it is more common in♀.

Is there a pattern regarding its distribution worldwide? Yes. XT is much more common in the Middle East, Africa and Asia than in the US and/or Europe. It is also more commonly found at latitudes that receive more sun exposure.
Which is more common in children: comitant XT, or comitant ET? ET is significantly more common.

Is there a gender predilection for comitant XT? Yes, it is more common in ♀.

Is there a pattern regarding its distribution worldwide? Yes. XT is much more common in the Middle East, Africa and Asia than in the US and/or Europe. It is also more commonly found at latitudes that receive more sun exposure.

Outside of the US, strabismus in general, and exotropia in particular, is frequently referred to as ‘squint’ (eg, ‘I saw a child in clinic today with a squint.’) Why?
Comitant Exotropia

**Which is more common in children: comitant XT, or comitant ET?**
ET is significantly more common

**Is there a gender predilection for comitant XT?**
Yes, it is more common in ♀

**Is there a pattern regarding its distribution worldwide?**
Yes. XT is much more common in the Middle East, Africa and Asia than in the US and/or Europe. It is also more commonly found at latitudes that receive more **sun exposure**.

Outside of the US, strabismus in general, and exotropia in particular, is frequently referred to as ‘squint’ (eg, ‘I saw a child in clinic today with a squint.’) Why?
One of the common characteristics of exotropia is that the child will close the deviating eye (ie, squint), especially in **bright sunlight**
Comitant Exotropia

Exodeviations

Two broad categories

?  ?
Comitant Exotropia

Exodeviations

Intermittent

Constant

Two broad categories
Comitant Exotropia

Exodeviations

- Intermittent
- Constant

Two broad categories

?
Comitant Exotropia

Exodeviations

- Intermittent
- Constant
  - Congenital
  - Sensory

Two broad categories
Comitant Exotropia

Exodeviations

Intermittent  Constant

Congenital  Sensory

**Congenital XT**
--Onset prior to age…
Comitant Exotropia

Exodeviations

- Intermittent
- Constant

**Congenital XT**
--Onset prior to age...6 months

- Congenital
- Sensory
Comitant Exotropia

Exodeviations

Intermittent

Constant

Congenital

Sensory

*Congenital XT*
--Onset prior to age...6 months
--Usually syndromic  *two very general types of syndromes*
Comitant Exotropia

Exodeviations

Intermittent

Constant

Congenital

Sensory

**Congenital XT**
--Onset prior to age…6 months
--Usually syndromic: Craniofacial syndromes, neurologic syndromes
Comitant Exotropia

Exodeviations

- Intermittent
- Constant

**Congenital XT**
--Onset prior to age...6 months
--Usually syndromic: Craniofacial syndromes, neurologic syndromes
--Potential for stereopsis/bifoveation is... *good vs poor*
Comitant Exotropia

Exodeviations

Intermittent

Constant

Congenital

Sensory

**Congenital XT**
--Onset prior to age...6 months
--Usually syndromic: Craniofacial syndromes, neurologic syndromes
--Potential for stereopsis/bifoveation is...poor
Comitant Exotropia

Exodeviations

Intermittent

Constant

Congenital

Sensory

Congenital XT
--Onset prior to age...6 months
--Usually syndromic: **Craniofacial syndromes** neurologic syndromes
--Potential for stereopsis/bifoveation is...poor

What are the two broad categories of craniofacial syndrome?
Comitant Exotropia

Exodeviations

- Intermittent
- Constant

**Congenital XT**
-- Onset prior to age...6 months
-- Usually syndromic: Craniofacial syndromes, neurologic syndromes
-- Potential for stereopsis/bifoveation is...poor

Craniosynostoses
Not craniosynostoses

What are the two broad categories of craniofacial syndrome?
Comitant Exotropia

Exodeviations

Intermittent

Constant

Congenital

Sensory

Congenital XT
--Onset prior to age...6 months
--Usually syndromic: **Craniofacial syndromes**, neurologic syndromes
--Potential for stereopsis/bifoveation...is...poor

Two categories of craniofacial syndrome

Craniosynostoses
Not craniosynostoses

Which not-craniosynostosis syndromes are addressed in the Peds book?
Comitant Exotropia

Exodeviations

Intermittent

Constant

Congenital

Sensory

Congenital XT
--Onset prior to age...6 months
--Usually syndromic: Craniofacial syndromes, neurologic syndromes
--Potential for stereopsis/bifoveal fusion is poor

Two categories of craniofacial syndrome

Craniosynostoses

Not craniosynostoses

Which not-craniosynostosis syndromes are addressed in the Peds book?

- Goldenhar
- Treacher Collins
- Pierre Robin sequence
- Fetal alcohol
Comitant Exotropia

Exodeviations

Intermittent

Constant

Congenital

Sensory

Congenital XT
--Onset prior to age...6 months
--Usually syndromic: **Craniofacial syndromes**, neurologic syndromes
--Potential for stereopsis/bifoveation is... poor

Craniosynostoses

Not craniosynostoses

Which craniosynostosis syndromes are addressed in the Peds book?

- Goldenhar
- Treacher Collins
- Pierre Robin sequence
- Fetal alcohol
Comitant Exotropia

Exodeviations

- Intermittent
- Constant

**Congenital XT**
-- Onset prior to age...6 months
-- Usually syndromic: Craniofacial syndromes, neurologic syndromes
-- Potential for stereopsis/bifoveation is...poor

Two categories of craniofacial syndrome

**Craniosynostoses**
- Crouzon
- Apert
- Pfeiffer
- Saethre-Chotzen

**Not craniosynostoses**
- Goldenhar
- Treacher Collins
- Pierre Robin sequence
- Fetal alcohol

Which craniosynostosis syndromes are addressed in the Peds book?
Comitant Exotropia

Exodeviations

- Intermittent
- Constant

Congenital

- Cranial synostoses
- Craniofacial syndromes
- Neurologic syndromes

Potential for stereopsis/bifoveation is often poor

Craniosynostoses

- Crouzon?
- Apert?
- Pfeiffer?
- Saethre-Chotzen?

Not craniosynostoses

- Goldenhar?
- Treacher Collins?
- Pierre Robin sequence?
- Fetal alcohol?

