THE OPHTHALMIC EMERGENCY DEPARTMENT

Alison Bozung, OD, FAAO

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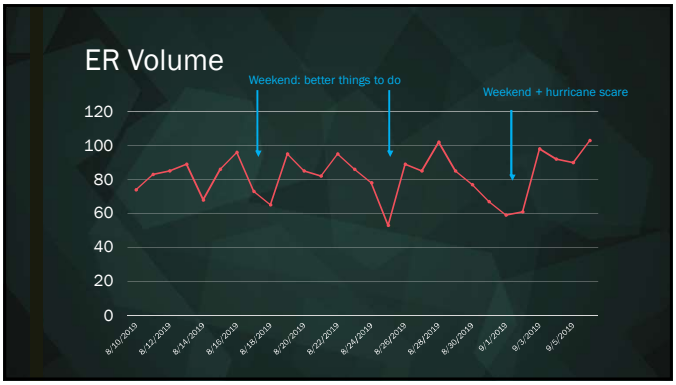

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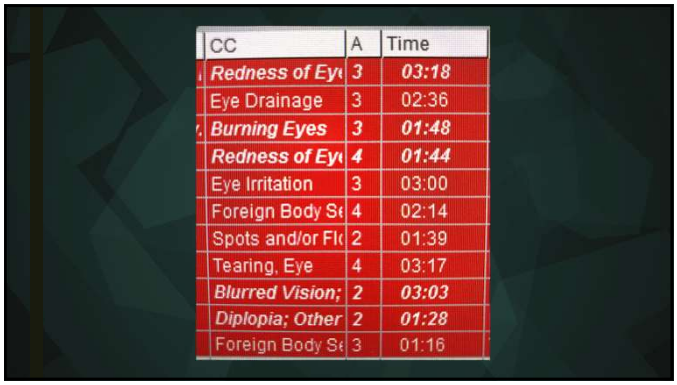

CC	A	Time
Redness of Eye	3	03:18
Eye Drainage	3	02:36
Burning Eyes	3	01:48
Redness of Eye	4	01:44
Eye Irritation	3	03:00
Foreign Body Se	4	02:14
Spots and/or Flo	2	01:39
Tearing, Eye	4	03:17
Blurred Vision;	2	03:03
Diplopia; Other	2	01:28
Foreign Body Se	3	01:16

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Age / DOB	Chief complaint	Acuity
67, F	Double vision	3
65, M	Diplopia	2
19, F	Papilledema	2
18, F	Photophobia, red eye	2
30, F	Eye pain	2
17, M	Flashes, floaters	2
24, M	Blind spot	3
52, M	Acute loss of vision	2
28, M	Red eye, sore	3
82, F	Floaters, blurred vision	3
30, M	Eyelid swelling	3
57, M	Blurred vision, pain	2
58, M	Diplopia, 1 month	4
67, F	Loss of vision	2
12, M	Red eye, pain	2
49, F	Eyelid swelling	3
32, F	Papilledema	2
46, F	Diplopia	2

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CHIEF COMPLAINT:

EYELID SWELLING

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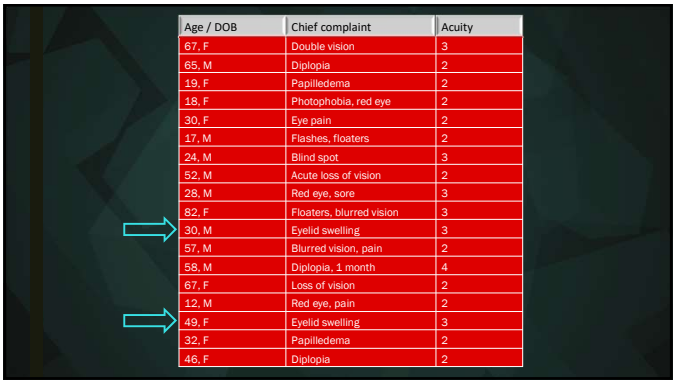

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Differential diagnoses

- Blepharitis
- Chalazion
- Preseptal cellulitis
- Orbital cellulitis
- Darcyocystitis
- Acute allergic edema

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PRESEPTAL VS ORBITAL CELLULITIS

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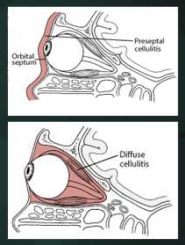
Preseptal vs Orbital Cellulitis What's the difference?

- Preseptal Cellulitis
  - *Infection and inflammation of the preseptal eyelids*
- Orbital Cellulitis
  - *Infection and inflammation of the orbital contents*



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Preseptal vs Orbital Cellulitis Why does it matter?

- Potential outcome..

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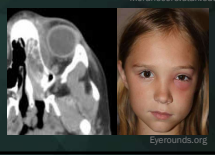
Preseptal vs Orbital Cellulitis Etiology

- Skin trauma / infected insect bites
- Adjacent structures
  - *Hordoelum*
  - *Sinusitis*
  - *Dacryocystitis*
- Local or systemic infection
  - *Middle ear, tooth infection, etc*
  - *Hematogenous spread*



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Preseptal vs Orbital Cellulitis Signs / Symptoms

- Periorbital edema
- Periorbital erythema
- Tenderness
- Pain

- Loss of vision with APD
- Ophthalmoplegia / diplopia
- Pain on eye movement
- Proptosis
- Chemosis
- Fever

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Preseptal Cellulitis: Management

Empiric treatment typically suffices
- *Augmentin*
- *Cephalexin*
- *Doxycycline*

Suspect MRSA
- *Trimethoprim-Sulfamethoxazole*
- *Clindamycin*
- *Fluoroquinolones*

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Orbital Cellulitis: CT findings

- Orbital fat stranding
- Sinusitis
- Anterior globe displacement
- Subperiosteal abscess

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Orbital Cellulitis: Management

