CONTENTS

1) NEURO

A) Sensory

DDX of assymptomatic disc swelling

- normal retina; normal vision
- noted by MD

1) Ý ICP
2) ß IOP or acute Ý IOP
3) Ý intraorbital pressure (orbital tumors)
4) Ý systemic CO2
5) hyperopia
6) o.n. drusen
7) disc hamartoma (eg. astrocytoma)

Ddx of symptomatic disc edema

A) *Vascular*
1) AION
2) CRVO
3) malignant hypertension
4) benign papillophlebitis (minimal symptoms)
5) diabetic papillopathy (minimal symptoms)

B) *Inflammation*
1) papillitis (optic neuritis)
2) uveitis
3) Leber's idiopathic stellate neuroretinitis

C) *Raised orbital pressure*
1) TRO
2) orbital tumor

D) *Raised ICP*
1) tumor
2) IIH

E) *O.N. tumors*
1) glioma
2) meningioma

F) *Infiltration*
1) leukemia
2) lymphoma
3) myeloma
4) granuloma (sarcoid, TB)

G) *Infectious*
1) toxocara of disc
2) TB
3) toxoplasma
4) CMV
5) Lyme disease

H) *Other*
1) trauma

Optic disc drusen associations

1) angioid streaks
2) RP
3) chronic papillitis/optic atrophy
4) chronic glaucoma (COAG)
5) vascular occlusions (drusen occlude)
6) with phacomatoses (giant drusen)
7) idiopathic (most common) - some AD

DDx of swollen disc with otherwise normal eye exam

- swollen nerve and rest normal; decreased vision

1) optic neuritis (M.S.)
2) diabetic papillopathy
3) LISN (Leber's idiopathic stellate neuroretinitis)
4) AION
5) benign papillophlebitis (normal recovery)

* see above optic neuritis

DDx unilateral optic atrophy

A) *Neoplastic*
1) glioma
2) meningioma
3) craniopharyngeoma
4) pit adenoma (post fixed)?
5) treated leukemia of ON

B) *Inflammatory*
1) optic neuritis
2) trauma

C) *Vascular*
1) AION
2) old CRAO
3) old CRVO

D) *Infectious*
1) syphilis

E) *Pressure*
1) ACG episode
2) COAG
3) old papilledema

F) *Other*
1) Leber's optic atrophy

ON collaterals (optociliary shunt)

- more correctly “acquired cilioretinal veins” or “optociliary anastomoses” (vein to vein)
- “optociliary shunts” is a misnomer (not artery to vein)

A) *Head Squishing*
1) CRVO/BRVO ** common (vein to vein)
2) COAG
3) chronic papilledema
4) ON drusen

B) *Nerve Squishing*
1) ON meningioma (espec. optic canal)
2) ON glioma (rare)
3) any orbital or intracranial tumor (theoretically)
4) ON arachnoid cyst
5) craniosynostosis (optic canal narrowed)
6) ON sarcoidosis (granuloma)

Ddx of nonarteritic AION (normal ESR) or optic neuritis

A) *Vascular*
1) idiopathic (small cup:disc)
2) temporal arteritis (normal ESR)
3) sickle cell anemia

B) *Inflammation*
1) optic neuritis
2) SLE
1) sarcoid

C) *Infectious*
1) HZV
2) HSV
3) CMV
4) Syphilis

Ddx PION

A) *Vascular*
1) temporal arteritis
2) post CABG

B) *Inflammation*
1) syphilis
2) retrobulbar neuritis

C) *Other*
1) radiation

DDx of optic neuropathy

- bilateral central or centrocecal scotomas

A) *Inflammatory*
1) optic neuritis - see above

B) *Vascular*
1) AION

C) *Toxic*
i) *Meds*
- 4 are TB meds
1) Isoniazid
2) Rifampin
3) Ethambutol
4) Streptomycin
5) Chloramphenicol
6) Quinine

ii) *Nutritional*
1) tobacco-alcohol
2) thiamine (B1?) deficiency
3) B12 deficiency
4) folate deficiency

iii) *Toxins*
1) methanol
2) lead

D) *Hereditary*
1) A.D. (Kjer)
2) A.R. (Behr’s)
3) x-linked
4) mitochondral (Leber’s)
5) syndromic (assoc. with DM, DI, ataxia)

E) *Infectious*
1) TB
2) syphilis

F) *Pressure*
1) papilledema

ON thickening on CT

A) *Kids*
1) glioma - kids
2) RB (kids)
3) leukemia

B) *Adults*
1) meningioma (train track) - adults
2) mets
3) OID
4) sarcoid
5) papilledema
6) ARN

VF defects

A) *Altudinal*
1) AION
2) optic neuritis
3) hemiretinal vein occlusion
4) hemiretinal artery occlusion

5) RD
6) bilateral occipital infarcts

B) *Arcuate (NFB)*
i) *Retina*
1) vascular occlusion
2) juxtapapillary retinochoroiditis
3) RD
4) Retinoschisis
5) myopia with perip. atrophy
6) atypical RP
ii) *ON head*
1) glaucoma
2) ON drusen
3) ON head pits
4) colobomas
5) AION
6) chronic papilledema
7) optic neuritis
8) hypotensive episode
iii) *Optic nerve lesion (rare)*
1) meningioma
2) chiasmal lesions: pituitary adenoma
iv) *Other*
1) prominent nose

C) *Binasal*
i) *Retina*
1) atypical RP
2) schisis
3) vascular occlusion (2 vessels)
4) juxtapapillary retinochoroiditis
5) myopia with perip. atrophy
ii) *ON Head*
1) glaucoma
2) disc drusen
3) chronic papilledema
iii) *Chiasm*
1) tumor
2) aneurysm (compressing both o.n. or the chiasm)

D) *Bitemporal*
I) *chiasmal lesion*
1) pit. adenoma
2) meningioma
3) craniopharyngioma
4) aneurysm
5) glioma
II) *other*
1) tilted discs
2) nasal RP
3) dermatochalasis
4) refractive error

E) *Cecocentral*
1) tobacco/alcohol
2) nutritional amblyopia
3) toxic (see earlier)
4) optic nerve pit
5) any lesion that causes central scotoma

DDx of constricted VF
A) *Nerve problems*
1) disc drusen
2) chronic papilledema
3) glaucoma
4) peripheral optic neuritis (syphilis)

B) *Retina problems*
1) retinoschisis
2) RD
3) RP
4) choroidemia
5) PRP
6) CRAO with cilioretinal artery sparing

C) *Medications (retina)*
1) quinine
2) thioridazine
3) salicylates
4) carbon monoxide poisoning

D) *Optical*
1) aphakic with ring scotoma
2) cortical cataract
3) rim artifact
4) wrong perscription
5) on miotic

E) *Other*
1) malingerer
2) bilateral occipital infarcts with macular sparing

DDx of Large ON
1) coloboma
2) ON pit
3) morning glory syndrome
4) megalopapilla
5) ON edema

6) ON drusen
7) Aicardi's syndrome - x-linked

LGN
ipsilateral: 2,3,5
contralateral: 1,4,6

Findings in optic nerve drusen
1) caucasians only
2) peripapapillary hemorrhage
3) SRNV
4) pseudopapilledema
5) autofluorescence
6) bilateral in 80%

Ddx of transient visual obscurations (less than 24 hours; usually < 1 hour)
Seconds:
1) papiledema (usually bilat.)
2) ON drusen
3) GCA
4) glaucoma

<10 Minutes:
1) amaurosis fugax (unil.)
2) vertebrobasilar insufficiency (bilat.)
3) orthostatic hypotension
4) ocular ischemic syndrome

10-60 minutes:
1) migraine

Other:
1) impending CRVO
2) o.n. tumor
3) optic neuritis (Uthoff's)
4) AION
5) CNS lesion

Classified Anatomically
A) *Nerve*
1) papilledema (usually bilat.)
2) ON drusen
3) GCA
4) glaucoma
5) optic neuritis (Uthoff's)
6) AION
7) optic nerve tumor
B) *Retina*
1) amaurosis fugax (unil.)
4) ocular ischemic syndrome
3) impending CRVO
C) *CNS*
1) migraine
2) vertebrobasilar insufficiency (bilat.)
3) orthostatic hypotension
4) CNS lesion

Non-ocular causes of photophobia
- all irrtate CNS, nerves or meninges
1) migraine
2) meningitis
3) retrobulbar optic neuritis
4) subarachnoid hemorrhage
5) trigeminal neuralgia

Decreased vision with normal fundus in adults
A) *Nerve*
1) retrobulbar optic neuritis
2) optic neuropathy
B) *Retina*
1) cone dystrophy
2) rod monochromatism
3) Stargardt's
C) *Other*
1) non-physiologic loss

ON hypoplasia
A) *Maternal causes*
1) alcohol
2) LSD
3) quinine
4) phenytoin
5) DM in pregnancy
B) *Fetal causes*
1) aniridia
2) idiopathic
3) deMorsier's
4) congenital CMV
5) hydrocephalus
6) brain structure anomalies (anencephaly)