Of these, which three are strongly associated with congenital XT?
Comitant Exotropia

Exodeviations

Intermittent

Constant

Congenital

Sensory

Congenital XT
--Onset prior to age...6 months
--Usually syndromic: Craniofacial syndromes, neurologic syndromes
--Potential for stereopsis/bifoveation is...poor

Craniosynostoses
--Crouzon
--Apert
--Pfeiffer
--Saethre-Chotzen

Not craniosynostoses
--Goldenhar
--Treacher Collins
--Pierre Robin sequence
--Fetal alcohol

Of these, which three are strongly associated with congenital XT?
Comitant Exotropia

Exodeviations

Intermittent

Constant

Intermittent XT
--Initially XT only when pt is... [general state]

--Initially XT only when pt is... [general state]
--Later, XT periods more frequent, last longer
--If patient < 10 y.o., will develop... [2 adaptive responses]
--XT frequently associated with... HT, A/V pattern
--1/3 XT patients also have... IO overaction
--Amblyopia is... uncommon

Management
--Give specs for myopia (but not for mild hyperopia)
--Consider part-time patching of the nondeviating eye
--Consider diplopia awareness and convergence training
--If XT continues to progress: Surgery
Comitant Exotropia

Exodeviations

Intermittent

Constant

Intermittent XT
--Initially XT only when pt is… tired/ill/inattentive

Management
--Give specs for myopia (but not for mild hyperopia)
--Consider part-time patching of the nondeviating eye
--Consider diplopia awareness and convergence training
--If XT continues to progress: Surgery

Intermittent XT
--Initially XT only when pt is… tired/ill/inattentive
--Later, XT periods more frequent, last longer
--If patient < 10 y.o., will develop… supression and ARC
--XT frequently associated with… HT, A/V pattern
--1/3 XT patients also have… IO overaction
--Amblyopia is… uncommon

Management
--Give specs for myopia (but not for mild hyperopia)
--Consider part-time patching of the nondeviating eye
--Consider diplopia awareness and convergence training
--If XT continues to progress: Surgery
Comitant Exotropia

Exodeviations

Intermittent

Constant

Intermittent XT
--Initially XT only when pt is...tired/ill/inattentive
--Later, XT periods more frequent, last longer

Management
--Give specs for myopia (but not for mild hyperopia)
--Consider part-time patching of the nondeviating eye
--Consider diplopia awareness and convergence training
--If XT continues to progress: Surgery
Comitant Exotropia

Exodeviations

Intermittent

- Initially XT only when pt is... tired/ill/inattentive
- Later, XT periods more frequent, last longer
- If patient < 10 y.o., will develop... [2 adaptive responses]

Constant

Sensory

32
Comitant Exotropia

Exodeviations

Intermittent

Constant

Intermittent XT
--Initially XT only when pt is...tired/ill/inattentive
--Later, XT periods more frequent, last longer
--If patient < 10 y.o., will develop...suppression and ARC

Management
--Give specs for myopia (but not for mild hyperopia)
--Consider part-time patching of the nondeviating eye
--Consider diplopia awareness and convergence training
--If XT continues to progress: Surgery
Comitant Exotropia

Exodeviations

Intermittent

Constant

Intermittent XT
--Initially XT only when pt is...tired/ill/inattentive
--Later, XT periods more frequent, last longer
--If patient < 10 y.o., will develop...suppression and ARC

What does ARC stand for in this context?

ARC = Anomalous retinal correspondence
Comitant Exotropia

Exodeviations

Intermittent

Constant

Intermittent XT
--Initially XT only when pt is...tired/ill/inattentive
--Later, XT periods more frequent, last longer
--If patient < 10 y.o., will develop...suppression and ARC

Constant XT

Intermittent XT

What does ARC stand for in this context?
Anomalous retinal correspondence
Comitant Exotropia

Exodeviations

Intermittent

Intermittent XT
--Initially XT only when pt is... tired/ill/inattentive
--Later, XT periods more frequent, last longer
--If patient < 10 y.o., will develop...

suppression and ARC

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

Constant

Sensory

Somatic

Intergenital
Comitant Exotropia

Exodeviations

Intermittent

- Initially XT only when pt is...tired/ill/inattentive
- Later, XT periods more frequent, last longer
- If patient < 10 y.o., will develop...suppression and ARC
- XT frequently associated with...HT, A/V pattern
- 1/3 XT patients also have...IO overaction
- Amblyopia is...uncommon

Management
- Give specs for myopia (but not for mild hyperopia)
- Consider part-time patching of the nondeviating eye
- Consider diplopia awareness and convergence training
- If XT continues to progress: Surgery

Constant

Sensory

Intermittent XT

- Initially XT only when pt is...tired/ill/inattentive
- Later, XT periods more frequent, last longer
- If patient < 10 y.o., will develop...suppression and ARC
- XT frequently associated with...HT, A/V pattern
- 1/3 XT patients also have...IO overaction
- Amblyopia is...uncommon

Management
- Give specs for myopia (but not for mild hyperopia)
- Consider part-time patching of the nondeviating eye
- Consider diplopia awareness and convergence training
- If XT continues to progress: Surgery

Suppression and ARC are two of the three adaptations the immature visual system makes in response to misalignment. What is the other?

- Suppression
- Anomalous retinal correspondence
- M

Mnemonic...SAM
Comitant Exotropia

Exodeviations

Intermittent

--Initially XT only when pt is...tired/ill/inattentive
--Later, XT periods more frequent, last longer
--If patient < 10 y.o., will develop...

suppression and ARC

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

Constant

Sensory
Comitant Exotropia

Exodeviations

Intermittent

Constant

Intermittent XT
--Initially XT only when pt is ... tired/ill/inattentive
--Later, XT periods more frequent, last longer
--If patient < 10 y.o., will develop ... suppression and ARC
--XT frequently associated with ... [other strabismus manifestations]
Comitant Exotropia

Exodeviations

Intermittent

Constant

Intermittent XT
--Initially XT only when pt is...tired/ill/inattentive
--Later, XT periods more frequent, last longer
--If patient < 10 y.o., will develop...suppression and ARC
-- XT frequently associated with...HT, A/V pattern

(hypertropia)
Comitant Exotropia

Exodeviations

Intermittent

Constant

Intermittent XT
--Initially XT only when pt is...tired/ill/inattentive
--Later, XT periods more frequent, last longer
--If patient < 10 y.o., will develop...suppression and ARC
--XT frequently associated with...HT, A/V pattern
--1/3 XT patients also have...[yet another strabismus manifestation]
Comitant Exotropia

Exodeviations

Intermittent

*Intermittent XT*
--Initially XT only when pt is...tired/ill/inattentive
--Later, XT periods more frequent, last longer
--If patient < 10 y.o., will develop...suppression and ARC
--XT frequently associated with...HT, A/V pattern
--1/3 XT patients also have...IO overaction

(inferior oblique)

Constant

Sensory
Comitant Exotropia

Exodeviations

Intermittent

- Initially XT only when pt is... tired/ill/inattentive
- Later, XT periods more frequent, last longer
- If patient < 10 y.o., will develop... suppression and ARC
- XT frequently associated with... HT, A/V pattern
- 1/3 XT patients also have... IO overaction
- Amblyopia is... [common v uncommon]
Comitant Exotropia

Exodeviations

- **Intermittent**
  - Initially XT only when pt is... *tired/ill/inattentive*
  - Later, XT periods more frequent, last longer
  - If patient < 10 y.o., will develop... *suppression and ARC*
  - XT frequently associated with... *HT, A/V pattern*
  - 1/3 XT patients also have... *IO overaction*
  - Amblyopia is... *uncommon*

- **Constant**
  - Congenital
  - Sensory

Management

- Give specs for myopia (but not for mild hyperopia)
- Consider part-time patching of the nondeviating eye
- Consider diplopia awareness and convergence training
- If XT continues to progress: Surgery
Comitant Exotropia

Exodeviations

Intermittent

Intermittent XT
--Initially XT only when pt is...tired/ill/inattentive
--Later, XT periods more frequent, last longer
--If patient < 10 y.o., will develop...suppression and ARC
--XT frequently associated with...HT, A/V pattern
--1/3 XT patients also have...IO overaction
--Amblyopia is...uncommon

Management
--Give specs for myopia (but not for mild hyperopia)

Constant

Sensory
Comitant Exotropia

Exodeviations

Intermittent

Intermittent XT
--Initially XT only when pt is...tired/ill/inattentive
--Later, XT periods more frequent, last longer
--If patient < 10 y.o., will develop...suppression and ARC
--XT frequently associated with...HT, A/V pattern
--1/3 XT patients also have...IO overaction
--Amblyopia is...uncommon

Management
--Give specs for myopia (but not for mild hyperopia)
Comitant Exotropia

Exodeviations

Intermittent

Constant

Intermittent XT
--Initially XT only when pt is...tired/ill/inattentive
--Later, XT periods more frequent, last longer
--If patient < 10 y.o., will develop...suppression and ARC
--XT frequently associated with...HT, A/V pattern
--1/3 XT patients also have...IO overaction
--Amblyopia is...uncommon

Management
--Give specs for myopia (but not for mild hyperopia)

Why no Rx for mild hyperopia?