- ER referral!
- Emergent CT imaging
- Admission
  - *Surgical intervention indicated for subperiosteal abscess*
  - *IV antibiotics 3-5 days*
  - *Discharge with oral antibiotics*

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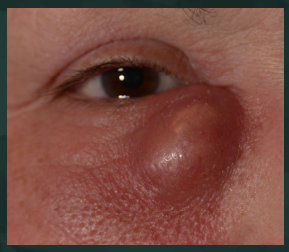

Patient B

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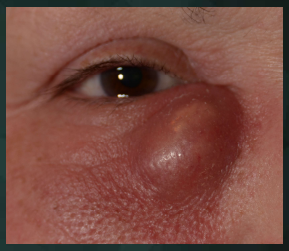
Dacryocystitis Signs / Symptoms

- Rapid onset
- Erythematous, tender, and distended lacrimal sac
- +/- purulent discharge from punctum
- Likely history of NLDO



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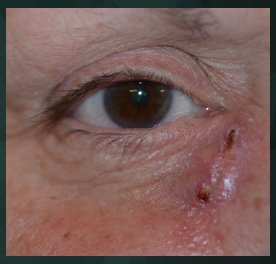
Dacryocystitis: Management

- Step 1: oral antibiotics
  - *Gram positive**
  - *Consider gram negative in immunocompromised patients*
- Step 2: incision and drainage
- Step 3: DCR if NLDO



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"PAPILLEDEMA"

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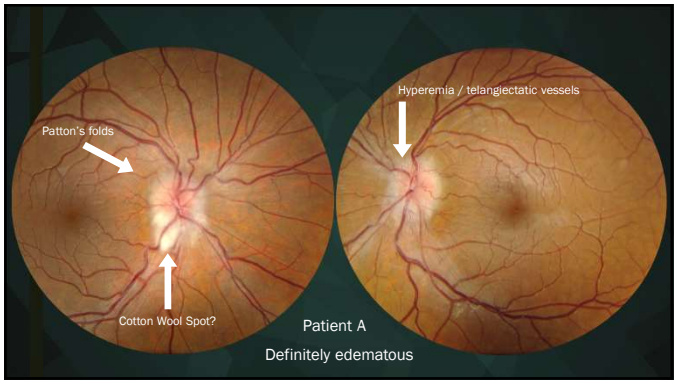

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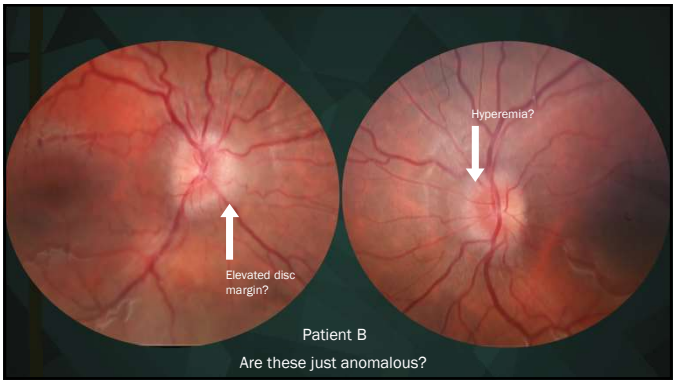

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Papilledema

Swelling of the optic disc due to increased intracranial pressure

Differential diagnoses:
- *Idiopathic intracranial hypertension (IIH)*
- *Space occupying lesion*
- *Venous sinus thrombosis*
- *Obstructive hydrocephalus*

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Bilateral optic nerve edema

ALWAYS ASK these questions:
- *History of cancer*
- *New or frequent headaches*
- *Recent unintentional weight loss or gain*
- *Medications*
- *Diplopia*
- *Transient visual obscurations (TVOs)*
- *Pulsatile tinnitus*

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Bilateral optic nerve "edema"

Slit Lamp Evaluation
- *Disc edema*
- *Disc hemorrhages*
- *Patton's folds*
- *Absence of SVP*

Clinical Testing
- *OCT RNFL + GCC*
- *Visual field*
- *Ultrasound*
- *Autofluorescence*

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Optic nerve edema

- *OCT RNFL* → Avg RNFL > 116; Nasal RNFL > 92 (*90% sensitivity and specificity!*)
- *Visual field* → Enlarged blind spot
- *Ultrasound** → Drusen hyperechoic or hyperautofluorescent
- *Autofluorescence* → Drusen hyperechoic or hyperautofluorescent

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Neuro-imaging for bilateral disc edema

- What do I order?
  - *MRI: mass lesions, hydrocephalus*
  - *MRV: venous sinus thrombosis*

With contrast

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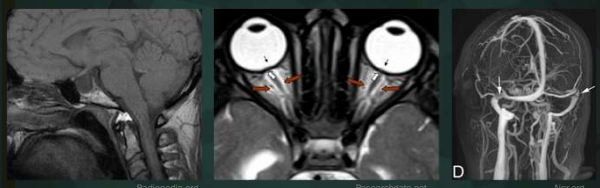
Signs of elevated ICP



Empty Sella | Posterior Globe Flattening | Transverse sinus stenosis

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IIH: diagnosis

- No mass or thrombosis on MRI + MRV
- Evidence of elevated ICP (one of following):
  - *Pulse synchronous tinnitus*
  - *6th nerve palsy*
  - *Optic nerve edema*
  - *Empty sella*
  - *Optic nerve sheath fluid*
- Elevated CSF opening pressure
  - *Normal CSF*

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IIH: treatment

- Most effective management?
  - *Weight reduction (6% body weight)*
  - *Acetazolamide, up to 4g daily*
  - *Low sodium diet*

