

#### Approach to Double Vision

- History
- Monocular Diplopia
- Physical Examination
- Paretic vs Restrictive Diplopia
- Comitant vs Incomitant Deviations
- Localization

#### History

- Blurred vision vs double vision?
- Intermittent or constant?
- Closing one eye eliminates the double vision?
- Worse at when looking at distance vs at near?
- Worse in a particular position of gaze?
- Associated... Pain? Swelling? Redness? Numbness? Other neurologic symptoms?
- History of.... Malignancy? Trauma? Thyroid disease? Generalized weakness?

#### Monocular Diplopia

- Usually due to abnormalities of refractive media
  - Uncorrected astigmatism
  - Corneal irregularities e.g. keratoconus
  - Tear film abnormalities
  - Cataract
- Can also be due to retinal pathology e.g. fluid, hemorrhage, fibrosis
- Ghost images, haloes, more than two images
- Monocular diplopia that resolves with pinhole confirms
  optical cause

#### **Physical Examination**

- External exam: redness, swelling, obvious proptosis?
- Extraocular movements:
- Each eye individually (ductions)
- Both eyes together (versions)



#### **Physical Examination**

- Ptosis?
- Anisocoria?



### **Physical Examination**

Alignment Measurements:
 Hirschberg





# Physical Examination

Alignment Measurements:
 <u>Maddox Rod testing</u>



# Paretic vs Restrictive Diplopia

- Common causes of restrictive eye disease
  - Thyroid eye disease
  - Orbital trauma
  - Prior eye surgery
- Reduced saccadic speed in paretic etiologies
- Forced ductions shows limitation in restrictive etiologies

#### Comitant vs Incomitant Deviations

• Comitant

- More commonly due to congenital vs early onset strabismus
- May not experience diplopia due to suppression of one eye
- Incomitant
  - More often acquired
  - Usually causes diplopia



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#### Nuclear causes of diplopia

- CN III nucleus → may affect or spare both upper eyelids and may affect the contralateral superior rectus muscle
- CN VI nucleus → horizontal gaze palsy



#### One and a half syndrome

Horizontal gaze palsy (PPRF or CN VI nucleus) + INO (MLF)



#### Infranuclear causes of diplopia

- Brainstem often affects many structures, presenting with other neurologic symptoms
- Subarachnoid segment often microvascular
- Also consider
- Myasthenia gravis
- Giant cell arteriti
- Neoplasm (compressive or infiiltrative)

# CN III palsy

- Pupil involvement? → must rule out posterior communicating aneurysm
- Complete vs Partial?
  - Complete and pupil sparing ightarrow GCA vs microvascular
  - Partial and pupil sparing → must rule out aneurysm



### CN IV palsy

- 3 step test
- Congenital large vertical fusional amplitudes and head tilt
- Acquired trauma, microvascular, GCA



# CN VI palsy

- Older adults Microvascular
- Younger adults trauma, high ICP, posteriorly draining C-C fistula



#### More than one CN involved

- Cavernous sinus, superior orbital fissure CN III, IV, V, VI, sympathetic fibers
  - Tolosa Hunt idiopathic inflammatory
  - Carotid Cavernous sinus fistula
- Neuromusclar junction
  - Myasthenia Gravis

# Myopathic, Restrictive, Orbital causes of diplopia

• Thyroid eye disease – restrictive strabismus



- Post-traumatic entrapment, paresis
- Orbital myositis idiopathic inflammation of the muscles
- Post-surgical extraocular muscle fibrosis

#### Other

- Chronic Progressive External Ophthalmoplegia
- Neoplasm
- Brown syndrome limited upgaze with adduction
- Heavy eye syndrome, Sagging eye syndrome esotropia and hypotropia in high myopes with staphylomatous globes or older patients

# Esodeviations in children

- Congenital
- Accommodative
  Refractive
  - Partially
  - accommodativeHigh ACA ratio
- Non accommodative
  - Basic
- Cyclic, q24-48 hours
- Sensory
- Diverger

- insufficiency
- Primary vs Secondary to
- pontine tumor, increased ICP
- Spasm of near reflex
- Consecutive
- CN VI palsy
- Medial rectus
  restriction



# Exodeviations in children

- Intermittent exotropia
- Convergence weakness
- Infantile exotropia
- Sensory
- Consecutive