Because the near triad. That is, the accommodative effort required by the uncorrected hyperopia will induce convergence, which may offset the XT.

What about high hyperopia?
In contrast to mild hyperopia, high levels of hyperopia should be at least partially corrected. If the accommodative demand is too high, the patient may be unable to sustain it, and s/he will 'give up' and lose focus, with the subsequent loss of fusion causing a lapse into XT.
Comitant Exotropia

Exodeviations

Intermittent

Constant

Intermittent XT
--Initially XT only when pt is...tired/ill/inattentive
--Later, XT periods more frequent, last longer
--If patient < 10 y.o., will develop...suppression and ARC
--XT frequently associated with...HT, A/V pattern
--1/3 XT patients also have...IO overaction
--Amblyopia is...uncommon

Management
--Give specs for myopia (but not for mild hyperopia)

Why no Rx for mild hyperopia?
Because the near triad. That is, the accommodative effort required by the uncorrected hyperopia will induce convergence, which may offset the XT.
Comitant Exotropia

Exodeviations

Intermittent

Constant

**Intermittent XT**
--Initially XT only when pt is...tired/ill/inattentive
--Later, XT periods more frequent, last longer
--If patient < 10 y.o., will develop...suppression and ARC
--XT frequently associated with...HT, A/V pattern
--1/3 XT patients also have...IO overaction
--Amblyopia is...uncommon

**Management**
--Give specs for myopia (but not for mild hyperopia)

**Why no Rx for mild hyperopia?**
Because the near triad. That is, the accommodative effort required by the uncorrected hyperopia will induce convergence, which may offset the XT.

**What about high hyperopia?**
Comitant Exotropia

Exodeviations

Intermittent

Constant

Intermittent XT
--Initially XT only when pt is...tired/ill/inattentive
--Later, XT periods more frequent, last longer
--If patient < 10 y.o., will develop...suppression and ARC
--XT frequently associated with...HT, A/V pattern
--1/3 XT patients also have...IO overaction
--Amblyopia is...uncommon

Management
--Give specs for myopia (but not for mild hyperopia)
--Consider part-time patching of the nondeviating eye
--Consider diplopia awareness and convergence training
--If XT continues to progress: Surgery

Why no Rx for mild hyperopia?
Because the near triad. That is, the accommodative effort required by the uncorrected hyperopia will induce convergence, which may offset the XT.

What about high hyperopia?
In contrast to mild hyperopia, high levels of hyperopia should be at least partially corrected. If the accommodative demand is too high, the patient may be unable to sustain it, and s/he will ‘give up’ and lose focus, with the subsequent loss of fusion causing a lapse into XT.
Congenital Sensory Exodeviations

Intermittent

Intermittent XT
--Initially XT only when pt is...tired/ill/inattentive
--Later, XT periods more frequent, last longer
--If patient < 10 y.o., will develop...suppression and ARC
--XT frequently associated with...HT, A/V pattern
--1/3 XT patients also have...IO overaction
--Amblyopia is...uncommon

Management
--Give specs for myopia (but not for mild hyperopia)
--Consider part-time patching of the nondeviating eye
--Consider diplopia awareness and convergence training
--If XT continues to progress: Surgery
Comitant Exotropia

Exodeviations

Intermittent

**Intermittent XT**
--Initially XT only when pt is...**tired/ill/inattentive**
--Later, XT periods more frequent, last longer
--If patient < 10 y.o., will develop...**suppression and ARC**
--XT frequently associated with...**HT, A/V pattern**
--1/3 XT patients also have...**IO overaction**
--Amblyopia is...**uncommon**

**Management**
--Give specs for **myopia** (but *not* for mild **hyperopia**)
--Consider **part-time patching** of the nondeviating eye
Comitant Exotropia

Exodeviations

- **Intermittent**
  - Initially XT only when pt is...tired/ill/inattentive
  - Later, XT periods more frequent, last longer
  - If patient < 10 y.o., will develop...suppression and ARC
  - XT frequently associated with...HT, A/V pattern
  - 1/3 XT patients also have...IO overaction
  - Amblyopia is...uncommon

- **Constant**

- **Sensory**

**Management**
- Give specs for myopia (but not for mild hyperopia)
- Consider **part-time patching** of the nondeviating eye

*If amblyopia is uncommon, why perform patching?*
**Comitant Exotropia**

Exodeviations

- **Intermittent XT**
  - Initially XT only when pt is tired/ill/inattentive
  - Later, XT periods more frequent, last longer
  - If patient < 10 y.o., will develop suppression and ARC
  - XT frequently associated with HT, A/V pattern
  - 1/3 XT patients also have IO overaction
  - Amblyopia is uncommon

**Management**
- Give specs for myopia (but not for mild hyperopia)
- Consider part-time patching of the nondeviating eye

**If amblyopia is uncommon, why perform patching?**
The patching is **not** for amblyopia; rather, it seems to help the XT (for reasons that are not clear)
Congenital Sensory Comitant Exotropia

Exodeviations

Intermittent

Constant

Intermittent XT
--Initially XT only when pt is... tired/ill/inattentive
--Later, XT periods more frequent, last longer
--If patient < 10 y.o., will develop... suppression and ARC
--XT frequently associated with... HT, A/V pattern
--1/3 XT patients also have... IO overaction
--Amblyopia is... uncommon

Management
--Give specs for myopia (but not for mild hyperopia)
--Consider part-time patching of the nondeviating eye
--Consider nonsurgical intervention 2 and nonsurgical intervention 3
Comitant Exotropia

Exodeviations

Intermittent

Intermittent XT
--Initially XT only when pt is...tired/ill/inattentive
--Later, XT periods more frequent, last longer
--If patient < 10 y.o., will develop...suppression and ARC
--XT frequently associated with...HT, A/V pattern
--1/3 XT patients also have...IO overaction
--Amblyopia is...uncommon

Management
--Give specs for myopia (but not for mild hyperopia)
--Consider part-time patching of the nondeviating eye
--Consider diplopia awareness and convergence training

Constant

Sensory
Comitant Exotropia

Exodeviations

Intermittent

Intermittent XT
--Initially XT only when pt is…tired/ill/inattentive
--Later, XT periods more frequent, last longer
--If patient < 10 y.o., will develop…suppression and ARC
--XT frequently associated with…HT, A/V pattern

Do intermittent XT patients c/o diplopia?