Pseudotumor (IIH) Associations
1) obesity
2) COPD
3) otitis media
4) nonspecific infections (post-viral)
5) pregnancy?
6) radical neck dissection

A) Associated with Medications
1) Vit A (isoretinoin?)
2) tetracycline
3) nalidixic acid
4) corticosteroids
5) lithium (Duanes')
6) amiodarone (new) (Duanes')
7) danazol (androgen) (new) (Duanes')

Causes of ON demyelination
- have increased VER latency
1) Vit B12 defic.
2) Parkinson's
3) MS

Signs of optic disc edema
A) *Mechanical signs*
1) elevation of ON head
2) blurring of disc margins
3) filling in of physiologic cup
4) peripapillary NFL edema
5) retinal choroidal folds

B) *Vascular signs*
1) hyperemia
2) venous dilation
3) peripapillary hemorrhages
4) hard exudates
5) cotton wool spots

B) Pupils

DDx of internal ophthalmoplegia

A) *Orbital*
1) orbital apex syndrome (any cause)
2) mucormycosis
3) post-trauma
4) post retrobulbar
5) post-Botox
B) *Ocular*
1) post-PRP

DDx of light - near dissociation

1) syphilis
2) Adie's
3) Parinaud's syndrome
4) myotonic dystrophy
5) diabetics
6) aberrant third nerve regeneration
7) primary systemic amyloidosis

Argyll Roberston pupil associations

- lesion: aqueduct of Sylvius
1) syphilis
2) DM → pupil neuropathy
3) alcoholism
4) MS
5) encephalitis
6) degenerative disorders (CNS)
7) sarcoid ?

Signs of Argyll Robertson pupil

1. Visual function grossly intact
2. Decreased pupillary light reaction
3. Intact near response
4. Miosis
5. Pupils irregular
6. Bilateral, asymmetric
7. Poor dilation
8. Iris atrophy variable

DDx of Tonic pupils (DDx of Adie's)

A) *Inflammatory*
1) idiopathic (Adie's)
2) Guillaine Barre
B) *Infectious*
1) HZV
2) syphilis
3) orbital infection
C) *Vascular*
1) temporal arteritis
2) diabetes
D) *Other*
1) orbital trauma
2) alcohol

Bilateral Tonic Pupils

1) DM
2) alcohol
3) cancer associated dysautonomia
4) amyloidosis associated dysautonomia
5) Riley Day syndrome (familial dysautonomia)

Adie's characteristics

1) light near dissociation
2) poor tendon reflexes
3) poor response to Atropine

Causes of Parinaud's

1) pinealoma
2) ischemia
3) metastatic tumor
4) MS
5) hydrocephalus

Paradoxical Pupils (dilate in light)

- normal light is too much for these eyes to handle
A) *Common causes*
1) CSNB (most common)
2) achromatopsia
3) O.N. hypoplasia
B) *Rare causes*
i) *Retina*
1) Leber's congenital amaurosis (kid RP)
2) RP
3) albinism
4) cone dystrophy
5) Best's disease
ii) *Optic nerve*
1) amblyopia
2) optic neuritis
3) dominant optic atrophy

Anisocoria

A) *eye miotic*
1) on miotic in 1 eye
2) physiologic anisocoria
3) Horner's
4) syphilis (Argyll Robertson)

5) iritis
6) longstanding Adie's
7) episodic spasm of the iris sphincter
B) *eye dilated*
1) pharmacologic (adrenergics, mydriatics)
2) 3rd nerve palsy
3) Adie's
4) damage to ciliary ganglion
5) physiologic
6) iris spincter damaged (trauma)
7) episodic unilateral mydriasis

Aneurysms
1) posterior comm. artery: most common with eye signs (15% of all aneurysms)
2) anterior comm. artery: 50% of all aneurysms

Drugs which cause mydriasis
1) LSD
2) amphetamines
3) cocaine
4) marijuana
5) mescaline
6) carbamazepine

Drugs which cause miosis
1) narcotics (pinpoint)

Pupil size
1) Relaxed (sleep, coma): miosis
2) excited (seizure): dilates

Pupil Reflexes
1) lateral gaze: abducting eye dilates
2) forced lid closure: constricts
3) ciliospinal reflex: pain → dilate
4) loud sound: dilate

Lesions in Horner's
A) *First order* (between pons? And sympathetic chain (C7-T2)
- numbness, ataxia, nystagmus, weakness
1) vascular occlusion (lat medullary syndrome)
2) vertebrobasilar insufficiency
3) tumors
4) cervical disc disease

B) *Second order* (between sympathetic chain in upper thorax and the superior cervical ganglion in the upper neck - through stellate ganglion)
- trauma, cough, hemoptysis, neck swelling
1) apical lung tumors
2) thyroid tumors
3) chest surgery
4) thoracic aortic aneurysms
5) trauma to brachial plexus (eg birth trauma)
6) sympathetic chain tumors (neuroblastoma in kids)

C) *Third order*
- signs: anesthesia over V1, V2 +/- V3
1) upper neck tumors
2) carotid artery surgery
3) compressive tumors on carotid
4) spontaneous dissection of carotid
5) cavernous sinus tumor invasion by nasopharyngeal carcinoma
6) cluster headaches
7) Raeder's paratrigeminal syndrome
8) migraines
9) Tolosa Hunt
10) congenital Horner's ? (upper neck trauma?)

C) Motor

Ddx of External Ophthamoplegia

A) *Central*
1) CPEO
2) progressive supranuclear palsy (S-R)
3) migraine
4) myotonic dystrophy
5) Huntingdon's disease
6) Wilson's disease
7) olivopontocerebellar atrophy
8) PPRF lesions
9) Parkinsons's disease (late)
10) Alzheimer's disease (late)
11) ataxia-telangiectasia
12) Whipple's disease
B) *Subarachnoid space*
1) Guillaine Barre (Miller Fisher variant)
2) carcinomatous meningitis
3) meningioma
B) *Cavernous Sinus/ SOF*
1) cavernous vein thrombosis
2) cavernous sinus tumor (carcinoma)
3) mucormycosis
4) pituitary apoplexy or adenoma
5) OID of cavernous sinus (Tolosa Hunt)
6) A-V fistula
7) TB, sarcoid
8) metastases
9) lymphoma
C) *Orbit/EOM's*
1) orbital pseudotumor
2) orbital cellulitis
3) mucormycosis
4) orbital tumors (primary and mets)
5) myasthenia

Classification of Nystagmus

1) Congenital
a) sensory
b) motor
2) Acquired (most types)
3) Induced (eg MS)
4) With related conditions
- jerk nystagmus: problem is slow phase; fast phase is correcting movement

Congenital Nystagmus

1) congenital motor
- have null point
- no oscillopsia
- dampens with convergence
- improves with age
- remains horizontal in downgaze and upgaze
treatment:
a) Kestenbaum procedure
b) contact lenses

2) manifest latent
- towards uncovered eye
- seen with strabismus

Acquired Nystagmus (cranial → caudal)

VSCAVRUPD
Very Suddenly, Canadians Are Very Rigid;
Grumpy Until the Province (quebec) Departs
1) voluntary: cerebral origin
- rapid
- unsustained
- induced by convergence

2) see-saw: chiasmal lesions (diencephalon/thalamus)
- pendular, torsional

3) convergence retraction: dorsal midbrain (mesencephalon)
- signs of Parinaud's

4) ataxic or "dissociated" (mesencephalon/pons) (MLF)
- INO (in Abducting eye)

5) vestibular (pons)
- jerk type, +/- rotatory
- central and peripheral types

6) gaze evoked (posterior fossa)
- in field of gaze
- not present in primary gaze
causes: CPA tumor, drugs

7) rebound (cerebellum)
- seen on return to primary gaze

8) upbeat (medulla, cerebellum)
- deficit in upward pursuit
- present in primary gaze
- causes: tumors, drugs (phenytoin)

9) periodic alternating (medulla or craniocervical jxn)
- occurs during sleep
- lesions: demyelinating, vascular

10) downbeat (cervico-medullary jxn)
- deficit in downward pursuit
- present in primary position
- worse in horizontal and downgaze
- better in upgaze
- causes: - Arnold-Chiari malformation, MS, alcohol abuse, spinocerebellar degeneration, B12 defic., anticonvulsants, lithium

Nystagmus which remains horizontal in upgaze and downgaze
1) congenital motor
2) vestibular
3) periodic alternating nystagmus

Causes of Uniocular Nystagmus
1) MS (INO) - abducting eye
2) spasmus nutans - some
3) chiasmal gliomas
4) SO myokymia

Nystagmus Blocking Syndrome
1) horizontal nystagmus
2) variable eso
3) nystagmus greater whan abducting eye fixes
4) nystagmus less when adducting eye fixes
5) head turn towards fixing eye
6) maybe associated with CNS pathology
7) Tx. Recession of MR with post. fixation suture

Congenital Motor Nystagmus
1) uniplanar, pendular, conjugated
2) decrease with convergence
4) increases with fixation (eg. chart)
5) latent nystagmus assoc
6) inverted OKN
7) no oscillopsia
8) stops during sleep
9) binocular
10) head oscillation
11) null point (some cases)
12) head towards fast phase - Polomeno (doesn't make sense)

Latent Nystagmus
1) beats towards uncovered eye
2) diminished visual acuity
3) assoc. with infantile ET

Cerebellar disease signs
1) opsoclonus
2) square wave jerks
3) ocular dysmetria (saccades)
4) ocular flutter
5) rebound nystagmus
6) upbeat nystagmus
7) past pointing
8) jerky pursuit
9) skew deviation
10) saccadic intrusions?
11) can't overide VOR?