Studies show improved VF, QOL, and weight loss when combined

- In vision threatening cases, optic nerve sheath fenestration may be indicated

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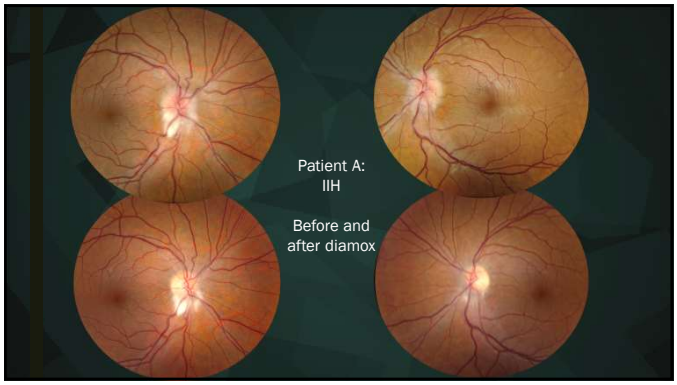

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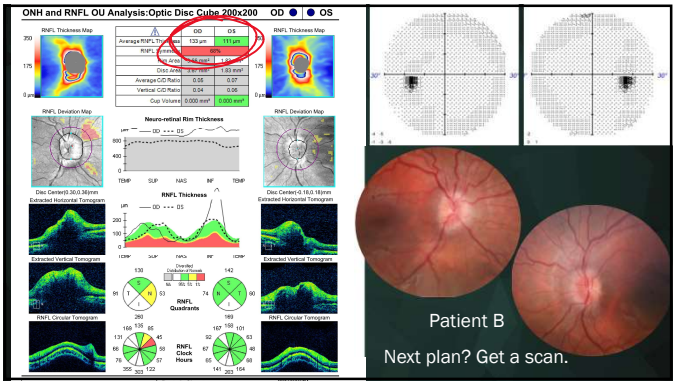

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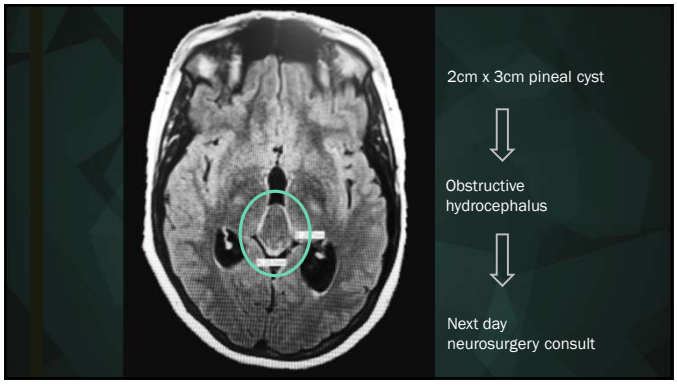

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67, F	Foreign body sensation	4

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FLASHES + FLOATERS

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RETINAL DETACHMENT

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Are all retinal detachments created equally?

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Retinal Detachment

- What are the most important things to consider?
  1. *Is the macula on or off?*
  2. *What kind of detachment is this?*
  3. *Where are the retinal break (s)?*
  4. *What can this patient expect from surgery?*

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1. Is the macula on or off?

- Determination:
  - *VA: not always reliable, subject to other factors*
  - *OCT: better if available*
- Macula ON → Refer NPO/same day
- Macula OFF → Refer for repair within the week since LOV noted
  - *Sooner is better, but within reason.*

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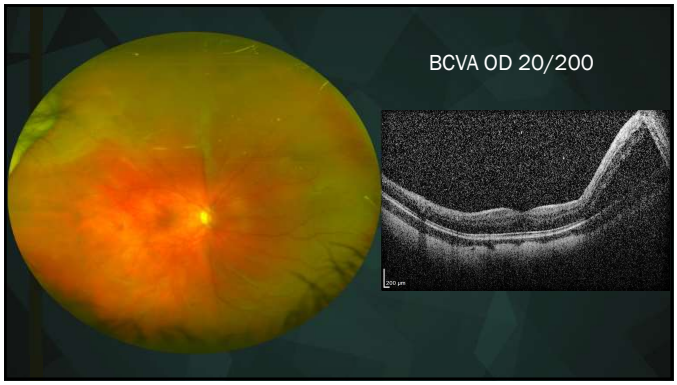

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2. What kind of detachment is this?

- Rhegmatogenous
  - *Most common*
  - *Associated with retinal break(s)*
  - *Typically has a corrugated surface*

  ⇨ Vitrectomy + gas/oil
  Scleral buckle + laser
- Exudative / serous
  - *Associated with hyperpermeable process*
  - *May have shifting SRF*

  ⇨ Treat the underlying cause
- Tractional

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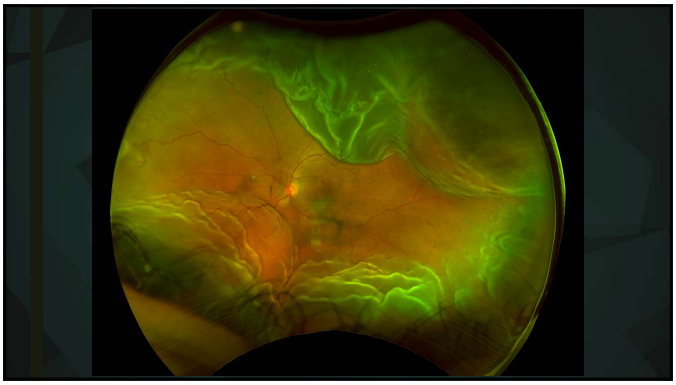

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- Exudative / serous
  - *Associated with hyperpermeable process*
  - *May have shifting SRF*

  ⇨ Treat the underlying cause
- Tractional
  - *Associated with proliferative retinopathy*
  - *Medical emergency?*

  ⇨ Treat the VEGF problem.
  Surgery indicated if macula threatened.