--Consider part-time patching of the nondeviating eye
--Consider diplopia awareness and convergence training

Constant

Sensory

Intermittent XT
--Initially XT only when pt is…tired/ill/inattentive
--Later, XT periods more frequent, last longer
--If patient < 10 y.o., will develop…suppression and ARC
--XT frequently associated with…HT, A/V pattern

Management
--Give specs for myopia (but not for mild hyperopia)
--Consider part-time patching of the nondeviating eye
--Consider diplopia awareness and convergence training
--If XT continues to progress: Surgery

Amblyopia is…uncommon
Comitant Exotropia

Exodeviations

Intermittent

Intermittent XT
--Initially XT only when pt is...tired/ill/inattentive
--Later, XT periods more frequent, last longer
--If patient < 10 y.o., will develop...suppression and ARC
--XT frequently associated with...HT, A/V pattern

Constant

Do intermittent XT patients c/o diplopia?
It depends. Prior to development of ARC and suppression, they will experience and c/o diplopia. However, once ARC/suppression develop, the diplopia ceases. Often the ARC and suppression are facultative; that is, the patient will have NRC and fine stereo when their eyes are straight, but ARC and suppression when they are XT.
--Consider part-time patching of the nondeviating eye
--Consider diplopia awareness and convergence training

Sensory
Comitant Exotropia

Exodeviations

Intermittent

- Initially XT only when pt is... tired/ill/inattentive
- Later, XT periods more frequent, last longer
- If patient < 10 y.o., will develop... suppression and ARC
- XT frequently associated with... HT, A/V pattern
- 1/3 XT patients also have... IO overaction
- Amblyopia is... uncommon

Management
- Give specs for myopia (but not for mild hyperopia)
- Consider part-time patching of the nondeviating eye
- Consider diplopia awareness and convergence training
- If XT continues to progress: [last resort]
Comitant Exotropia

Exodeviations

Intermittent

Constant

*Intermittent XT*
--Initially XT only when pt is...tired/ill/inattentive
--Later, XT periods more frequent, last longer
--If patient < 10 y.o., will develop...suppression and ARC
--XT frequently associated with...HT, A/V pattern
--1/3 XT patients also have...IO overaction
--Amblyopia is...uncommon

**Management**
--Give specs for myopia (but not for mild hyperopia)
--Consider part-time patching of the nondeviating eye
--Consider diplopia awareness and convergence training
--If XT continues to progress: Surgery
Comitant Exotropia

Exodeviations

Intermittent

Constant

Intermittent XT
--Initially XT only when pt is...tired/ill/inattentive
--Later, XT periods more frequent, last longer
--If patient < 10 y.o., will develop...suppression and ARC
--XT frequently associated with...HT, A/V pattern
--1/3 XT patients also have...IO overaction
--Amblyopia is...uncommon

Management
--Give specs for myopia (but not for mild hyperopia )
--Consider part-time patching of the nondeviating eye
--Consider diplopia awareness and convergence training
--If XT continues to progress: Surgery

How is progression defined?

With respect to control of the XT.

What are the 3 levels of control?

--Good control =Become XT only with cover, and
--Resumes fusion w/o blink

--Moderate control =Become XT only with cover, and
--Resumes fusion only with blink

--Poor control =Become XT spontaneously, and
--Remains XT for extended period
**Comitant Exotropia**

**Exodeviations**

**Intermittent**

- Initially XT only when pt is...tired/ill/inattentive
- Later, XT periods more frequent, last longer
- If patient < 10 y.o., will develop...suppression and ARC
- XT frequently associated with...HT, A/V pattern
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Comitant Exotropia

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Management
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Constant

How is progression defined?
With respect to control of the XT

What are the 3 levels of control?

- Good control
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Comitant Exotropia

Exodeviations

Intermittent

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**Constant**

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--- Consider diplopia awareness and convergence training
--- If XT continues to progress: Surgery

Additionally, be aware that several quantitative scales for assessing intermittent exotropia have been developed (the *Peds* book refers by name to the *Newcastle Control Score for Intermittent Exotropia*).

--- How is progression defined? With respect to **control** of the XT

--- What are the 3 levels of control? How is each defined?
--- **Good control** =
  -- Become XT only with cover, **and**
  -- Resumes fusion w/o blink
--- **Moderate control** =
  -- Become XT only with cover, **and**
  -- Resumes fusion only **with** blink
--- **Poor control** =
  -- Become XT spontaneously, **and**
  -- Remains XT for extended period
Intermittent Exotropia

Exodeviations

Intermittent

Constant

Congenital

Sensory

Intermittent XT
--Initially XT only when pt is...tired/ill/inattentive
--Later, XT periods more frequent, last longer
--If patient < 10 y.o., will develop...suppression and ARC
--XT frequently associated with...HT, A/V pattern
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--Consider diplopia awareness and convergence training
--If XT continues to progress: Surgery

Bilateral LR recession is performed, and the patient is 10△ ET 2 weeks post-op. What should you do?
Comitant Exotropia

Exodeviations

Intermittent

- Initially XT only when pt is...tired/ill/inattentive
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Management
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- Consider part-time patching of the nondeviating eye
- Consider diplopia awareness and convergence training
- If XT continues to progress: Surgery

Constant

Bilateral LR recession is performed, and the patient is 10Δ ET 2 weeks post-op. What should you do?

Nothing. A small overcorrection (up to ~15Δ) after XT surgery is desirable. Prisms can be considered if the ET persists beyond a month or so. Surgical correction should not be considered for at least 4-6 months (unless a slipped muscle is the culprit, in which case an immediate re-op is indicated).
Comitant Exotropia

Exodeviations

Intermittent  Constant

?  ?  ?  Congenital  Sensory

One logical way to divvy these up based on a key clinical finding
Comitant Exotropia

Exodeviations

Intermittent

Constant

One logical way to divvy these up based on a key clinical finding

Congenital

Sensory

Hint: This ‘key clinical finding’ is determined via an exam maneuver performed very early in the initial evaluation of a child with intermittent XT, that being…
Comitant Exotropia

Exodeviations

Intermittent

XT > XT’  XT ≈ XT’  XT < XT’

One logical way to divvy these up based on a key clinical finding

Constant

Congenital  Sensory

Hint: This ‘key clinical finding’ is determined via an exam maneuver performed very early in the initial evaluation of a child with intermittent XT, that being… Measuring the magnitude of the deviation at both distance and near
Comitant Exotropia

Exodeviations

Intermittent

\[ XT > XT' \]
\[ XT \approx XT' \]
\[ XT < XT' \]

Constant

Congenital

Sensory

A descriptive name for each
Comitant Exotropia

Exodeviations

Intermittent
- $XT > XT'$: 'Divergence excess'
- $XT ≈ XT'$: 'Basic XT'
- $XT < XT'$: 'Convergence insufficiency'