DDx of Opsoclonus
1) cerebellar disease
2) neuroblastoma
3) breast cancer

DDx of facial twitching
- basal ganglia is the center for involuntary eyelid closure (affected in Parkinson's, antipsycotics)
- do CT or MRI for all (for exams)
A) *Local*
1) essential blepharospasm - basal ganglia; bil.
2) hemifacial spasm - CN 7 in CPA; unilateral
3) facial myokymia; unilateral; CN 7 nucleus
4) facial tic (habit spasm)
5) lid myokymia
6) tic douloureux - in response to CN 5 pain
4) focal cortical seizures (cortical facial region)
B) *Systemic Diseases*
1) Parkinson's (b.g.)
2) tardive dyskinesia (b.g.)
3) Huntingdon's chorea (b.g.)
4) Tourette's syndrome
5) meningeal irritation
C) *Other*
1) corneal irritation (reflex blepharospasm)
2) hypocalcemia

Initial upgaze palsy
1) Parinaud's

Initial downgaze palsy
1) Parkinson's
2) CVA

3) Steele Richardson (PSNP)

Causes of fourth nerve palsy
1) congenital (see pediatric causes)
2) trauma
3) hydrocephalus
4) vascular (CVA)
5) vascular loops
6) tumor (glioma)
7) carcinomatous meningitis

Causes of sixth nerve palsy
A) *General*
1) hydrocephalus
2) vascular (HTN, DM, GCA)
3) demyelinating
4) alcohol encephalopathy (Wernicke-Korsakoff)
6) trauma
7) mastoid infections (Gradenigo's)
B) *Tumors*
i) gliomas (central)
ii) meningiomas (SA space)
iii) chordoma (clivus)
iv) accoustic neuroma (CPA)
v) nasopharyngeal carcinoma (cavernous sinus)
C) *Syndromes*
1) Duane's
2) Moebius

Pediatric nerve paresis causes
1) trauma
2) tumors
3) migraine
4) meningitis (during and after)
5) post infectious (eg. viral)
6) post vaccination

Pediatric brain tumors
1) glioma (ON, brain stem, chiasm)
2) astrocytoma
3) ependymoma
4) medullobalstoma

D) Treatments

CN 3 palsy due to aneurysm
1) pupil involved in 95%
2) pain always present
3) younger patients

CN 3 palsy due to ischemia
1) older patients
2) intense pain often present
3) resolve in 12 weeks
4) pupil involved in 5%

Treatment of CN 3 palsy
A) seems nuclear or fascicular on physical
1) MRI or at least high-resolution CT

B) if accompanying meningeal signs or other cranial nerve involvement even if pupil spared
1) LP
2) CT with and without contrast
3) cerebral angio

C) if localized to cavernous sinus on exam
1) MRI with contrast

D) all patients 10 - 50 years old (without vascular risk factors?)
1) complete neurologic evaluation
2) cerebral angiogram

E) patients > 50 with isolated, pupil-sparing, complete third-nerve palsy
1) ESR
2) CBC
3) glucose tolerance test
4) BP
5) observe Qday x 5 days for evidence of pupillary involvement then Q 6 weeks

F) patient > 50 with isolated complete oculomotor nerve palsy with pupillary involvement
1) CBC, ESR, glucose tolerance
2) MRI
3) cerebral angiography

G) patient > 50 years old with a incomplete third-nerve palsy, pupil spared
1) CBC, ESR, glucose tolerance
2) MRI
3) cerebral angiography (probably)

H) any patient with incomplete third nerve palsy and pupil involved
1) MRI
2) angio

I) kids < 10 years old
1) probably migraine
2) angio controversial (aneurysms rare)

Treatment of CN 6 palsy
1) CBC
2) ESR
3) FU Q 6 weeks

Indications for ONSF in IIH (Jakobiec)
1) development of a new visual field defect
2) enlargement of a previously existing field defect
3) presence of severe visual loss in one or both eyes at the time of first examination

Treatment of SO myokimia
1) tegretol (carbamazepine)
2) inderal (propanolol)

Treatment of hemifacial spasm
1) Tegretol
2) Baclofen
3) Janetta procedure
4) Botox

Treatment of facial myokymia
1) Tegretol (carbamazepine)
2) Dilantin (phenytoin)

Treatment of benign essential blepharospasm
1) haloperidol
2) clonazepam
3) Botox
4) selective facial nerve sectioning
5) extirpation of lid protractors (not done)

Treatment of IIH
1) CT/MRI
2) diagnostic LP (> 250 mm H2O)
3) D/C problem meds
4) lose weight, decrease sodium intake

5) Diamox
6) Lasix: 80 mg/ day
7) repeat LP
8) optic nerve fenestration
9) migraine treatment for HA before VPS
10) VP shunt

Treatment of optic neuritis
- MRI if available
- If 2 lesions (periventr. abnorm. > 3 mm) or more (67% have less than 2):
1) IV prednisolone: 250 mg IV Q 6h x 3 days
2) po steroids: 60-80 mg po Qday x 11 days
- may delay onset of MS, but does not affect chance of developing MS
- no change in vision long term (faster recovery)

Myasthenia Tests (Neil Miller)
1) Tensilon (edrophonium) IV; 2mg then observe for 60 seconds; then 8 mg
2) Prostigmin test (neostigmine) IM in kids; works in 45 minutes
3) sleep test - sleep 1 hour
4) ice test - ice to lids
5) EMG
6) relax in hallway ith eyes closed 10-15 minutes

Physical Exam
1) lid lag
2) look up at finger for 1 minute; see if ptosis worsens or diplopia develops
3) pupils should be normal
4) swallowing

Workup of Myasthenia
1) MRI - head
2) serum anti ACh antibodies
3) EMG
4) CT chest for thymoma (all)
5) TFT's

Treatment of myasthenia (Neil Miller)
1) nothing
2) anti-cholinesterase meds (Mestinon, Prostigmine)
3) thymectomy
4) steroids
5) immunosupression
6) plasmapharesis
7) surgery (lids, muscles) - rare

Treatment of traumatic optic neuropathy (Jakobiec)
I) *Anterior type*
- edematous nerve head
- dilated retinal veins
II) *Posterior type*
- normal nerve head
- medical treatment should be instituted as soon as the diagnosis is made; it should not be withheld while awaiting neuroimaging studies
Direct injury: bone or f.b. impinging nerve
Indirect: no bone or f.b. seen
Traumatic:
- vision can be from 20/40 (Spoor) to NLP for treatment
A) *Initial treatment*
1) methylprednisolone: 2g loading dose, followed by 1g every 6 hr for 3 to 5 days
(most common side effect of high-dose corticosteroid treatment is cardiac arrhythmia)
2) taper with oral steroids for 7-10 days (follow daily)
B) *Later treatment*
- if delayed loss of vision develops while on high-dose corticosteroids or during tapering of corticosteroids then a compressive lesion is assumed
- do imaging:
1) lateral canthotomy or orbital drainage (if have orbital soft tissue swelling or subperiosteal hematoma comprimising nerve)
2) optic nerve sheath fenestration (for an intrasheath optic nerve hematoma)
3) decompression of the optic canal (if neuroimaging shows the presence of bone fragments or foreign bodies impinging on the optic nerve; if no such lesions are seen, surgical intervention is controversial)

Treatment of Meningioma
- will grow slowly (vs. glioma which may not grow)
1) CT
2) if ON tumor grows towards chiasm, consider surgical resection
3) mifepristone (RU 486) - experimental

Meds for Migraines
A) *During Attack*

1) sumatriptan ? (serotonin)
2) ergotamine compounds
3) caffeine compounds
4) NSAIDs
B) *Prophylactic*
2) beta blockers
3) calcium channel blockers
4) amitryptiline (anti-depressant)
5) NSAIDs
C) *Avoid*
1) alcohol
2) cheese
3) chocolate
4) BCP