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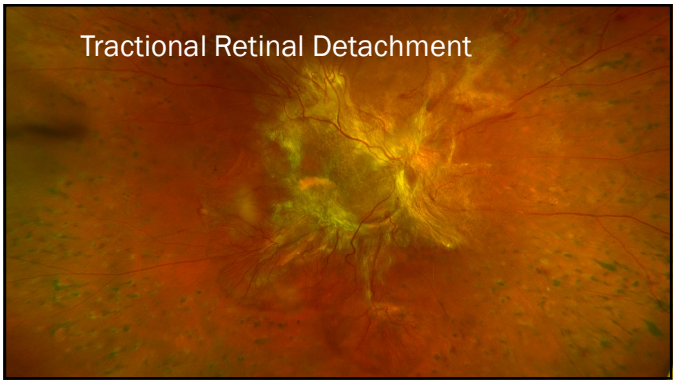

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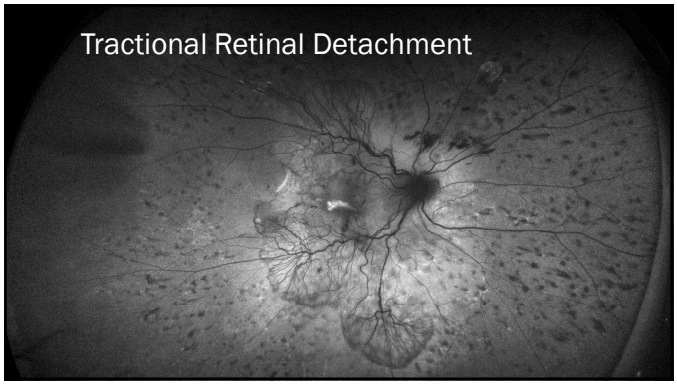
Tractional Retinal Detachment



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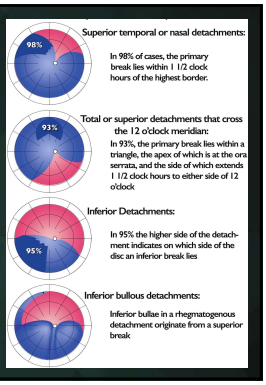
3. Where are the retinal break(s)?

- Lincoff's Rule
- Most important in macula-on RRDs, so you can have patient position better
- If no tear visualized, consider exudative detachment



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4. What can this patient expect after referral?

- Same day referral, but they don't always have same day surgery
  - *Still best to keep patient NPO just in case*
- Still very high risk of vision loss with "macula-on"
- If gas is used, patient will 100% develop a cataract
  - *Usually within 2-6 months*

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ACUTE VISION LOSS

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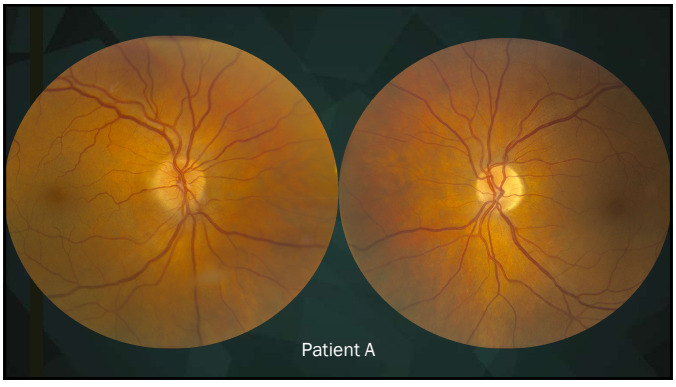

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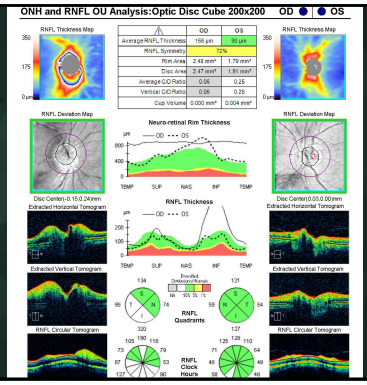

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What's going through our mind?

- Is this arteritic or non-arteritic?

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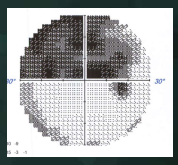
Non-arteritic AION

- Demographics
  - *Middle and older age*
  - *Vasculopath*
  - *Disc at risk*
  - *Disc drusen*
  - *Nocturnal hypotension*
  - *Sleep apnea*
  - *Medications: PDE-5 inhibitors*
  - *Migraine*
- "Classic" symptoms
  - *Altitudinal defect*
  - *Vision loss upon awakening*
  - *BCVA may be preserved*



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Arteritic AION (GCA)

- Demographics
  - *Older (age > 55, peak 70-79)*
  - *Female > male*
- Review of systems
  - *Transient vision loss**
  - *New headache (70%)*
  - *Jaw claudication (50%)*
  - *Fever (50%)*
  - *Polymyalgia rheumatica (40-50%)*
  - *Temporal pain*
  - *Weight or appetite loss*
  - *Fatigue*
- "Classic" signs + symptoms
  - *Significantly decreased VA*
  - *Significantly depressed VF*
  - *Pallid nerve edema*

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NA-AION

- Treatment: manage risk factors
  - *Control HTN*
  - *Manage cholesterol*
  - *Review medications (dosage, timing, etc)*
  - *Sleep study referral*
  - *Consider daily aspirin*
- Monitor monthly

A-AION

- Management consists of emergent lab testing and treatment
  - *ESR*
  - *CRP*
  - *CBC (anemia)*
  - *Confirmatory test*
    - Temporal artery biopsy
    - Color doppler ultrasound
- Emergent referral

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Arteritic AION

- Where do I refer?
  - *ER: IV steroids*
  - *TA biopsy: Oculoplastics, vascular surgery, plastic surgery*
- What dose of steroids is administered?
  - *500-1000mg IV methylprednisolone x 3d*
  - *Then prednisone taper*
- Can I start steroids before a biopsy?
  - ***Absolutely.***
  - *Biopsy should be done within 2 weeks.*

VERY careful taper over 6-12 months.

Improper taper can lead to breakthrough.