Constant
- Congenital
- Sensory

A descriptive name for each
Comitant Exotropia

Exodeviations

Intermittent

- $XT > XT'$: 'Divergence excess'
- $XT \approx XT'$: 'Basic XT'
- $XT < XT'$: 'Convergence insufficiency'

Constant

- Congenital
- Sensory

How close do the distance and near measurements have to be for an intermittent XT to qualify as 'basic'?
Comitant Exotropia

Exodeviations

Intermittent

- $XT > XT'$: 'Divergence excess'
- $XT \approx XT'$: 'Basic $XT$'
- $XT < XT'$: 'Convergence insufficiency'

Constant

- Congenital
- Sensory

How close do the distance and near measurements have to be for an intermittent $XT$ to qualify as 'basic'? Less than 10Δ difference
Comitant Exotropia

Exodeviations

Intermittent

- \( XT > XT' \)
  - 'Divergence excess'
    - Two subtypes

- \( XT \approx XT' \)
  - 'Basic XT'

- \( XT < XT' \)
  - 'Convergence insufficiency'

Constant

- Congenital
- Sensory
Comitant Exotropia

Exodeviations

Intermittent

- \( XT > XT' \) "Divergence excess"
- \( XT \approx XT' \) "Basic XT"
- \( XT < XT' \) "Convergence insufficiency"

Two subtypes

Constant

- Congenital
- Sensory

Hint: Determining which of the two subtypes is present is done via an exam maneuver performed in the initial evaluation of a child with divergence-excess intermittent XT, that being…
Comitant Exotropia

Exodeviations

Intermittent

- \( XT > XT' \)
  - ‘Divergence excess’
    - Two subtypes
  - \( XT \approx XT' \)
  - ‘Basic XT’
  - ‘Convergence insufficiency’

- \( XT < XT' \)

Constant

- Congenital
- Sensory

Hint: Determining which of the two subtypes is present is done via an exam maneuver performed in the initial evaluation of a child with divergence-excess intermittent XT, that being… Re-measurement of the magnitude of the deviation at both distance and near after three words
Comitant Exotropia

Exodeviations

Intermittent

- $XT > XT'$
  - ‘Divergence excess’
  - Two subtypes

- $XT \approx XT'$
  - ‘Basic $XT$’

- $XT < XT'$
  - ‘Convergence insufficiency’

Constant

- Congenital
- Sensory

Re-measurement of the magnitude of the deviation at both distance and near after prolonged monocular occlusion

**Hint:** Determining which of the two subtypes is present is done via an exam maneuver performed in the initial evaluation of a child with divergence-excess intermittent $XT$, that being...
Why must the deviation be re-measured after prolonged monocular occlusion?

- **XT > XT'**
  - ‘Divergence excess’
  - Two subtypes

- **XT ≈ XT’**
  - ‘Basic XT’

- **XT < XT’**
  - ‘Convergence insufficiency’

- **Congenital**

- **Sensory**

**Hint:** Determining which of the two subtypes is present is done via an exam maneuver performed in the initial evaluation of a child with divergence-excess intermittent XT, that being… Re-measurement of the magnitude of the deviation at both distance and near after **prolonged monocular occlusion**
**Comitant Exotropia**

Why must the deviation be re-measured after prolonged monocular occlusion? To determine whether a phenomenon called tenacious proximal fusion (TPF) is the cause of the distance vs near disparity in deviation size.

*XT > XT’*  
‘Divergence excess’

*XT ≈ XT’*  
‘Basic XT’

*XT < XT’*  
‘Convergence insufficiency’

Congenital  
Sensory

**Hint:** Determining which of the two subtypes is present is done via an exam maneuver performed in the initial evaluation of a child with divergence-excess intermittent XT, that being... Re-measurement of the magnitude of the deviation at both distance and near after **prolonged monocular occlusion**
**Comitant Exotropia**

Why must the deviation be re-measured after prolonged monocular occlusion? To determine whether a phenomenon called **tenacious proximal fusion** (TPF) is the cause of the distance vs near disparity in deviation size.

- **XT > XT’**  
  ‘Divergence excess’
- **XT ≈ XT’**  
  ‘Basic XT’
- **XT < XT’**  
  ‘Convergence insufficiency’

Two subtypes

- Congenital
- Sensory

**Hint:** Determining which of the two subtypes is present is done via an exam maneuver performed in the initial evaluation of a child with divergence-excess intermittent XT, that being… Re-measurement of the magnitude of the deviation at both distance and near after **prolonged monocular occlusion**
Why must the deviation be re-measured after prolonged monocular occlusion?
To determine whether a phenomenon called tenacious proximal fusion (TPF) is the cause of the distance vs near disparity in deviation size. TPF represents a ‘proximal fusion aftereffect’--a tendency for the fusional convergence induced by near vision to persist. Because of TPF, attempts to break fusion-mediated convergence with an alternate-cover test may be unsuccessful, and initial measurements will produce the incorrect impression that the near deviation is significantly less than the distance deviation. Occluding one eye for an extended period allows TPF (if present) to dissipate.

Re-measurement of the magnitude of the deviation at both distance and near after prolonged monocular occlusion

Hint: Determining which of the two subtypes is present is done via an exam maneuver performed in the initial evaluation of a child with divergence-excess intermittent XT, that being…
Why must the deviation be re-measured after prolonged monocular occlusion?

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When we say monocular occlusion for “an extended period,” how long are we talking about?
Why must the deviation be re-measured after prolonged monocular occlusion?
To determine whether a phenomenon called *tenacious proximal fusion* (TPF) is the cause of the deviation for distance vs near disparity in deviation size. TPF represents a 'proximal fusion aftereffect'—a tendency for the fusional convergence induced by near vision to persist. Because of TPF, attempts to break fusion-mediated convergence with an alternate-cover test may be unsuccessful, and initial measurements will produce the incorrect impression that the near deviation is significantly less than the distance deviation. Occluding one eye for an extended period allows TPF (if present) to dissipate.

When we say monocular occlusion for “an extended period,” how long are we talking about?
Back in the day, the child would be patched up to 24 hours; however, this was found to be unnecessarily long. Current practice is to patch the child for 30-60 minutes.

Hint: Determining which of the two subtypes is present is done via an exam maneuver performed in the initial evaluation of a child with divergence-excess intermittent XT, that being…
Re-measurement of the magnitude of the deviation at both distance and near after prolonged monocular occlusion.
Why must the deviation be re-measured after prolonged monocular occlusion?
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Hint: Determining which of the two subtypes is present is done via an exam maneuver performed in the initial evaluation of a child with divergence-excess intermittent XT, that being… Re-measurement of the magnitude of the deviation at both distance and near after prolonged monocular occlusion.
Comitant Exotropia

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Occluding one eye for an extended period allows TPF (if present) to dissipate. Upon re-measurement after prolonged monocular occlusion, if the magnitude of the XT>XT' difference is unchanged, the pt has a true divergence-excess XT. But if the magnitude after occlusion is less than 10Δ, the pt has pseudo-divergence-excess XT.

Re-measurement of the magnitude of the deviation at both distance and near after prolonged monocular occlusion

Hint: Determining which of the two subtypes is present is done via an exam maneuver performed in the initial evaluation of a child with divergence-excess intermittent XT, that being…
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Remember this?

