





Anterior Segment Grand Rounds: Corneas, Cases, and Complexities

Joseph Sowka, OD, FAAO, Diplomate



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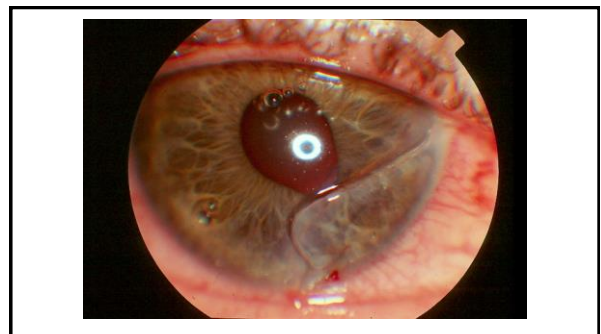



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Case

- 21 YOWM plumber
- Calls in after hitting himself with "Blunt end of screwdriver"
 - "Fluid running down cheek"
 - Tylenol for pain
- Loose flap of skin
- Tried to manually remove

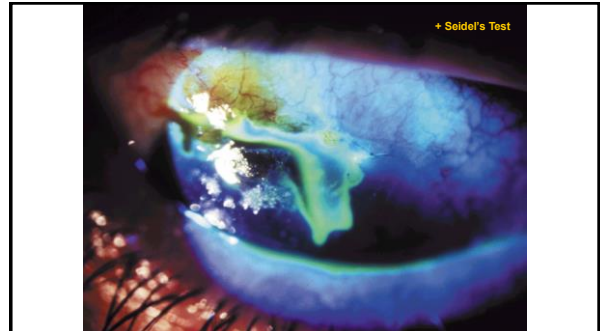
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What do you think?

CORNEAL LACERATION

- Excessive PAIN, decreased vision
- Deeper than abrasion; may be smaller, linear
- + Seidel's sign; additionally, may see hyphema, A/C rxn, flattened A/C (relative), air bubbles in A/C
- Iris prolapse possible
- IOP is low -- **DO NOT perform tonometry**



Sometimes it is Black and White... or Worse

- 55 YOBM with 'weed whacker abrasion'
 - 2 ODs
 - Shallow chamber; IOP < 5 mm; hypopyon
 - End Result?

Corneal Injury Pearls

- Perforations can self-seal
- High speed injury is a perforation until proven otherwise
 - DFE; B scan
 - Progressive vision loss
 - Inappropriate inflammation
 - You don't get hypopyon from a corneal abrasion
 - Shallow chamber
 - Hypotony
 - Instilling NaFL is not a Seidel's test

CORNEAL LACERATION: Management

- Photodocument (if possible for clinicolegal purposes)
- MINIMAL manipulation of the globe
- Avoid topical medications
- Shield the eye but DO NOT PATCH
- N.P.O.
- Refer IMMEDIATELY for surgical repair

A sharp stick to the eye

- A 71-year-old man presented urgently
- He had been injured that morning.
- He had been pruning an areca palm tree when he bent down and caught the sharp end of a new shoot on his left eye.
- What next?



CASE: 20 Year Old White Female

- CC: Intermittent itching and irritation OU x 2 months
 - Worse after showers
 - Eyelids red and swollen all the time
 - Lid scrubs not helpful
- Medical Hx: non-contributory
- BVA 20/20 OD, OS

20 Year Old White Female

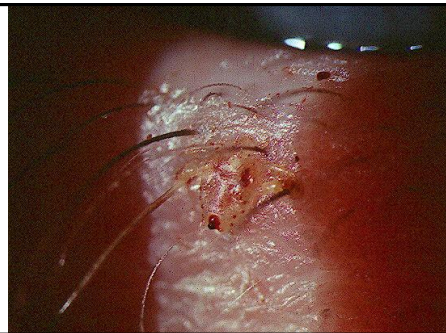
Continued...

- Significant erythema OU
- Thick crusting about lashes
- IOP normal OU
- Fundus unremarkable



20 Year Old White Female

- Can I get some more detail?



Crab Louse Infection

- **Pediculosis** refers to infestation by *Pediculus humanus corporis* (body) or *capitus* (head).
- **Phthiriasis** refers to eyelid infestation by *Phthirus pubis* (pubic louse).
 - Eyelid infestation is almost always *Phthirus pubis*.
- Phthirus organisms are 2 mm long with a broad-shaped, crab-like body
- Thick, clawed legs make it less Pediculus species



Crab Louse Infection

- Infest areas where the adjacent hairs are within its grasp (eyelashes, beard, chest, axillary region, pubic region).
 - Rarely do they infest the scalp.
- Ocular signs and symptoms:
 - visible organisms
 - reddish brown deposits (louse feces)
 - 2° blepharitis with preauricular adenopathy
 - follicular conjunctivitis
 - bilateral ocular itching and irritation

Crab Louse Infection: Treatment

- Pediculus organisms possess good mobility and can be passed from person to person by either close contact with an infested individual or by contact with contaminated bedding.
- Phthiriasis are slow moving organisms that cannot typically be passed unless cilia is brought into close proximity with infested cilia.