Types of Headaches with no signs on exam
1) migraine
- common
- classic
- complicated
2) tension
3) cluster (type of migraine)
4) Raeder's trigeminal
5) trigeminal neuralgia
6) glossopharyngeal neuralgia
7) carotodynia
8) TMJ syndrome
9) HZV -pre or post breakout

2) PEDIATRICS
A) Non-strabismus
DDx of ophthalmia neonatorum
A) **normal vaginal flora**
1) Candida
2) staph
3) coliforms
4) strep
5) acinobacter
6) strep pneumo
7) H.flu

B) **abnormal vaginal flora**
1) gono
2) chlamydia
3) HSV

C) **Other**
1) chemical (silver nitrate)

time:
chemical < 24 hours;
gono 1-3
herpes 1-5 days
chlamydia: 5-14 days

Corneal leukoma in infants
A) *Descemet's/endothelium*
1) congenital glaucoma
2) forceps injury
3) Peter's
4) posterior ulcer (Von-Hippel)
5) posterior keratoconus
6) CHED
B) *Stromal*
1) sclerocornea
2) MPS/ML
3) CHSD
4) limbal dermoids
5) cystinosis?
6) NF?
C) *Infectious*
1) ToRCHS (HSV, rubella, syphilis)
2) neonatal ulcer (gono)

Ddx of Leukocoria (white pupil)
1) PHPV (small eye)
2) RB (6-18 months)
3) toxocara (young child)
4) Coat's (child)
5) ROP
6) coloboma
7) cataract
8) RD
9) retinal dysplasia
10) uveitis
11) myelinated nerve fibers
12) other tumors
13) vitreous hemorrhage
14) morning glory disk
15) Norrie's disease
16) FEVR
17) combined hamartoma

Lesions which mimic RB on retina exam
1) astrocytic hamartoma
2) retinocytoma
3) toxocara (young child)
4) Coat's (child)
5) combined hamartoma
6) PHPV
7) RD
8) retinal dysplasia
9) active toxoplasmosis
10) medullepithelioma

Ddx of pediatric glaucoma
1) congenital glaucoma
2) ectropion uvea
3) Sturge Weber
4) rubella (serology)
5) neurofibromatosis (rarely)
6) Lowe's syndrome (urine aa)
7) Axenfeld/ Rieger's/ Peter's
8) trauma
9) syphilis
10) aniridia
11) PHPV

Cataract + glaucoma
1) rubella
2) Lowe's
3) PHPV

Periorbital ecchimosis
1) trauma
2) neuroblastoma
3) leukemia

corneal diameter in infants: 10 mm

investigate diameters < 9 and > 11

Forms of CSNB
1) AD, AR, and X-linked with normal fundus
2) Oguchi's disease
3) fundus albipunctatus

Associations with foveal hypoplasia
1) albinism
2) aniridia
3) amaurosis (Leber's)
4) achromatopsia
5) CSNB
6) PHPV
7) ON hypoplasia?

VH in children
1) trauma
2) retinoschisis
3) PHPV
4) ROP
5) Coat's
6) pars planitis
7) coag. disorder
8) RB
9) Eales'

Hyphemas in kids
A) *Neoplastic*
1) JXG
2) RB
3) medulloepithelioma
B) *pupilary or retrolental vasculary mb:*
1) PHPV
2) ROP
3) Coat's
C) *Other*
1) HSV
2) HZV
3) trauma
4) severe iritis
5) coag. Disorder

Sx for hyphema
—corneal blood staining
—total hyphema
—IOP > 50 for > 5 days
—total hyphema > 50% after 6 days with IOP > 25
—day 4 best for AC washout
—express clot with Healon
—I/A ± vitrector
—± trabeculectomy

Stages of ROP
no ROP: no demarcation line
1: demarcation line
2: ridge
3: ridge with NV
4: subtotal RD
5: total RD

Zones in ROP
Zone 1: 30 degree radius circle around disc (2x disc-macula distance)
Zone II: Zone I to nasal ora

ROP cryo study
Indications for treatment:
1) Stage 3 (ridge with NV)
2) plus disease
3) 5 contiguous or 8 total clock hours
4) zone 1 or 2
Treatment reduces unfavorable outcome risks (RD, fixed macular folds)

who to screen for ROP:
1) BW < 1500 g (AAO says 2000 and got oxygen)
2) GA < 36 weeks (AAO) (normal GA is 40 weeks) - Bloom says 30 weeks
3) first exam 4-6 weeks post-gestation (after birth) or at 30 weeks total (later of the two)

Risk of Threshold ROP
1) < 750g: 15%
2) 750-1000: 7%
3) 1000-1250: 2%

To Dilate:
1) cyclopentalate 0.2% (max 0.5%)
2) phenylephrine 1%

Follow up for ROP:
1) no ROP : Q4 weeks until retina vascularized or Stage 1?
2) stage 2 ROP: Q2 weeks until retina vascularized
3) stage 2 + or stage 3 prethreshold: Q 1 week (earlier if have "plus", known as "rush" disease)

4) Threshold: cryo within 72 hours
85% have spontaneous regression

- All eyes have a complete eye exam at 3 months corrected age (when macula is developed)

Laser for ROP
1) easier to treat posteriorly
2) less trauma to eye
3) easier for patient
4) done in ICU vs OR?
5) less myopia?

Note:
1) gestational age: since LMP (40 weeks or 280 days)
2) fertilization age: since ovulation (38 weeks or 266 days total)

Sequelae of ROP
1) RD
2) myopia
3) cataract
4) macular dragging
5) glaucoma

Poor vision and normal fundus in infant
- do ERG to confirm
1) Leber's (10% of cases)
2) achromatopsia (rod monochromatism)
3) blue cone monochromatism
4) CSNB
5) cortical visual impairment ("blindness")
6) delayed visual maturation

Nystagmus in infant
A) *Motor*
1) congenital motor nystagmus
2) NBS
3) spasmus nutans
4) thalamic injury
B) *Sensory*
1) congenital cataract
2) albinism
3) Leber's congenital amaurosis
4) aniridia
5) achromatopsia
6) TORCHS
7) glioma (O.N. or chiasm)
8) o.n. hypoplasia
9) congenital glaucoma
10) cornea leukoma

Microphthalmos associations
1) PHPV
2) isolated (nanophthalmos)
3) rubella
4) microphthalmos with cyst
5) trisomy 13

Disorders with defective DNA processing
1) xeroderma pigmentosum
2) Bloom's syndrome
3) Fanconi's anemia
4) Cockayne syndrome
5) ataxia telangiectasia

Congenital cataracts
A) *Bilateral*
1) sporadic (60%)
2) heriditary without syst. Assoc. (30%)
3) with syst. disease: 5%
4) with TORCHS: 3%
5) with other ocular abnormalities: 2%

B) *Unilateral*
1) sporadic: 80%
2) ocular abnormalities: 10% (PHPV)
3) traumatic: 10% (beware child abuse)

Chloral Hydrate in kids:
1) oral or suppository
2) sedation only
3) very slight resp. supression
4) good for children < 3 y.o.
5) monitor VS
6) dose: 50-100 mg/kg; repeat at half initial; dose if necessary
7) give on empty stomach

DPT (Demerol, Phenergan, Thorazine)
1) better for older children
2) sedation and anesthetia
3) good for painful procedures
4) used only when a pediatrician immediately available

Workup for Aniridia
1) family Hx, examine family

2) IOP + gonio (EUA if necessary)
3) BP (elevated in Wilm's)
4) Genetics and Peds referal
5) karyotyping (see if chrom. 11 deletion)
5) regular urinalysis and abdo. U/S Q3 months until age 5 (Wills says Q 6 months if karyotyping is normal)
6) IVP if U/S abnormal
7) regular pediatrician exam

B) Strabismus and visual development
Development Stages in Kids
Wright
1) birth:
- pupil response
- vestibular generated eye movements (VOR)
- OKN: present but slow and poor
- fixation present (1 study)
- conjugate horizontal gaze
2) 1 month
- stable alignment
3) 2 months
- fixation reflex(most studies): CSM refers to fixation
- saccades
- conjugate vertical gaze
- following (pursuit)
- OKN
- dampening of VOR
AAO
1) birth: blink reflex to light
2) 6 weeks: fixation and maintenance with "happy" response in expression
3) 2-3 months: interest in bright objects
4) first 4 months: disconjugate eye mvts

Signs of Poor visual dev't to parents
1) nystagmus (3 months)
2) wandering eye mvts
3) lack of response to familiar faces
4) staring at bright lights
5) oculodigital massge

Signs of Poor visual dev't to MD
1) poor light response
2) poor visual attention
3) inability to fix object

Tests of visual acuity in preverbal children (less than 2 years)
1) OKN
- 20/400 at birth
- 20/100 at 6 months
- 20/20 at 2 years
2) pattern VEP
- 20/400 at birth
- 20/20 at 6 months
3) preferential looking (Teller cards)
- 20/400 at birth
- 20/200 at 6 months
- 20/20 at 2 years