So in essence, Pseudo-divergence-excess XT is like Basic XT, but with tenacious proximal fusion leading to the false impression of a significant near-vs-distance difference in deviation size.

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**Comitant Exotropia**

How close do the distance and near measurements have to be for an intermittent XT to qualify as 'basic'? **Less than 10Δ difference**
Why must the deviation be re-measured after prolonged monocular occlusion?

To determine whether a phenomenon called **tenacious proximal fusion** (TPF) is the cause of the distance vs near disparity in deviation size. TPF represents a ‘proximal fusion aftereffect’--a tendency for the fusional convergence induced by near vision to persist. Because of TPF, attempts to break fusion-mediated convergence with an alternate-cover test may be unsuccessful, and initial measurements will produce the incorrect impression that the near deviation is significantly less than the distance deviation. **Occluding one eye for an extended period allows TPF (if present) to dissipate.**

Upon re-measurement after prolonged monocular occlusion, if the magnitude of the XT>XT’ difference is unchanged, the pt has a **true divergence-excess XT**. But if the magnitude after occlusion is **less than 10Δ**, the pt has **pseudo-divergence-excess XT**.

**Remember this?**

**So in essence, Pseudo-divergence-excess XT is like Basic XT, but with tenacious proximal fusion leading to the false impression of a significant near-vs-distance difference in deviation size.**

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**How close do the distance and near measurements have to be for an intermittent XT to qualify as ‘basic’?**

**Less than 10Δ difference**
In true divergence-excess XT, what is the underlying mechanism of the XT vs XT’ disparity?
Comitant Exotropia

Exodeviations

Intermittent

XT > XT'

‘Divergence excess’

Two subtypes

True divergence-excess XT

XT ≈ XT'

‘Basic XT’

Pseudo-divergence-excess XT

XT < XT'

‘Convergence insufficiency’

Constant

Congenital

Sensory

In true divergence-excess XT, what is the underlying mechanism of the XT vs XT’ disparity? This has not been completely elucidated, but in at least half of cases the cause seems to be...
In true divergence-excess XT, what is the underlying mechanism of the XT vs XT’ disparity? This has not been completely elucidated, but in at least half of cases the cause seems to be high AC/A ratio.
Comitant Exotropia

Exodeviations

Intermittent Constant 'XT'

'Convergence insufficiency'

'Divergence excess'

Two subtypes

True divergence-excess XT

Pseudo-divergence-excess XT

In true divergence-excess XT, what is the underlying mechanism of the XT vs XT' disparity? This has not been completely elucidated, but in at least half of cases the cause seems to be a 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. For some individuals, the 'factory setting' of the AC/A ratio is too high, so their eyes over-converge when they accommodate. Because near vision elicits more accommodation than distance vision, their eyes are significantly less exotropic at near.
Comitant Exotropia

Exodeviations

Intermittent Constant 'XT'

'Divergence excess'

Two subtypes

True divergence-excess XT

Pseudo-divergence-excess XT

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Comitant Exotropia

Exodeviations

Intermittent Constant 'XT'

'Convergence insufficiency'

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True divergence-excess XT

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**Comitant Exotropia**

**Exodeviations**

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**Intermittent Constant 'XT'**

- **Divergence excess**
  - In true divergence-excess XT, there is an underlying mechanism for the XT vs XT’ disparity. This has not been completely elucidated, but in at least half of cases the cause seems to be a high AC/A ratio.

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

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**XT > XT’**

- True divergence-excess XT
- Pseudo-divergence-excess XT

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*Note: The AC/A ratio is a measure of how much the eyes converge or diverge in response to accommodation.*
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Exodeviations

Intermittent Constant

'Basic

XT’

Convergence

insufficiency

102

XT > XT’

‘Divergence

excess’

Two

subtypes

True
divergence-

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Pseudo-
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What is the AC/A ratio?
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In true divergence-excess XT, what is the underlying mechanism of the XT vs XT’ disparity? This has not been completely elucidated, but in at least half of cases the cause seems to be high AC/A ratio.
Comitant Exotropia

Exodeviations

Intermittent Constant 'XT' 'Convergence insufficiency'

XT > XT'

'Divergence excess'

Two subtypes

True divergence-excess XT

Pseudo-divergence-excess XT

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, so their eyes over-converge when they accommodate. Because near vision elicits more accommodation than distance vision, their eyes are significantly less exotropic at near.

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

--A?
Diopters

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

In true divergence-excess XT, what is the underlying mechanism of the XT vs XT’ disparity? This has not been completely elucidated, but in at least half of cases, the cause seems to be high AC/A ratio.
**Comitant Exotropia**

**Exodeviations**

Intermittent Constant 'Basic XT'

'Convergence insufficiency'

**'Divergence excess'**

Two subtypes

True divergence-excess XT

Pseudo-divergence-excess XT

1. **XT > XT**'

2. **XT < XT**'

In true divergence-excess XT, what is the underlying mechanism of the XT vs XT' disparity?

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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, so their eyes over-converge when they accommodate. Because near vision elicits more accommodation than distance vision, their eyes are significantly less exotropic at near.

What are the units for:

-- AC? Prism diopters
-- A? Diopters

In true divergence-excess XT, what is the underlying mechanism of the XT vs XT' disparity?

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Comitant Exotropia

Exodeviations

Intermittent Constant 'XT'

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'Divergence excess'

Two subtypes

True divergence-excess XT

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

What is a normal AC/A?

high AC/A ratio

In true divergence-excess XT, what is the underlying mechanism of the XT vs XT' disparity? This has not been completely elucidated, but in at least half of cases the cause seems to be high AC/A ratio.
Comitant Exotropia

Exodeviations

Intermittent Constant XT

VT > VT'

‘Divergence excess’

Two subtypes

True divergence-excess XT

Pseudo-divergence-excess XT

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, so their eyes over-converge when they accommodate. Because near vision elicits more accommodation than distance vision, their eyes are significantly less exotropic at near.

What are the units for:

--AC? Prism diopters
--A? Diopters

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

In true divergence-excess XT, what is the underlying mechanism of the XT vs XT’ disparity? This has not been completely elucidated, but in at least half of cases the cause seems to be a high AC/A ratio.
Comitant Exotropia

Exodeviations

XT > XT’
‘Divergence excess’

Two subtypes

True divergence-excess XT
Pseudo-divergence excess XT

In true divergence-excess XT, what is the underlying mechanism of the XT vs XT’ disparity? This has not been completely elucidated, but in at least half of cases the cause seems to be high AC/A ratio.

What is the AC/A ratio?

How is the AC/A ratio measured?

AC/A ratio = \((XT' \text{ without add} - XT' \text{ with add}) / 3\)

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

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Comitant Exotropia

Exodeviations

**Intermittent Constant XT**

- XT > XT'
- ‘Divergence excess’

**True divergence-excess XT**

**Pseudo-divergence-excess XT**

Two subtypes

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

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 XT is divided by 3 (the power of the add); the result is the child’s AC/A ratio.

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

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

In true divergence-excess XT, what is the underlying mechanism of the XT vs XT’ disparity?

