Diplopia

[ ] **Monocular** (monocular if diplopia present even when only 1 eye open) vs [ ] **Binocular** (binocular only when both eyes open)

Causes	
Monocular diplopia usually d/t something distorting light through eye to retina	**Binocular diplopia** usually d/t disconjugate alignment of eyes
cataract	CN palsy (3rd, 4th, 6th)
corneal shape problems (keratoconus)	Myasthenia gravis
uncorrected refractive error (usually astigmatism)	Orbital infiltration (e.g. thyroid infiltrative ophthalmopathy, orbital pseudotumor)
other: corneal scarring, dislocated lens, malingering	Other causes: CVA affecting pons/midbrain; compressive lesion (aneurysm, tumor); idiopathic; inflammatory/infectious (sinusitis, cavernous sinus thrombosis, abscess); Wernicke's ; orbital myositis; trauma (fracture, hematoma); tumors near base of skull/sinuses/orbits; botulism; GBS/Miller-Fisher; MS

Key points
Isolated pupil-sparing nerve palsy with no other s/s may resolve spontaneously
Do imaging if any red flags
Focal weakness in any muscle may indicate neuromuscular problem

If painful, think of the following:
Compressive lesion/tumor/aneurysm
Sinusitis/abscess/cavernous sinus thrombosis
Orbital myositis
Trauma (fracture/hematoma)
Skull base tumors (pain often unrelated to eye movement)

Red Flags
>1 cranial nerve deficit
Pupillary involvement
Other neurologic s/s alongwith diplopia
Pain
Proptosis

History	
monocular vs binocular?	gait difficulties (CN 8)
intermittent or constant?	difficulty with bladder control (MS)
images separated horizontally or vertically or a combination of both?	weakness/sensory abnormalities (intermittent or constant)
vision changes? (CN2)	N/V/diarrhea (botulism)
numbness of forehead/face/cheek (CN5)	swallowing or speech difficulties (CN 9, 12)
facial weakness (CN 7)	palpitations, heat insensitivity, weight loss (Graves' disease)
dizziness (CN 8)	PMH: HTN, DM or both (risk factors for CVA)
hearing loss (CN 8)	PMH: alcohol abuse (Wernicke's)

Eye Exam	
Visual acuity (each eye separately, then both together to determine if monocular or binocular)	Fundoscopy? (cataract, lens displacement, retina, disc)
Bulging/proptosis?	EOMs (mild paresis may not be evident on exam)
Ptosis?	Rest of Neuro exam findings:
Pupillary abnormalities?	Pupillary abnormality on convergence?
Disconjugate eye movements?	Goiter? (Graves')
Nystagmus?	Pretibial myxedema on shins (Graves')
If diplopia in 1 direction of gaze: place red glass over one eye – the image that is more peripheral is from paretic eye so if peripheral image is red, the red glass is over paretic eye	If no red glass, have patient close one eye: the paretic eye is the one that when closed causes the more peripheral image to disappear

Management/workup:	
If monocular diplopia:	Refer to Ophthalmology
Binocular:	If unilateral, single cranial nerve palsy, normal pupillary reflexes, no other s/s: observe w/o testing for a few weeks. Most will resolve spontaneously. Ophthalmology evaluation +/-
	If other s/s, usually will need imaging (CT/MRI – do not do MRI if intraocular metallic foreign body suspected) – do STAT if suspecting infection, CVA, tumor/aneurysm
	If s/s thyroid disease, do TSH, fT4
	intermittent diplopia: test for MG or MS

Specific findings/clues to etiology:	
Ptosis, eye deviated laterally and down, +/- pupillary dilation	CN 3
Vertical diplopia worse on downward gaze (patient will tilt head to improve vision)	CN 4
Eye deviated medially, diplopia worse on lateral gaze, patient turns head to improve vision	CN 6
Intermittent diplopia	MG or MS or unmasking of latent phoria (eye deviation)
INO: on horizontal gaze, there is weak adduction on affected side (cannot adduct past midline) and nystagmus of contralateral eye. Affected eye will converge normally	MLF lesion (MS)
Older patient, DM, HTN, atherosclerosis	CVA
Sudden pain/headache	Aneurysm
Constant pain, sometimes fever or systemic complaints, facial sensory changes, proptosis	Infection/inflammatory lesions including abscess/cavernous sinus thrombosis
H/o alcohol abuse, ataxia, confusion	Wernicke's
Exophthalmos, eye pain/irritation, photophobia, goiter, pretibial myxedema	Graves' disease
Constant eye pain worsening with eye movement, corneal injection, proptosis	Orbital myositis
H/o or s/s of trauma	Trauma/hematoma/fracture
Pain unrelated to eye motion, unilateral proptosis, other neurologic s/s	Tumors
GI s/s, descending weakness, other cranial nerve dysfunction, dilated pupils, normal sensation	Botulism
Ataxia, reduced reflexes	GBS, Miller-Fisher
Intermittent s/s, migratory neuro s/s, paresthesias, visual disturbance, urinary dysfunction, INO	MS
Intermittent diplopia, ptosis, bulbar s/s, weakness that worsens on repetition	MG
No other manifestations other than diplopia	Idiopathic, r/o infiltrative tumors of extra-ocular muscles