** difference may be from association visual areas developing more slowly
- first test monocular status then binocular status (binocular more sensitive to detect amblyopia)
4) dampening of VOR: after spinning in chair, nystagmus should stop in 30 seconds due to fixation reflex - young infants

Tests of acuity in verbal children
1) Allen cards (photos) - 3 years
2) Tumbling E - 5 years
3) Landolt C - 5 years
4) school age (5-6): Snellen letters

Stereopsis Tests
1) Titmus stereo acuity (polarized)
2) Randot stereograms
3) 2 pencil test

Diplopia tests (from most to least dissociating)
- 1 target
1) Maddox rod (most)
2) dark red filter
3) Worth 4 dot (lights out)
4) Worth 4 dot (lights on)
5) Bagolini lenses

Tests for supression + NRC vs ARC
1) Worth 4 dot
2) Bagolini striated lenses
3) vertical prism plus red filter over 1 eye ("does patient see 2 images?")
4) afterimage test:

note: here *crossed* afterimage is seen in ET with ARC (opposite of the usual)
5) amblyoscope

Tests to detect ocular alignment
A) *Cover tests*
1) cover/ uncover: detects tropia
2) alternate cover: total phoria + tropia
3) simultaneous cover: detects phoria
B) *light reflex tests*
1) Hirshberg
2) Krimsky
3) Bruckner
4) major amblyoscope (look at reflex)
C) *Dissimilar image tests* (diplopia)
- 1 target
1) Maddox rod
2) double (1R 1W) Maddox rod: torsions
3) red filter test
4) Bagolini lenses
D) *Dissimilar target tests* (haploscopic)
- 2 targets
1) Lancaster red-green test
2) Hess screen
3) Lees screen
4) amblyoscope

W4D:
far: 1.25 degrees
near (33 cm): 6 degrees

Test to detect amblyopia
1) 15 PD vertical prism:
- to detect amblyopia in straight eyes
- prism over 1 eye;
- breaks up central scotoma & periph. fusion complex
- Ques: does pt still maintain in CSM testing?

History of poor seeing child
1) pregnancy (meds, rads, cx., infections)
2) delivery (cx., trauma)
3) perinatal problems (oxygen, bradycardia, etc)
3) family history of vision problems
4) developmental stages of child

Krimsky reflex
1) pupil margin: 15 degrees (30PD)
2) between pupil and limbus: 30 degrees (60 PD)
3) at limbus: 40 degrees (80PD)

Causes of Chin Up (difficulty looking up)
1) Brown's
2) V pattern XT
3) A pattern ET
4) double elvator palsy
5) ptosis
6) torticollis
7) myasthenia
8) congenital nystagmus (null point in down gaze)

Anomalous head position:
A) *Ocular*
1) strabismus
- Duane's
- Brown's
- A and V patterns
- Ciancia
2) cong. nyst. with head position
3) orbital neoplasm
4) myasthenia
5) ptosis
B) *Systemic*
1) sternomastoid hypoplasia
2) cervical spine anomalies
3) decreased hearing

Types of Ambyopia
1) Strabismic (ET, XT, rarely X(T))
2) Monocular pattern
a) ametropic:
    - anisometropia
    - unil. astigmatism
b) media opacity
    - cataract
    - corneal opacity
    - vitreous hemorrhage
3) Binocular pattern
a) ametropic
    - bilateral high hypermetropia
    - astigmatic
b) media opacity
    - cataract
    - corneal opacity
    - vitreous hemorrhage

Traditional Classification of Amblyopia
1) strabismic

2) refractive: anisometropic, astigmatic, high hyperopia, high myopia
3) deprivation (occlusive or poor image)

Characteristics of Amblyopia
1) abnormal contour interaction
- "crowding" phenomenon
- ⇓ spatial summation
- ⇑ lateral inhibition
- ⇑ receptive fields

2) central depression (larger in anisometropic than strabismic)
3) RAPD in 10% (severe)
4) abnormal VEP, pERG
5) defect in accomodation
6) no effect from neutral density filter
7) eccentric fixation

Penalization Techniques
1) Atropine
- 0.5% atropine Qday to good eye
- full correction in bad eye
- works only in at least +3.00 hyperopes
- the greater the hyperopia, the greater the amblyopia that can be treated with this
- trial in office done with cyclogyl
2) overplussing good eye with glasses
3) patching
a) FTO:
- good for significant amblyopia with no fusion
- eg. constant strabismus
- examine every x weeks (x = patient's age)
- continue until no improvement for 2-3 months (Polomeno)
- risk of occlusion amblyopia until 5 years of age
b) PTO:
- good for mild moderate amblyopia with some fusion
- used for maintenence after FTO
- eg.
i) at home from school
4) patch taped to glasses
5) opaque contact lens
6) nail polish or tape to spectacle of good eye
** Note: always try optical correction before penalization
*** attempt trial of amblyopia until age 9
- for non-patching treatments in straight eyes, you should check to make sure "bad" eye becomes the fixating eye (eg. vertical prism test)

Prescribing glasses in kids
1) high hyperopes (> 5D?)
2) asinometropic hyperopia > 1D
3) bilateral astigmatism > 2.00 D
4) unilateral astigmatism (or diff) > 1.5 D
5) bilateral myopia > -10 D?
6) anisometropic myopia > 6 D

Total Hyperopia:
1) Manifest
a) absolute (need to see 20/20)
b) facultative (can add this and still see 20/20)
2) Latent (uncovered by drops)

Classification of Esodeviations
A) *congenital / infantile (< 6 months)*
1) essential esotropia ("congenital")
2) early onset accomodative
3) Duane's type I
4) nystagmus blocking syndrome
5) CN 6 palsy (or Moebius)
B) *acquired comitant*
1) high hyperopia
2) high ACA
3) mixed mechanism (ACA and hyperopia)
4) decompensated accomodative
5) cyclic ET
6) divergence insufficiency/paresis ** often associated with brain pathology - scan!
7) spasm of near reflex
8) esophoria (common)
C) *acquired incomitant*
1) LR weak (CN 6 palsy, slipped muscle)
3) MR restriction (#, TRO, postop)
D) *pseudostrabismus* (epicanthus)

Exotropia
A) *Intermittent XT*
1) basic type
2) divergence excess (XT at far)
true: still more XT at far with + 3.00 add at near
pseudo: same one + 3.00 is added
3) convergence insufficiency (XT at near) (CT head if complete convergence paralysis)
B) *Constant XT*
1) decompensated intermittent XT
2) congenital XT

3) sensory XT
4) craniofacial anomalies
C) *Incomitant XT*
1) Duane's type II
2) CN 3 palsy

Treatment of accomodative ET
1) cycloplegic refraction
2) give glasses (full time!) (if not wearing glasses well → atropine Qday to blur)
3) see 1 week later to make sure wearing glasses
4) see 8 weeks later → any better?
5) treat amblyopia
6) rerefract 1-2 months after glasses given (see if any change)
7) after amblyopia and glasses treatment, if ET> 10, then surgery

Treat high ACA
1) bifocals
2) if not wearing properly: atropine ointment with bifocals (for compliance)
3) PI (0.125%) Qday to cause accomodation (must stop 6 weeks before surgery)

Surgery for accomodative ET not fully corrected by glasses
1) treat with Fresnel prisms (BO) and then reexamine 2 weeks later
2) If deviation is now greater, give more prisms (patient "eats up" prisms)
3) continue this until no deviation with prisms
4) surgically treat full deviation with prism adds

Non-Surgical Treatment of (X)T
1) orthoptic treatment (fusional training, etc..)
2) treat amblyopia if present (rare)
3) minus lenses
4) alternating occlusion ??
5) BI prisms

Treatment of convergence insufficiency
1) orthoptic exercices to stimulate fusional amplitudes:
i) practice reading through BO prisms
ii) pencil pushups
iii) red filter, light and prism bar
iv) stereograms
2) BI prisms (tx)
3) MR resection (last resort)

Treatment of DVD
1) unil. SR recession (5-9mm)
2) bilat. SR recession (7-10 mm)
3) post. fixation (faden) sutures 12-15mm post. to insertion
4) IO anteriorization (with IOOA)

Treatment of DVD + IOOA
IO recession with anteriorization

Treatment of IOOA
1) IO recession (8, 10, 14 mm)
2) IO anteriorization
2) IO myectomy

Treatment of SOOA
1) silicone expander
2) SO tenotomy

Treatment of A pattern (>10 PD between 25 degrees upgaze and 25 degrees down gaze)
A) *With SOOA*
1) SO tenotomy
2) SO recession
3) silicone expander

B) *Minimal SOOA*
horizontal recti displacement: (MR ⇑; LR⇓)
i) ½tendon width: 15 PD
ii) full tendon width: 30 PD

Treatment of V pattern (>15 PD between 25 degrees upgaze and 25 degrees down gaze)
A) *with IOOA*
1) IO recession (8, 10, or 14mm)
2) IO myectomy
3) recession with anteriorization
4) IO extirpation
5) vertical recti transposition (not used today)