This has not been completely elucidated, but in at least half of cases the cause seems to be high AC/A ratio.
Comitant Exotropia

Exodeviations

Instead of formally calculating the AC/A ratio, some strabismologists simply note how much the XT’ increases with the 3D add, and use a value of $\#\Delta$ as the cutoff for concluding that a child has a high AC/A ratio.

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 increased by 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 XT is divided by 3 (the power of the add while gazing at a near 33 cm target). The child is then re-measured while wearing a 3D add; the result is the child’s AC/A ratio.

$$\text{AC/A ratio} = \frac{\text{XT’ with add} - \text{XT’ without add}}{3}$$

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

What are the units for:

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

In true divergence-excess XT, what is the underlying mechanism of the XT vs XT’ disparity?
This has not been completely elucidated, but in at least half of cases the cause seems to be 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. For some individuals, the ‘factory setting’ of the AC/A ratio is too high, so their eyes over-converge when they accommodate. Because near vision elicits more accommodation than distance vision, their eyes are significantly less exotropic at near.

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

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$\text{AC/A ratio} = \frac{\text{XT’ with add} - \text{XT’ without add}}{3}$

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

Instead of formally calculating the AC/A ratio, some strabismologists simply note how much the XT’ increases with the 3D add, and use a value of $\#\Delta$ as the cutoff for concluding that a child has a high AC/A ratio.

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 increased by 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 XT is divided by 3 (the power of the add while gazing at a near 33 cm target). The child is then re-measured while wearing a 3D add; the result is the child’s AC/A ratio.

$\text{AC/A ratio} = \frac{\text{XT’ with add} - \text{XT’ without add}}{3}$

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

In true divergence-excess XT, what is the underlying mechanism of the XT vs XT’ disparity?
This has not been completely elucidated, but in at least half of cases the cause seems to be high AC/A ratio.
Comitant Exotropia

Exodeviations

Instead of formally calculating the AC/A ratio, some strabismologists simply note how much the XT’ increases with the 3D add, and use a value of 20Δ as the cutoff for concluding that a child has a high AC/A ratio.

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 with +3D addition, the addition of which should obviate any accommodative effort on the part to see a target at 33 cm. The change in XT is divided by 3 (the power of the add) to get a near deviation at 33 cm.

\[
\text{AC/A ratio} = \frac{\text{XT’ with add} - \text{XT’ without add}}{3}
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Instead of formally calculating the AC/A ratio, some strabismologists simply note how much the XT’ increases with the 3D add, and use a value of 20Δ as the cutoff for concluding that a 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

In true divergence-excess XT, what is the underlying mechanism of the XT vs XT’ disparity? This has not been completely elucidated, but in at least half of cases the cause seems to be high AC/A ratio.
Comitant Exotropia

Exodeviations

Intermittent Constant 'XT'

'Divergence excess'

XT > XT'

Two subtypes

True divergence-excess XT

Pseudo-divergence-excess XT

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

How is the AC/A ratio measured?

The gradient method is probably the most commonly-employed technique in clinical practice. The child 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 XT is divided by 3 (the power of the add); the result is the child’s AC/A ratio.

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In true divergence-excess XT, what is the underlying mechanism of the XT vs XT' disparity?

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What are the units for:

- AC? Prism diopters
- A? Diopters

What is a normal AC/A?

Around 3:1 to 5:1

In true divergence-excess XT, what is the underlying mechanism of the XT vs XT' disparity?
Comitant Exotropia

Exodeviations

Why is a high AC/A ratio a component of an esotropia?

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

Yes

How is it 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 XT is divided by 3 (the power of the add); the result is the child's AC/A ratio.

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What are the units for:

- AC? Prism diopters
- A? Diopters

What is a normal AC/A?

Around 3:1 to 5:1

In true divergence-excess XT, what is the underlying mechanism of the XT vs XT' disparity?

Two subtypes

True divergence-excess XT

Pseudo-divergence-excess XT

XT > XT'

‘Divergence excess’
Comitant Exotropia

Exodeviations

In true divergence-excess XT, what is the underlying mechanism of the XT vs XT’ disparity? This has not been completely elucidated, but in at least half of cases, the cause seems to be a high AC/A ratio.

What is the AC/A ratio? The AC/A ratio is a measure of the quantitative relationship between the amplitude of convergence (AC) and the amount of accommodation (A). 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.

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AC/A ratio = (XT’ without add - XT’ with add)/3

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

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

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

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

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

In true divergence-excess XT, what is the underlying mechanism of the disparity? This has not been completely elucidated, but in at least half of cases, the cause seems to be a high AC/A ratio.
Comitant Exotropia

Exodeviations

Intermittent Constant XT

Convergence insufficiency

XT > XT’
‘Divergence excess’

Two subtypes

True divergence-excess XT

Pseudo-divergence excess XT

Can a high AC/A ratio be a component of an esotropia?
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Is high AC/A ratio more likely to be associated with ET, or with XT?
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What is a normal AC/A?
Around 3:1 to 5:1

How is the AC/A ratio measured?
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In distance vision, their eyes are significantly less exotropic at near.

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, so their eyes over-converge when they accommodate. Because near vision elicits more accommodation than distance vision, their eyes are significantly less exotropic at near.
Comitant Exotropia

Exodeviations

Intermittent Constant 'XT'

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‘Divergence excess’

Two subtypes

True divergence-excess XT

Pseudo-divergence-excess XT

XT > XT’

In true divergence-excess XT, what is the underlying mechanism of the XT vs XT’ disparity? This has not been completely elucidated, but in at least half of cases the cause seems to be 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. For some individuals, the ‘factory setting’ of the AC/A ratio is too high, so their eyes over-converge when they accommodate. Because near vision elicits more accommodation than distance vision, their eyes are significantly less exotropic at near.

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 XT is divided by 3 (the power of the add); the result is the child’s AC/A ratio.

AC/A ratio = (XT’ without add - XT’ with add)/3

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

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

Yes

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

ET (by a lot)

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)

What are the units for:

--AC? Prism diopters

--A? Diopters

What is a normal AC/A?

Around 3:1 to 5:1
Comitant Exotropia

Exodeviations

Intermittent Constant

XT > XT'

‘Divergence excess’

Two subtypes

True divergence-excess XT

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Around 3:1 to 5:1
Comitant Exotropia

Exodeviations

**XT > XT’**

‘Divergence excess’

Two subtypes

- True divergence-excess XT
- Pseudo-divergence-excess XT

- ‘Basic XT’
- ‘Convergence insufficiency’

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Comitant Exotropia

Exodeviations

Intermittent Constant

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Comitant Exotropia

Exodeviations

Intermittent

- $XT > XT'$: 'Divergence excess'
  - True divergence-excess XT
  - Pseudo-divergence-excess XT
- $XT ≈ XT'$: 'Basic XT'
- $XT < XT'$: 'Convergence insufficiency'
  - Two subtypes

Constant

- Congenital
- Sensory
Comitant Exotropia

Exodeviations

Intermittent

- $XT > XT'$: 'Divergence excess'
- $XT \approx XT'$: 'Basic XT'
- $XT < XT'$: 'Convergence insufficiency'

Two subtypes:
- True divergence-excess XT
- Pseudo-divergence-excess XT

Constant

- Congenital
- Sensory

Low AC/A ratio XT
Isolated convergence insufficiency
Comitant Exotropia
Exodeviations
Intermittent Constant
‘Basic XT’
‘Convergence insufficiency’

$XT > XT'$

‘Divergence excess’
True divergence-excess XT

$XT \approx XT'$
‘Basic XT’
Pseudo-divergence-excess XT

$XT < XT'$

‘Convergence insufficiency’
Low AC/A ratio XT

Congenital
Isolated convergence insufficiency

Sensory

Compared to pts with other forms of intermittent XT:
--Are isolated CI pts more likely or less likely to be older at presentation?

