Examination of Cranial Nerves 3, 4, 6 for **Diplopia:**

Definition of diplopia: Seeing 2 separate images of the same object in visual space

Approach:

1. Determine if diplopia is **monocular** or **binocular:**
   a. Cover one eye at a time and see if diplopia persists with only one eye open – if it does it is monocular diplopia
      i. Ddx: refractive errors, abnormalities of cornea, lens, cataracts; psychogenic (conversion disorder, Munchausen); central cause (rare – usually polyopia present) → ophtho referral
   b. If diplopia only present with both eyes open = binocular
2. Once you determine it is **binocular** (and assuming normal acuity and fields)
   a. Look for clues to the etiology with **INSPECTION**
      i. Bony abnormalities – trauma (#, hematoma, edema)
      ii. ST abnormalities – periorbital soft tissue infection, infiltration (amyloid), proliferation (GRAVES disease) causing proptosis
      iii. Ptosis - Consider Myasthenia Gravis or 3\textsuperscript{rd} nerve palsy if you see ptosis associated with diplopia
      iv. position of the eye and head:
         1. Pupil down and out 3\textsuperscript{rd} nerve palsy
         2. Head tilt away from side of 4\textsuperscript{th} nerve lesion; hypertropia of eye
   b. Examination of the pupils:
      i. Pt. looks at an object at intermediate distance
      ii. Examine pupils for size, shape, equality
      iii. Test the direct and consensual light reflex (relies on CN 2 afferent limb and CN 3 for the efferent limb)
         1. DM pupil: reduced SNS small, poor dilation in dark; reduced PNS sluggish rxn to light
         2. Full 3\textsuperscript{rd} nerve: dilated pupil with partial ptosis
         3. Argyl Robertson: small at rest, accommodates to near but doesn’t respond to light (DM, neurosyphilis, neurosarcoid, Lyme)
         4. Tonic Pupil: unilateral, dilated, not responsive to light (trauma, Zoster, idiopathic = Adie’s Pupil)
      iv. Test accommodation to near focus
         1. Start 30 cm away and come toward nose
         2. Should converge and constrict
         3. Focus = smooth m. of ciliary body stim’d to change shape of lens (convex), and pupil constricts (both mediated by parasympathetic component of CN 3)
         4. Inability to implies midbrain lesion
c. Eye Movements:
   i. Voluntary movements up down right left – gross abN’s
   ii. Hat pin 30 cm from face in “H”
   iii. Pt to say when 2 images present, and when max separation
   iv. 2 images side by side? Or on top of eachother?
   v. Cover one eye: does outside (further) image go away?
      1. If YES, the covered eye is the one with the problem
      2. If NO, cover the other eye and outside image should go away.
   vi. Determine which muscle is in use (in the affected eye)
   vii. Which nerve supplies that muscle

CN Palsy’s:

Full 3rd nerve: dilated pupil with ptosis, ophthalmoplegia, and resting position
of pupil is down and out and unreactive to direct light and accommodation

Trauma (ipsilateral brainstem herniation), idiopathic
Central causes: vascular lesions or tumor in the brainstem
Peripheral causes: compressive lesions (PCom aneurysm, tumor, meningitis,
orbital lesions (tolosa-Hunt syndrome = painful lesions of CN 3, 4, 6 and V1 in
superior orbital fissure)), and ischemia or infarct (arteritis, DM, migraine)

Partial 3rd nerve: usually seen with DM (ischemia) – pupil spared

* pupillomotor fibers travel at periphery – in ischemia, they are spared. In
  compression they are first hit.

4th nerve: superior oblique – ask pt to look in and down. May observe head tilt
away from lesion.
Isolated lesion rare – usually trauma or idiopathic

6th nerve: failure of lateral movement, convergent strabismus (MR takes over),
and diplopia worse on lateral gaze.

Bilateral lesions: trauma, Wernicke’s, mononeuritis multiplex, increased ICP
Unilateral lesions: trauma, idiopathic, central (vascular lesion, tumor), or
peripheral (DM)

Internuclear Ophthalmoplegia: lesion of the MLF which is responsible for
conjugate lateral gaze. See jerky nystagmus of the abducting eye, and inability
of the other eye to adduct. There is normal accommodation proving that CN 3 is
in tact (MR). #1 cause MS. In the elderly = vascular disease.
(left frontal area → right 6th nerve nucleus → MLF to left 3rd nerve nucleus