B) *Minimal IOOA*
i) horizontal recti displacement: (MR ⇓, LR⇑)
i) ½tendon width: 15 PD
ii) full tendon width: 30 PD

Treatment of SO palsy (Wright)

I) IO recession (if worse on upgaze) - corrects up to 15 PD vertic. deviation
II) SO tuck (for HT worse on down and in gaze or for bilateral SO palsy)
III) contralateral IR recession (for HT worse on downgaze; 3 PD correction per mm recession)
IV) ipsilateral SR recession (for HT worse on abduction or restricted downgaze on forced ductions)
V) Harado Ito: anteriorization of SO; for problem with excyclotorion but little vertical deviation
- NV: for 20-35 PD, do 2 muscles; for > 35 PD, do 3 muscles

Distinguishing DVD from IOOA
DVD:
1) is same in abduction and adduction
2) shows no hypotropia of opposite eye
3) does not have V pattern

Brown's causes:
1) idiopathic
2) JRA
3) sinusitis
4) trauma

Distinguishing Brown's from IOUA
Brown's:
1) involved eye is abducted with upgaze (IOUA would be adducted)
2) widened palpebral fissure on adduction
3) positive rotational forced ductions, especilally with retropulsion)

Treatment of Brown's
1) SO tenotomy with IO recession
2) SO spacer
3) IO weakening procedure

Treatment of IO paresis
1) SO tenotomy

Treatment of double elevator palsy (monocular elevation deficiency)
1) If tight IR: recession of IR 6-8mm
2) paretic elevation: Knapp procedure (MR and LR are transposed to edge of SR)

Treatment of CN 6 palsy
A) if some LR function
1) ipsil. LR rs + MR rc
2) contral. MR rc + posterior fixation (optional)
B) If no LR function: Jensen or Hummelsheim

Treatment of CN 3 palsy (eye is out and down)
1) large LR rc and MR rs with supraplacement
2) or for hypotropia: SO tenotomy or IR rc

Treatment of Duane's
1) ipsilateral MR recession
2) ipsilateral MR rc and LR rc
3) Faden suture to SR for leash phenomenon
4) splitting LR for leash phenomenon

Treatment of congenital nystagmus
1) Kestenbaum procedure: bilat rc/rs (see pseudonyms)

Tx of NBS
1) bilateral MR rc with Faden sutures

Complications of Strab surgery
A) *Intraop*
1) malignant hyperthermia or GA complic.
2) perforated globe
3) lost muscle
B) *Postop - Common*
1) pyogenic granuloma
2) hematoma
3) conjunctivitis
4) adults - diplopia (20% without adjustables, 2% with adjustables - Connolly)
C) *Rare - serious*
1) lost muscle
2) slipped muscle
3) orbital cellulitis

Indications for re-op post ET surgery
1) < 4 years: > 10 D (want binocularity)
2) > 4 years: > 15 D (cosmesis)

Treatment of post-op ET (surgery for XT)
1) wait, it should get better
2) BO prisms
3) + lenses for hyperopes
4) patching
5) Reop as last resort

Indication for X(T) surgery

1) increasing XT (size, frequency, duration) - indicates loss of fusion control and potential loss of binocularity
- if parents notice frequency increasing or if MD's examine demonstrates change
signs:
1) increasing measurements
2) remains XT after blink
3) XT easily elicited looking in distance or quick cover
4) worsening performance on stereopsis tests ? (mine)
Note: starts at distance and then develops at near

For strabismus onset after 10, patient may or may not be able to supress; to check:
1) prescibe Fresnel prism for 1 month
2) if after 1 month patient develops either fusion or supression (ie no diplopia), then postop diplopia is unlikely

Indications for Strabismus surgery
1) to gain fusion (kids)
2) to treat diplopia (adults)
3) cosmesis
4) to treat asthenopia (eg. intermittent exo)
5) head position

Surgical terms
1) myotomy: cut the muscle in completely
2) myectomy: cut out wedge of muscle to weaken
3) marginal myotomy: cut muscle incompletely (eg. to weaken rectus muscle that has been maximally recessed)
4) extirpation: for IO, to remove it

Numbers:
MR, SR, IR: 1mm gives 3 PD
LR: 1 mm gives 2 PD
horizontal effect: bilat. IO recession: 0 PD in primary, 15-25 PD in upgaze
horizontal effect: bilat SO tenotomy: 5-10 PD in primary, 30-40 PD in downgaze
bilat horiz. recti: 15 PD for ½width displacement

Indications for Botox
1) small to moderate angle ET or XT (< 40 PD)
2) acute paralytic strabismus
3) post-op residual strabismus
4) cyclic ET
5) diplopia when surgery contraindicated (eg. active TRO)

Three step Test for HT
1) HT greater on right or left (pair up SR-SO; IR-IO)
2) HT greater in ABD (IR-IO) or ADD (SR-SO)
3) HT greater in ipsitilt or contratilt

Maximum surgery for usual ET and XT
- can resect more than you can recess (slightly)
MR: Rc: 6 mm; Rs: 6 mm
LR: Rc: 7 mm; Rs: 9 mm

Exceptions
1) XT > 40 PD with profound amblyopia
2) cong. motor nystagmus: augmented

Kestenbaum
Rc MR: 5
Rs MR: 6
Rc LR: 7
Rs LR: 8

Minimum surgery (for 15 PD)
MR: Rc: 3mm; Rs: 3 mm
LR: Rc: 4mm; Rs: 4mm

Complications of Botox
1) diplopia
2) ptosis
3) retrobulbar hemorrhage
4) pupil dilation (ciliary ganglion)
5) scleral perforation
6) punctate keratitis?

3) PLASTICS

DDx of ulcerative blepharitis

A) Bacteria: staph, moraxella
B) virus: HZV
C) Fungus: candida
D) Parasites: dermatophytes (Demodex?)
E) Immune: lupus

DDx umbilicated lesions

A) Infectious: molluscum
B) benign: keratoacanthoma, trichofolliculoma, sebaceous hyperplasia
C) malignant: BCC, squamos cell CA

DDX pigmented lesions of skin of lid

1) nevus
2) malignant melanoma
3) BCC
4) seborrheic keratosis
5) actinic keratosis
6) SCC

BCC clinical types:

1) Nodular
2) Nodular/ ulcerative
3) cystic
4) morpheaform
5) pigmented

DDx of ptosis

A) *Neurogenic*
1) Horner's
2) IIIrd nerve palsy
3) 3rd nerve misdirection
4) Marcus-Gunn
B) *Aponeurotic*
1) involutional
2) post-op
3) blepharochalasis
4) post-trauma
C) *Mechanical*
1) scarring
2) dermatochalasis
3) tumors
4) edema
5) SR resection
6) GPC
D) *Myogenic*
I) congenital
a) simple
b) blepharophimosis syndrome
II) acquired
a) myotonic dystrophy
b) oculopharyngeal dystrophy
c) CPEO
d) post Botox
E) *Neuromyopathic*
1) myasthenia
F) *Pseudoptosis*
1) lack of posterior support
- enophthalmos
- microphthalmos
- phthisis
2) contralateral lid retraction or exophthalmos
3) hypotropia (pulls lid down)
4) dermatochalasis (both true and pseudoptosis)
5) eyelid tumor (chalazion, BCC)
6) eyelid edema
7) corneal disease

Ptosis with inflammation

A) *Neoplastic*
1) BCC
2) SCC
3) sebaceous CA
B) *Inflammatory - Lid*
1) chalazion
2) contact dermatitis
3) cellulitis
4) TRO?
5) IOD?
C) *GPC related*
1) CL
2) suture
3) prosthesis
4) vernal
D) *chronic conjunctivitis*
1) bacterial
2) chlamydial
3) drops

DDx of Congenital Ptosis

A) *Neuro*
1) jaw wink (Marcus Gunn)
2) CN 3
3) Horner's
4) migraine
5) CN 3 aberrant regeneration - CN 3
B) *Myogenic*
1) simple

2) myasthenia
C) *Associated with ocular syndromes*
1) blepharophimosis
2) double elevator palsy
D) *Aponeurotic*
1) congenital
2) traumatic

Floppy eyelid associations
1) obesity
2) keratoconus
3) eyelid rubbing
4) eyelid mechanical pressure
5) diabetes
6) sleep apnea

Eyelid swelling/edema
A) *Local causes*
1) aging (orbital fat herniation)
2) allergy
3) chalazion
4) orbital disease
5) dacryoadenitis (gland)
B) *Systemic causes* (edema)
1) heart disease
2) renal disease
3) hypothyroid
4) urticaria (allergy)
5) SVC synrome

Causes of canaliculitis
A) *Bacteria*
1) Actinomyces israelii
2) Nocardia
B) *Fungi*
1) candida
2) Aspergillus
C) *Virus*
1) HSV
2) HZV
D) chlamydia
- give Pen because besides actinomyces, rest are not bacteria and will resolve with hygene