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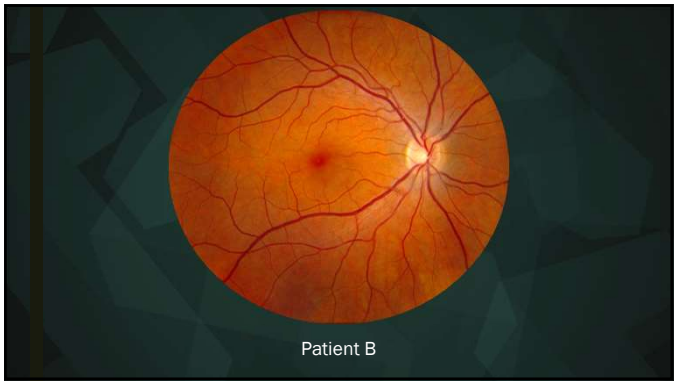

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Optic neuritis: the two camps

1. "Classic" optic neuritis
   - *Demyelinating (MS)*

2. All the other "optic neuropathies"
   - *Infectious*
     - HIV
     - Lyme
     - Toxoplasmosis
     - Herpes virus
     - Tuberculosis
   - *Inflammatory*
     - Sarcoidosis
     - Systemic lupus erythematosus
     - Radiation-induced
     - Neuromyelitis optica (NMO)

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Who gets optic neuritis?

- Demographics
  - *Young to middle age (18-40)*
  - *Female >> male*
- Key signs and symptoms
  - *Pain (> 90%)*
  - *Retrobulbar (up to 70%)*
  - *Moderate vision loss*
  - *Symptoms increase over hour to days*

IF your patient does not seem to follow the normal "rules", be sure your differential is not limiting your exam.

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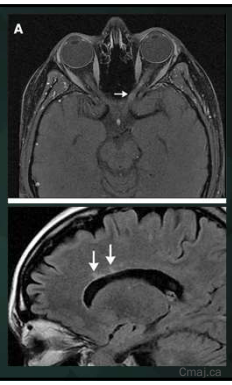
Diagnosis + prognosis

- MRI brain/orbit w/wo contrast
  - *Retrobulbar optic nerve enhancement*
  - *+/- ovoid periventricular WM lesions*
- Incidence of developing MS
  - *At 15 years*
    - 25% if no WM lesions
    - 72% if WM lesions present



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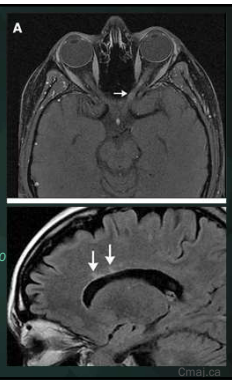
ONTT Guidelines

Management
- *IV methylprednisolone 1g x 3 days*
- *Oral prednisone 1mg/kg x 11 days + taper*

Benefits
- *More rapid visual improvement*1*
- *Halved the risk of conversion to MS*5*
- *Reduced risk of recurrent optic neuritis***10*

Oral prednisone ALONE had nearly doubled risk of recurrent optic neuritis event, even up to 10 years later!



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Optic neuritis in summary..

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Do not use oral steroids as monotherapy.

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Retinal artery occlusion: Etiology

- Carotid atherosclerosis
- Cardiogenic
- Hypercoagulable state
- Hematologic malignancy
- Arteritis

Visualizing an emboli can help narrow down your search

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How much of an emergency is this?

- Less than 3 hours
  - *IOP lowering therapy / digital manipulation*
  - *Then referral to ER for stroke protocol*
- More than 4 hours
  - *Referral to ER for stroke protocol*
- Asymptomatic plaque
  - *1-2 weeks to primary care physician*
  - *CBC, lipid panel, ESR/CRP, carotid study, cardiac echocardiogram*

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What happens next?

- Symptomatic carotid atherosclerosis
  - *Indications for carotid endarterectomy (CEA)*
    - Focal sudden neurologic symptom (i.e. amaurosis fugax)
    - >70% CA stenosis
- Asymptomatic carotid atherosclerosis
  - *Medical treatment strategy*
    - Statins, antiplatelet agents, treatment of HTN and DM
  - *Interventional: CEA + medical therapy*
    - >80% CA stenosis

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CHIEF COMPLAINT:

DOUBLE VISION

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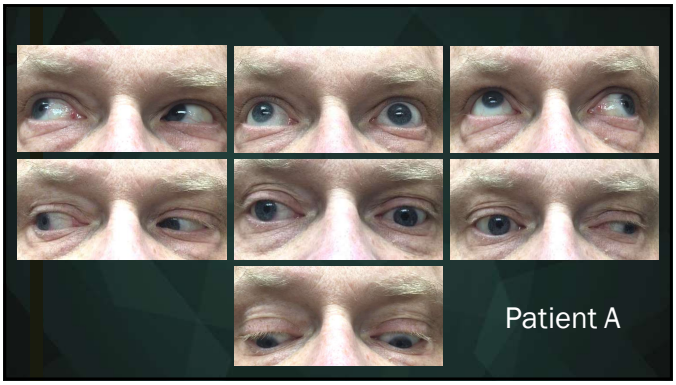

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What are we thinking about?

- Cranial nerve palsy
- Brain mass
- Thyroid eye disease
- Orbital mass or inflammation
- Myasthenia gravis
- Brainstem lesion or infarct
- Decompensated phoria

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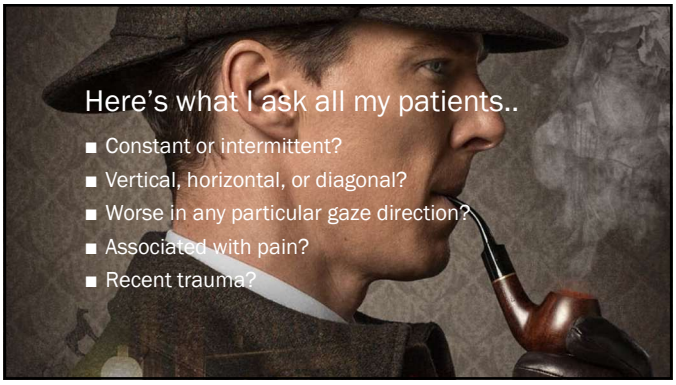

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How do you assess diplopia?