More likely. They usually present as teens or adults.

Smaller; the typical pt will be ortho at distance.

Smaller; frequently, they will have an X’.

That’s a good question! With their larger XT’, you might expect a pt with one of the other intermittent XT conditions to report diplopia; however, they usually enjoy the benefit of a diplopia-blocking suppression scotoma, while CI pts do not. Thus, the CI pt is probably more likely to experience diplopia.
Comitant Exotropia

Exodeviations

Intermittent Constant 'XT'

Convergence insufficiency

\[ TX > TX' \]

'Divergence excess'

True divergence-excess XT

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Pseudo-divergence-excess XT

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Low AC/A ratio XT

Isolated convergence insufficiency

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Comitant Exotropia

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'Convergence insufficiency'

XT > XT' 'Basic XT'

True divergence-excess XT

XT ≈ XT'

Pseudo-divergence-excess XT

XT < XT'

Low AC/A ratio XT

Two subtypes

Isolated convergence insufficiency

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Low AC/A ratio XT

Two subtypes

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Comitant Exotropia

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Comitant Exotropia

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Compared to pts with other forms of intermittent XT:

\[ XT > XT' \]

‘Divergence excess’

True divergence-excess XT

\[ XT \approx XT' \]

‘Basic XT’

Pseudo-divergence-excess XT

\[ XT < XT' \]

‘Convergence insufficiency’

Low AC/A ratio XT

Isolated convergence insufficiency

Congenital Sensory
Comitant Exotropia

Exodeviations

Intermittent Constant

'Basic XT'

'Convergence insufficiency'

Compared to pts with other forms of intermittent XT:

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'Convergence insufficiency'

Low AC/A ratio XT

Two subtypes

Isolated convergence insufficiency

Congenital

Sensory
Comitant Exotropia

**Exodeviations**

- **Intermittent Convergent Excess**
- **Intermittent Convergent Insufficiency**

### Compared to pts with other forms of intermittent XT:

- **Are isolated CI pts more likely or less likely to be older at presentation?**
  - More likely. They usually present as teens or adults.

- **Is the XT in isolated CI typically larger, or smaller?**
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- **Is the XT' in isolated CI typically larger, or smaller?**
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- **Is the isolated CI pt more likely or less likely to c/o diplopia at near?**
  - That's a good question! With their larger XT', you might expect a pt with one of the other intermittent XT conditions to report diplopia; however, they usually enjoy the benefit of a diplopia-blocking suppression scotoma, while CI pts do not. Thus, the CI pt is probably more likely to experience diplopia.

<table>
<thead>
<tr>
<th>XT &gt; XT'</th>
<th>XT ≈ XT'</th>
<th>XT &lt; XT'</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Low AC/A ratio XT</td>
</tr>
</tbody>
</table>

- **Congenital Sensory**

### Diagram

```
XT > XT'  XT ≈ XT'  XT < XT'  Congenital  Sensory
   'Divergence excess'  'Basic XT'  'Convergence insufficiency'
   True divergence-excess XT  Pseudo-divergence-excess XT  Low AC/A ratio XT

Two subtypes: Isolated convergence insufficiency
```
Comitant Exotropia

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### XT > XT'

- ‘Divergence excess’
- True divergence-excess XT
- Pseudo-divergence-excess XT

### XT ≈ XT'

- ‘Basic XT’

### XT < XT'

- ‘Convergence insufficiency’
- Low AC/A ratio XT
- Isolated convergence insufficiency
- Two subtypes
Comitant Exotropia

Compared to pts with other forms of intermittent XT:
--Are isolated CI pts more likely or less likely to be older at presentation?

How do isolated CI pts present?

XT > XT’

‘Divergence excess’

True divergence-excess XT

XT ≈ XT’

‘Basic XT’

Pseudo-divergence-excess XT

XT < XT’

‘Convergence insufficiency’

Low AC/A ratio XT

Two subtypes

Isolated convergence insufficiency

Compared to pts with other forms of intermittent XT:
--Are isolated CI pts more likely or less likely to be older at presentation? More likely. They usually present as teens or adults.
--Is the XT in isolated CI typically larger, or smaller? Smaller; the typical pt will be ortho at distance.
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--Is the isolated CI pt more likely or less likely to c/o diplopia at near? That’s a good question! With their larger XT’, you might expect a pt with one of the other intermittent XT conditions to report diplopia; however, they usually enjoy the benefit of a diplopia-blocking suppression scotoma, while CI pts do not. Thus, the CI pt is probably more likely to experience diplopia.

How do isolated CI pts present?

Usually with complaints revolving around difficulty performing near work (eg, reading; computer work)

What do they complain of?

Asthenopic symptoms—eye strain/fatigue; blurry vision; headache. Some will report diplopia.

What is the classic finding on exam?

A remote near point

How is isolated CI managed?

Orthoptic exercises (ie, ‘pencil pushups’) are first-line treatment. Some pts may require base-out prisms.

Rarely, bilateral medial-rectus resections are indicated.
Comitant Exotropia

Compared to pts with other forms of intermittent XT:
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Low AC/A ratio XT
Two subtypes

Isolated convergence insufficiency

Comenceal
Sensory

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Isolated convergence insufficiency

Two subtypes

Congenital
Sensory
Comitant Exotropia

**Exodeviations**
- **Intermittent**
- **Constant**
- ‘Basic XT’
- **Convergence insufficiency’

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*What is the classic finding on exam?*

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**XT > XT’**  **XT ≈ XT’**  **XT < XT’**

Currently, no power.

---

**Congenital**  **Sensory**

- Rarely, bilateral medial-rectus resections are indicated.

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Congenital

Sensory

Two subtypes
Comitant Exotropia

Exodeviations

Intermittent Constant 'Basic XT' Convergence insufficiency

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Exodeviations
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Exodeviations

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Pseudo-divergence-excess XT

$XT < XT'$

‘Convergence insufficiency’

Two subtypes

Low AC/A ratio XT

Isolated convergence insufficiency

Constant

Congenital

Sensory

Note that the BCSC Peds book (in my possession) refers to these as Convergence Weakness Exotropia.
Comitant Exotropia

**Exodeviations**

- **Intermittent**
  - $XT > XT'$
    - 'Divergence excess'
      - True divergence-excess XT
    - 'Basic XT'
      - Pseudo-divergence-excess XT
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    - Low AC/A ratio XT
  - $XT < XT'$
    - 'Convergence insufficiency'
      - Two subtypes
      - Isolated convergence insufficiency

- **Constant**
  - Congenital
  - Sensory

Speaking of the BCSC Peds book--it does not delve into the Low AC/A ratio subtype, so neither will we here.