Causes of acute dacryocystitis (sac)
A) Gram + (more common)
1) strep pneumo
2) staph aureus
3) beta hemol. strep
4) actinomyces?
- all respond to Cloxacillin
B) Gram -
1) pseudomonas
2) H flu (kids)
3) Proteus

Causes of chronic dacryocystitis (sac)
A) *Infectious*
1) strep pneumo
2) H. flu
3) TB
4) syphilis
B) *Infiltrative*
1) sarcoid
2) Sjogren's
3) lymphoid hyperplasia
4) lymphoma
5) SCC (blood in tears)
6) adenocarcinoma (see blood)

Causes of acute dacryoadenitis (gland)
A) *Viral*
1) EBV
2) mumps
3) HZV
4) influenza
B) *Bacterial* (secondary to conjunctivitis)
1) staph
2) gono
3) strep
C) *Inflammatory*
1) OID

DDx of chronic dacryoadenitis (gland)
1) Sjogren's
2) sarcoid
3) syphilis
4) TB
5) BRLH

DDx of lacrimal gland swelling
1) *non-epithelial* (>50%)
A) inflammatory
i) sarcoid
ii) OID
iii) Sjogren's
B) lymphoproliferative
i) BRLH
ii) lymphoma
2) *epithelial* (< 50%)

a) benign mixed (pleomophic adenoma): 50%
> 1 year, painless
b) rest (malignant): 50%
i) adenoid cystic (50%) - “cylindroma”; (swiss cheese appearance); < 1 year, pain
ii) malignant mixed
iii) adenocarcinoma
iv) mucoepidermoid
v) squamous?

Lacrimal sac tumors
1) squamous papilloma
2) SCC
3) adenocarcinoma

DDx of lymphatic dilations
1) lymphangiectasia
2) lymphangioma

Lymphoid rxns in orbit (same in conj.)
1) BRLH
2) Atypical lymphoid hyperplasia
3) lymphoma
4) lymphoplasmacytic proliferation
5) lymphangioma

DDx of EOM thickening
A) *Inflammatory*
1) TRO (muscle only)
2) OID (muscle and tendon)
B) *Infiltrative*
1) lymphoma
2) metastasis
3) lacrimal gland tumor into muscle
4) rhabdo
5) amyloid
C) *Vascular*
1) C-C fistula
2) A-V malformation
D) *Infectious*
1) trichinosis
E) Other
1) acromegaly? - like other tissues

DDx of EOM restriction
1) OID
2) Graves'
3) hemangiopericytoma
4) mets (esp. breast and lung)

Ddx of intermittent proptosis
1) sinus mucocele
2) dermoid cyst
3) lymphangioma (with URTI)
4) orbital inflammatory disease
5) TRO

Ddx of pulsating proptosis
1) C-C fistula
2) hypoplastic sphenoid; CSF into orbit
3) meningocele (meninges herniate)
4) encephalocele (brain herniates)
5) fractures of orbit ?
6) orbit surgery (transcranial orbitotomy)

Ddx of proptosis with crying or straining
1) capillary hemangioma
2) meningocele
3) encephalocele
4) orbital varices

DDx of congenital proptosis
1) meningocele
2) encephalocele
3) teratoma of orbit
4) capil. hemangioma (usually infancy, not cong.)
5) sphenoid hypoplasia

Ddx of rapid increase in proptosis
A) *Neoplastic*
1) rhabdomyosarcoma
2) mets (especially Ewing's)
3) leukemia (unil. or bilat.); A.L.L. #1
4) orbital neuroblastoma (unil. or bil.)
5) chloroma (leukemia)
6) Burkitt’s lymphoma
7) teratoma

B) *Ruptures or bleeds*
1) dermoid cyst rupture
2) lymphangioma with hemorrhage
3) ruptured hydatid cyst
4) bleed from orbital varix
5) coalescence of cysts in glioma(?)
6) post-trauma

C) *Inflammatory/ Infectious*
1) infectious cellulitis
2) orbital inflammatory disease
3) mucormycosis

4) aspergillosis of orbit

Rapidly growing orbital tumor in child
1) chloroma (leukemia)
2) Burkitt's lymphoma
3) teratoma
4) lymphangioma
5) rhabdo
6) neuroblastoma
7) mets (especially Ewing's)

DDX enophthalmos
1) post TRO
2) post O.I.D.
3) mets
4) post-radiation
5) post-blowout
6) chronic sinusitis
7) lying down with varix? (OKAP)

DDx of dry eye (decreased aqueous layer)
A) *Gland infiltration*
1) primary Sjogren's disease
2) secondary Sjogren's (RA, SLE, PAN,…)
3) leukemia
4) lymphoma
5) sarcoid
6) amyloid

B) *Decreased function*
1) post-menopausal women
2) meds with antichol. activity: anti-depressants, anti-histamines, OCP?
3) Riley-Day syndrome

C) *Other*
1) post-blepharoplasty (damage to gland)

DDx of mucin deficiency
A) Inflammation Stevens Johnson, OCP
B) Trauma: alkali burn, radiation damage
C) Infection: trachoma
D) Nutrition: Vit A deficiency

DDx of lipid layer deficiency
1) rosacea blepharitis
2) Acutane therapy

Langerhans granulomatoses (histiocyt. X)
- proptosis, lytic skull lesions "EHL"
1) +/- juvenile xanthogranuloma
2) eosinophilic granuloma (local)
"unifocal histiocytosis"
3) Hand-Schuller-Christian (subacute, syst.)
" multifocal histiocytosis"
- involves multiple sites
4) Lettere-Siwe (acute, systemic);
"diffuse soft tissue histiocytosis"
- involves visceral organs

Causes of lid retraction: (Duane's)
1) TRO
2) aberrant third nerve regeneration
3) unilateral ptosis, with contralateral overaction of levator palpebrae
4) Parinaud's syndrome; bilat.
5) hyperkalemic periodic paralysis
6) chronic systemic corticosteroid therapy ?

Calcified lesions of the Orbit
A) *bone or c.t. origin*
1) osteoma
2) osteosarcoma
3) ossifying fibroma
4) chondrosarcoma
5) fibrous dysplasia (hyperostosis)
B) *Vascular*
1) hemangioma
2) varices
C) *Lacrimal gland*
1) adenoid cystic CA
2) benign mixed (cart or bone)
D) *Globe*
- see path
E) *Other*
1) meningioma (common)
F) *Chiasm tumor with calcification*
1) meningioma
2) craniopharyngioma

Hyperostosis of orbit
1) meningioma
2) fibrous dysplasia

DDx of orbital bone destruction
1) rhabdo
2) adenoid cystic carcinoma
3) metastatic carcinoma
4) histiocytosis X
5) dermoids

6) multiple myeloma

Lytic lesions of skull
1) histiocytosis X
2) multiple myeloma
3) mets

Causes of acquired canalicular obstruction
1) trauma
2) drugs: antivirals, miotics (IdU, PI)
3) viral infections (HSV, vaccinia)
4) autoimmune (Stevens Johnson, OCP)

Causes of NLD obstruction
1) trauma
2) sinus disease
3) dacryocystitis
4) involutional stenosis
5) sarcoidosis
6) Wegener's
7) lethal midline granuloma

Causes of dacryoliths
1) Candida
2) actinomyces
3) epinephrine drops

Locations of orbit lesions
A) *Superonasal*
1) meningocele/encephelocele
2) fibrous histycytoma (most common site)
3) rhabdomyosarcoma

B) *Superotemporal*
1) dermolipoma (lipodermoid)
2) dermoid/epidermoid cyst

C) *Inferotemporal*
1) limbal dermoid of globe (assoc. with Goldenhar's)

Locations of Choristomas of globe/orbit
1) *limbal dermoid of globe*
- solid tumor
- inferotemporal most common
- assoc. with Goldenhar's
- can cause astigmatism and amblyopia
2) *dermolipoma (lipodermoid)*
- solid tumor
- same as dermoid but fat is greater component
- most common superotemporal then superonasal
- may extend into deep tissues
- if removed, can cause strabismus and fat adherence syndrome
- are best left alone
3) *dermoid/epidermoid cysts*
- cystic tumor which contain keratin
- wall has skin appendages in dermoid type
- superotemporal most common, then superonasal
- rupture is very irritating (must excise whole → if ruptures, irrigate ++)
- usually attached to bone

Lateral Tissue prolapse
1) dermolipoma (yellow)
2) orbital fat prolapse (yellow)
3) lacrimal gland prolapse (gray)
4) lymphoma (salmon)
5) dermoid cyst (white?)

DDx of multiple nodular lid lesions
1) sarcoid
2) molluscum
3) amyloid
4) lipoid proteinosis
5) granuloma annulare (SLE?)