- Cover test gives quantitative measure
  - *Helpful in isolating CN palsies*
  - *Provides baseline values to monitor for improvement*

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Cranial nerve palsies: Quick tips

CN3
- "Down and out"
- Ptosis
- Pupil exam is paramount
- Vertical hypertropia **alternates** on up vs down gaze

CN4
- Vertical / diagonal
- Park 3 step
- "GOTS" worse
  - *Gaze Opposite*
  - *Tilt Same*
  - *Applies to HYPER eye*

CN6
- Can't abduct eye
- Can be subtle

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Diplopia

- You isolate a cranial nerve. Are you done??
- Don't forget:
  - *Ensure no other CNs involved*
- When do we image?
  - *All 3rds → MRI w/wo contrast + MRA*
  - *All 4ths → MRI w/wo contrast*
  - *6ths → MRI w/wo contrast*
    - <50 yo
    - History not consistent with ischemic etiology

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Diplopia – that's NOT a CN palsy

- Evidence of PROPTOSIS or INFLAMMATION
  - *There's more going on..*
  - *Differentials:*
    - Thyroid orbitopathy (usually bilateral)
    - Orbital inflammatory syndrome (OIS / NSOI / IOI)
    - Orbital mass
    - Orbital cellulitis

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Thyroid orbitopathy
- Bilateral
- **Lid lag**, lateral lid flare
- Chemosis, conjunctival injection

- TSH / TSI / T3 / T4
- Imaging: CT orbit
- CAS Score
- Optic nerve compromise?

Non-specific orbital inflamation
- Unilateral
- Tender lacrimal gland
- Pain on EOM
- Conjunctival injection

- Rule out infectious
- Work up
- Imaging: CT orbit
- Likely PO steroid

Orbital mass
- Unilateral
- Slow onset
- "Quiet eye"

- Imaging: MRI w/wo contrast

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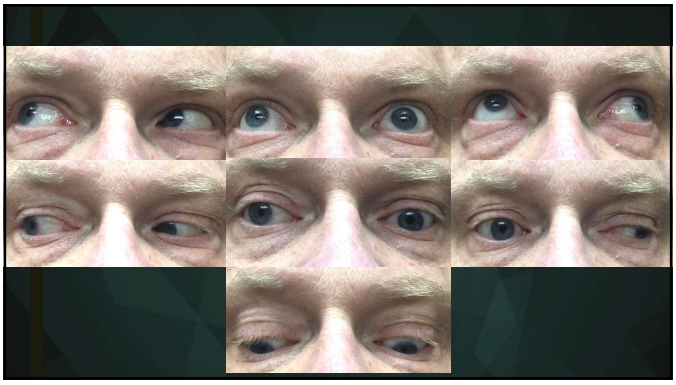

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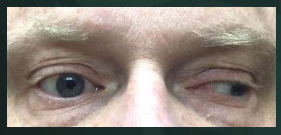
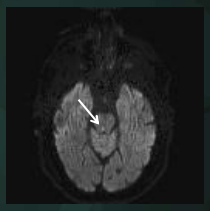
Internuclear Ophthalmoplegia (INO)

- Unilateral adduction deficit
- Damage to ipsilateral MLF
  - *Ipsilateral 6th / contralateral 3rd nuclei*





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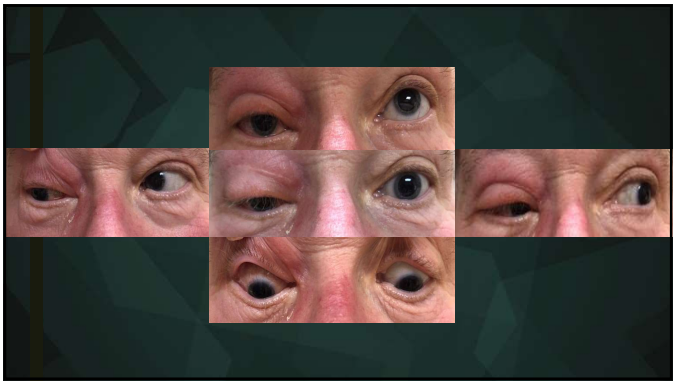

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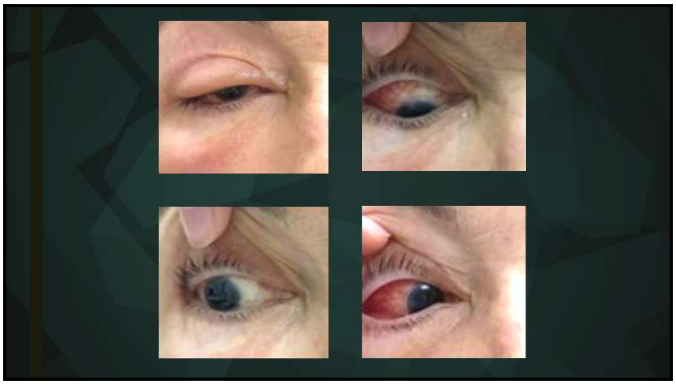

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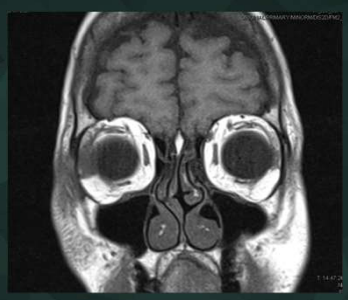

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Age / DOB	Chief complaint	Acuity
18, F	Photophobia, red eye	2
28, M	Red eye, sore	3
57, M	Blurred vision, pain	2
12, M	Red eye, pain	2
67, F	Foreign body sensation	4

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CHIEF COMPLAINT:

PAINFUL RED EYE

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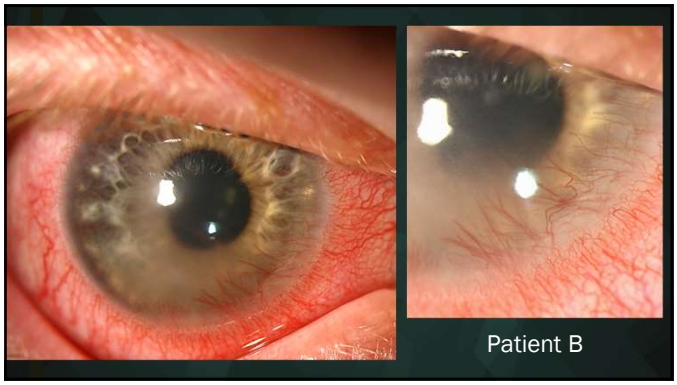

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UVEITIS

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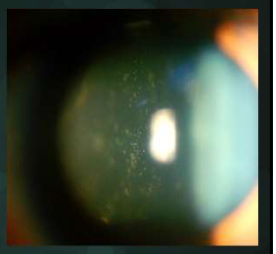
Uveitis
Signs / Symptoms

- Photophobia, pain, injection
- Circumlimbal flush
- Anterior chamber cell + flare + KPs
  - *May collect into hypopyon*
  - *May spillover into vitreous*



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Uveitis
Clinical Diagnosis

- Differentiate location involved
  - *Anterior vs Posterior vs Panuveitis*
- Granulomatous vs non-granulomatous
- Assess for evidence of prior episodes
- Review of systems
  - *Respiratory, joints, skin, gastrointestinal, genital, neurologic*

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Uveitis
Management

- Topical corticosteroid q1-2 hour
  - *i.e. difluprednate, prednisolone acetate, etc*
- Topical cycloplegic BID
  - *i.e. cyclopentolate 1%, atropine*
- When do we need to escalate therapy?
  - *Extensive involvement → not clearing with topical*
    - Prednisone 40-60mg**

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EPISCLERITIS VS SCLERITIS

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Episcleritis vs Scleritis
Real tips on differentiating the two..

- Common adages:
  - *"Vessels blanch with phenyl in episcleritis."*
  - *"Deep, boring pain is always scleritis."*
- Realistically:
  - *Injection can remain after phenyl in BOTH.*
  - *Globe is tender to palpation in scleritis.*
  - *Posterior injection more likely scleritis.*

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Episcleritis vs Scleritis
Why does it matter?

Episcleritis

- Low complication rate
- Relatively easy to treat
- Can be signal of systemic inflammation
  - *30% systemic rheumatic disease, 5% infectious*[1]

Scleritis

- 60% chance of ocular complication
  - *vs 13.5% in episcleritis*
- Potential for scleral thinning, severe pain, perforation
- Likely need oral steroids or steroid-sparing agent
- Can be signal of systemic inflammation
  - *39% systemic rheumatic disease, 8% infectious*[1]

1. Jabs DA, Mudun A, Dunn JP, Marsh MJ. Episcleritis and scleritis: clinical features and treatment results. Am J Ophthalmol. 2000;130(4):469-76.

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Abbreviation of test name	Complete name of test	Use
CBC with diff	Complete blood count with differential	Underlying bacterial or viral etiology, WBC malignancy (leukemia or lymphoma)
CMP	Comprehensive metabolic panel	Kidney function, liver function, electrolyte and fluid balance
ESR	Erythrocyte sedimentation rate	Generalized inflammation
CRP	C-reactive protein	Inflammation
ANA	Antinuclear antibody	SLE or JIA
RF	Rheumatoid factor	RA
HLA-B27	Human leukocyte antigen B27	IBD (Crohn's or ulcerative colitis), ankylosing spondylitis, reactive arthritis (Reiter's), psoriatic arthritis, Behcet's disease
FTA-ABS	Fluorescent treponemal antibody absorption	Syphilis (infected)
RPR and VDRL	Rapid plasma regain and venereal disease research laboratory	Syphilis (screening)
Lyme titers		Lyme disease
ELISA	Enzyme-linked immunosorbent assay	Lyme disease
ACE	Angiotensin-converting enzyme	Sarcoidosis
Serum lysozyme	Serum lysozyme	Sarcoidosis
Quantiferon gold	Quantiferon gold	TB
PPD skin test	Purified protein derivative	TB
CXR	Chest X-ray	TB, sarcoidosis

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Episcleritis vs Scleritis Work Up

- Consider deferring work up for episcleritis
- Always work up scleritis
- ANCA panel (!!) important for scleritis
- Important: RF, CBC, Quant/PPD, FTA
- Take ANA with grain of salt

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Episcleritis vs Scleritis Management

- Stratify risk for adverse complication
- Both:
  - *Oral NSAID, i.e. ibuprofen 800mg TID*
- Episcleritis
  - *Topical corticosteroids*
- Scleritis
  - *Oral steroid, i.e. prednisone 1mg/kg/d (40-60mg)*

** Prior to initiating oral steroid therapy, rule out infectious etiology (i.e. TB or syphilis)*

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CORNEAL ULCER

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Corneal Ulcer: Examination

Pertinent Findings
Epithelial defect
Presence of infiltrate(s)
Stromal edema
Stromal thinning
Anterior chamber
Keratic precipitates
Intraocular pressure
Perineuritis
Eye Pain
Eye Sensitivity

1. Is this infectious?
2. Does this need to be cultured?
3. Can I use empiric treatment?
4. What are the risk factors for something "bad"?

3-2-1 Rule	
3	mm or larger infiltrate
2	or more infiltrates
1	mm or less from visual axis

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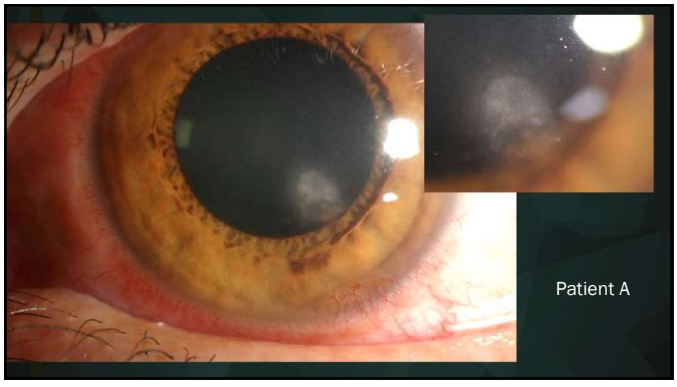

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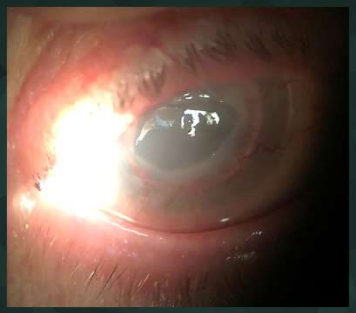

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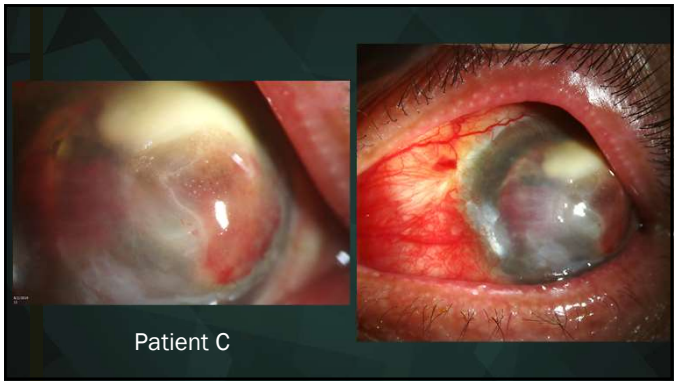

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Corneal Ulcer: Culturing

- Slides for gram stain
- Blood + chocolate
- Thio + TSB

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Treatment

- Empiric treatment
  - *3rd or 4th generation fluoroquinolone*
- Generally speaking..
  - *Suspicious enough to culture should be treated with fortified antibiotics*
    - Vancomycin 50mg/mL q1-2h, around the clock
    - Tobramycin 14mg/mL q1-2h, around the clock

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HERPETIC KERATITIS

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Herpetic Keratitis Signs

- Epithelial dendrite
- Geographic epithelial defect
- Marginal infiltrate
- Diffuse stromal edema
- Interstitial vasculature

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Herpetic Simplex Keratitis Management

- Epithelial
  - *Topical or oral antiviral*
  - *Prophylactic antibiotic*
  - *Avoid steroids*
- Stromal
  - *Topical or oral antiviral*
  - *Topical steroids*
- Endothelial
  - *Oral antiviral*
  - *Topical steroids*

Long term take-home:

Prophylactic oral antivirals reduce recurrence rates by 50%

HEDS

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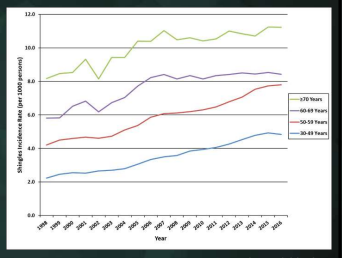
Herpetic Zoster Keratitis Management

- Oral antiviral +/- topical steroid
- Pain: capsaicin, gabapentin, TCAs
- Incidence on the rise
- Consider HIV testing
  - *Younger than 50*
  - *Multiple recurrences*
  - *Particularly virulent disease*
- Zoster Eye Disease Study (2017-2020)



cdc.gov/shingles

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Age / DOB	Chief complaint	Acuity
67, F	Foreign body sensation	4

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CHIEF COMPLAINT:

HIGH IOP

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REALISTICALLY,
CHIEF COMPLAINT:

1. EYE PAIN
2. BLURRED VISION
3. FOREIGN BODY SENSATION

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What causes high IOP?

Likely	POAG Acute angle closure glaucoma Neovascular glaucoma
Less Likely	Posner-Schlossman syndrome Uveitic glaucoma Herpetic keratouveitis Fuchs heterochromic iridocyclitis
Unlikely	Aqueous misdirection Uveitis glaucoma hyphema syndrome (UGH)

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High IOP Examination tips

- How long has this been going on?
  - *Acute: corneal edema*
  - *Chronic: no corneal edema*
- Any KPs or AC reaction?
  - *Uveitis, PSS, herpetic*
- Assess angle depth by GONIOSCOPY OF BOTH EYES
  - *Occludable angles? Less than 90 degrees PTM.*
  - *Assess for iris or angle neovascularization*

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High IOP Management

- First line therapy
  - *Topical aqueous suppressants (b blocker, a agonist, CAI)*
    - Why this doesn't work sometimes..
    - Watch out for too much beta blocker!
      - *AV block / bradycardia*

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High IOP Management

- Second line therapy
  - *Oral osmotic agent (acetazolamide, methazolamide)*
    - Who are we worried about?
      - *Sulfa allergy*
      - *Kidney stones*
      - *Diabetes*

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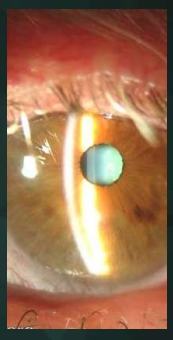
Angle closure

- Immediate goal: lower IOP
- Reduce corneal edema
- Laser peripheral iridotomy



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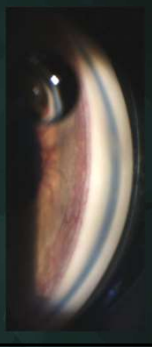
Neovascular glaucoma

- Immediate goal: lower IOP
- Reduce corneal edema (if present)
- PRP + intravitreal anti-VEGF



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- Immediate goal:

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Age / DOB	Chief complaint	Acuity

Phew.

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THANK YOU.

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