DDx erythematous plaque of lid
1) BCC
2) squamous cell (in situ)
3) discoid lupus
4) actinic keratosis
5) contact dermatitis

C) TREATMENTS

Cosmetic treatment for microphthalmos
1) prosthesis (scleral shell)
2) evisceration
3) enucleation
4) Gundersen flap with scleral shell

Integrated Implants
1) HA
2) Medpor

Quasiintegrated implants
1) Allen
2) Universal

Spherical Implants
1) PMMA

Other
1) dermis fat graft
- good for forshortened fornices
- remove epithelium
- from leg

Material for post lamellar grafting
1) buccal mucosa
2) ear cartilage
- plenty
- good structure
- no epithelial surface (bad)
- cysts form (bad)
3) hard palate
- plenty
- no loss of function
- epithelial
- keratinized (bad)
- irritating (bad)
4) nasal septum
- plenty
- good structure
-no epith (bad)
- ophthalmo. unfamiliar with nose (bad)
5) contralateral tarsus
- good structure
- epithelium
- not a lot (bad)
- shrinks (bad)
- other eyelid retracts
6) banked sclera
- plenty
- resorbs (bad)

Sites for anterior lamellar grafting
1) adjacent skin (flap)
2) supraclavicular
3) preauricular skin
4) retroauricilar skin
5) anterior forearm??

Materials for frontalis suspension
1) autologous fascia lata
2) donor fascia lata
3) silicone rods
4) supramyd (like Dacron)

Materials to replace orbital floor
1) Silastic sheet
2) Supramyd sheet
3) Medpor sheet
4) bone
5) microplates

Lid position changes with strab surgery
1) IR recess: lower lid retracts
2) IR resection: lower lid advances
3) SR rc: upper lid retracts
4) SR rs: upper lid ptosis
- IR / lower lid more sensitive

Treatment of cong. dacryocystocele
A) *no infection*
1) conservative: ABC's, massage
2) if no change in 2 weeks or infection → probing
B) *Gets infected*
1) systemic ABC's
2) surgical decompression: probing
3) avoid I & D (fistula created)

Tx of canaliculitis
1) unroofing canaliculus (cutting down over a probe)
2) curet concretions
3) send for culture and stain
4) irrigate with antibiotics (Pen for actinomyces, nystatin for Candida)
5) topical antibiotics (Pen, Nystatin or Viroptic for HSV) for 1 week
6) warm compresses

Treatment of dacryocystitis (adult)

1) warm compresses
2) avoid irrigation until infection subsides
3) oral antibiotics
4) aspiration of lacrimal sac or I and D if localized absecc forms
5) DCR eventually

Treatment of congenital NLD obstruction
1) topical antibiotics
2) massaging several times per day (removes bugs and may open duct)
3) observe until 9 months
4) probing (then irrigate with fluorescein)
5) repeat probing with silicone intubation +/- infracture
6) DCR at age 3 if not better

TRO muscle involvement: I>M>S>L

Decompession Order: M>I>L>S

Radiation doses for orbital disease
1) TRO, OID: 1500-2000 rads (100 rads per dose)
2) BRLH: 1500 rads
3) lymphoma: 2000-4000
4) rhabdo: 4500-6000 over 6 weeks
5) melanoma: 7000?

Radiation complications
1) dry eye: 1000 rads
2) cataract: 1000-2000 rads
3) retinopathy: 5000 rads
4) optic neuropathy: 5000 rads

Thyroid treatment
decompress → EOM surgery → lids

Treatment of TRO acute congestive myopathy
1) steroids: 60 mg to start; for up to 3 weeks
2) consider cyclosporin if not better

Treatment of TRO ON compression
1) high dose steroids until no improvement for 1 week, then try something else
2) radiation (1500-2500 rads over 10 days) if responding to steroids but can't be tapered (and continue steroids)
3) orbital decompression if no improvement in 1 week
4) VER's to follow (or color plates)
NB: if patient receives I^{131}, needs steroids because TRO may worsen

Emergency Radiotherapy (within 12 hours)
1) rhabdo
2) leukemia of orbit

Encapsulated or pseudoencapulated lesions
- don't want to rupture these during surgery
1) cavernous hemangioma
2) hemangiopericytoma
3) rhabdomyosarcoma
4) dermoid
5) Schwannoma (neurilemmoma)
6) benign mixed tumor

Facial assymetry
1) sphenoidal meningioma (temporal)
2) fibrous dysplasia
3) neurofibromatosis
4) post radiation
5) 4th nerve palsy
6) Sturge Weber

Tx. of capillary hemangioma
- treat for occlusion or astigmatism uncorrectable by glasses
- laser ?
1) steroid injection: short acting (Betamethasone 6 mg) and long acting triamcinolone (40 mg) every 2 months if necessary
or
2) oral steroids (high dose) - systemic side effects
3) consider systemic alpha interferon
4) pulsed dye laser (controversial)

Orbital cancer that may be treated by complete excision of orbital lesion
1) lymphoma
2) metastatic carcinoid
3) metastatic renal cell carcinoma

Treatment of lid BCC
1) if large → full skin diagnostic biopsy
2) if small and easily accesible → excision

3) if lesion near caruncl or punctum → Moh's (after diagnosis)
4) no cryo?

Treatment of lid SCC
1) examine lymph nodes
2) diagnostic full skin biopsy
3) excise (pentagonal) with frozen sections
4) remove 2mm of "normal" skin around margins
5) cryo?

Treatment of sebaceous cell CA
1) full thickness lid biopsy
2) remove entire tumor + take multiple conj biopsies for Pagetoid spread
3) 2 mm margins?

Treatment of lid melanoma (rare)
1) diagnostic biopsy
2) excise with frozen sections
3) 2 mm margins

NB: every excision is full lid thickness

Late Causes of poor fitting prostheses
1) poor fit of prosthesis
2) tumor recurrence
3) infection

Early causes of poor fitting prosthesis
1) poor closure
2) infection

Treatment of dehiscence of implant
1) scleral patch and reclosure
2) removal of implant with
a) if conj. foreshrtened → dermis fat graft
b) if conj. volume OK → new implant

Traetment of orbital floor #
1) observe for 1 week while giving steroids (60-80 mg Qday)
2) Repair if
i) enophthalmos > 2mm
ii) # > ½floor
iii) muscle entrapment (diplopia within 30 degrees of upgaze or downgaze)

Complications of orbital floor #
1) V2 anesthesia
2) diplopia
3) CSF leak
4) vision loss

Complications of blowout # surgery
1) diplopia
2) visual loss or blindness
3) infraorbital nerve anesthesia
4) overcorrection of enophtalmos
5) infection
6) implant extrusion
7) lymphedema
8) damage to lacrimal pump
9) lower eyelid retraction

Treatment of seborrheic keratosis
1) shave biopsy
2) or cryo

Treatment of Jaw wink (Codere)
1) wink < 3mm or less: unil. ptosis surgery only
2) wink > 3mm: bilateral disinsertion with frontalis suspension

Treatment of Congenital Ptosis (Codere)
1) 4mm or less: levator resection
2) > 4mm: frontalis suspension (bilateral probably better)

Resection in Congenital Ptosis (Duanes')

Ptosis	**Levator Function**	**Resection**
No ptosis	15+ mm	none
Mild: 1-2 mm	Good: 8 mm or more	10-13 mm
Mod.: 2-3 mm	Fair: 5-7 mm	14-20 mm
Severe: 4 mm	Poor: 4 mm or less	20-26 mm
Severe: >4 mm	None	front. sling

(1:10, 2:15, 3:20, 4:25)

Indications for Frontalis Suspension (Kanski)
1) severe ptosis
2) Marcus Gunn jaw winking
3) aberrant 3rd nerve regeneration
4) blepharophimosis syndrome

Indications for Fascinella Servat (Kanski)
1) Horner's
2) mild ptosis

Treatment Mucor
1) complete debridement until it bleeds

2) ampho irrigation
3) systemic ampho

Work up of Lacrimal Gland Mass
1) Orbital CT
2) CXR (TB and sarcsoid)
3) CBC, ACE,FTABS, PPD,
4) lymphoma suspected (abdominal and head CT scan, bone marrow biopsy)
5) lacrimal gland biopsy (lymphoma work up negative)

Indications for evisceration
1) endophthalmitis

Advantages of Evisceration
1) less disruption of orbit
2) good motility
3) technically simpler

Contraindications for evisceration
1) sympathetic ophthalmia
2) intraocular tumor
3) blind painful eye of unknown etiology

Lymphangioma Treatment
1) nothing
2) excise
3) CO2 laser
4) cautery
5) orbital decompression

Types of Exenteration
1) subtotal: eye + orbital tissues
2) Total 1+ periorbita +/- eyelids
3) extended: 2+ bone

Causes of contracted sockets
1) radiation
2) implant extrusion
3) alkali injury
4) extensive laceration
5) poor surgical technique
5) multiple operations
7) removal of conformer or prosthesis for long period