Crab Louse Infection: Treatment

- Forceps removal of all visible organisms and nits
 - Removed debris should be placed into an alcohol wipe and discarded
- Pediculocidal medicated shampoo
 - Lidane 1% (gamma benzene hexachloride)
 - Kwell®, Nix® or Rid®, which is a safe, effective, nonprescription pediculocide
 - NOT for ocular use



Crab Louse Infection: Treatment

- Topical therapy may include:
 - smothering lice & nits with petroleum jelly (or other bland ointment) x tid
 - 1% yellow mercuric oxide or 3% ammoniated mercuric oxide X bid
 - cholinesterase inhibitors (e.g. physostigmine)
- Typically, nits survive a single application of these agents.

Crab Louse Infection: Treatment

- Daily follow for 7 - 10 days
 - nits hatch q7-10 days
- Thoroughly wash all clothing and linens that may have been exposed.
- Patients should refrain from "interpersonal contact" until the disease is 100% resolved.
- Educate exposed partners to report for examination and evaluation.

"I'm Not Going Back in There!"

- OD-4 Student examines older male patient
- "I'm not going back in there. There are worms!"
- "I think that I am going to pass out"
- Nothing really to set up
- Social History: Recently returned from trip to Las Vegas



**"What happens in
Vegas stays in
Vegas..."**

**...isn't *necessarily*
true.**

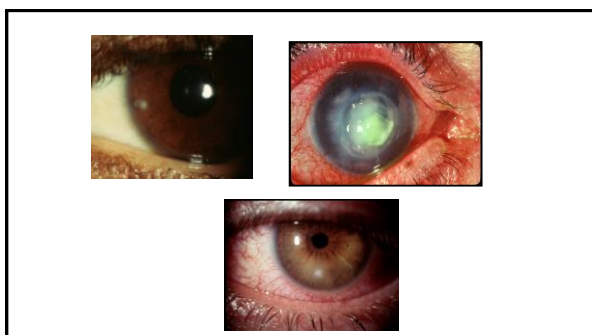
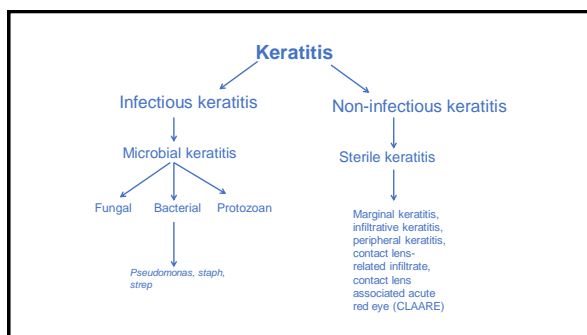
"PATCHING IN THE EMERGENCY ROOM"

- A 19 YOBF develops a red, painful right eye while wearing contact lenses
- Goes to the emergency room where they patch her eye with gentamicin after trying to remove "white foreign body".
- Med Hx: (-); No meds; NKDA
- Acuity: PH 20/100 OD, 20/20 OS
- Conjunctival injection OD
- Cornea: epithelial excavation with dense stromal infiltration and purulent discharge



So, what do you think?

What do you want to do now?



Back to the Case

- Cultures obtained
- Initiated Vigamox Q1min x 5 Min in office, then Q1H while awake
- Scopolamine in office
- F/U 24 hours

Acuity: CF @ 3"
Hypopyon



- Vigamox hourly
- Add Pred forte Q1H
 - F/U 6 hours
 - Some improvement in comfort – no worsening of ulcer
 - Continue meds
- F/U 24 hours
 - Microbiology report positive for Pseudomonas
 - Susceptible to most antibiotics
 - Improvement in comfort and inflammation

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- F/U 24 hours
- Greatly reduced inflammation
- Hypopyon resolved
- Cornea healing
- Final outcome 20/25 (with some surprises)

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Bacterial Keratitis

- Corneal defense breakdown
- Pathogen induction
- Proliferation and toxin release
- Toxic (organism) and mechanical (stromal lysis) antigens
- Antigen/antibody reaction
- Inflammatory response with infiltration
- Phagocytosis
- Enzyme release and further stromal lysis
- Antigen neutralization (hopefully)
- Cicatrization- fibroblast proliferation and scar tissue
- Vision loss

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Bacterial Keratitis

- Pain, photophobia, lacrimation
- Innocent bystander tissue involved
- A/C reaction - possible hypopyon
- Corneal infiltrate with excavation
- Wide presentation depending upon organism
 - Pseudomonas very exaggerated

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Bacterial Keratitis: Management

- Cultures
- Broad spectrum antibiotics
 - Fortified aminoglycosides and cephalosporins
 - Ciprofloxacin (Ciloxan): i/gtt q15minx 6H; Q30
 - Ofloxacin (Ocuflox): q30min, BID at night
 - Moxifloxacin or gatifloxacin Q1H (not approved)
 - Iquix; Besaflaxacin
 - Later generations (4th) have greater gram + coverage
- Cycloplegics
- Cold packs
- Corticosteroids

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Shah VM, Tandon R, Satpathy G, et al. Randomized clinical study for comparative evaluation of fourth-generation fluoroquinolones with the combination of fortified antibiotics in the treatment of bacterial corneal ulcers. *Cornea*. 2010 Jul;29(7):751-7.



Conclusion:

The study failed to find a difference in the efficacy of monotherapy with 4th-generation fluoroquinolones in the treatment of bacterial corneal ulcers of 2-8 mm size when compared with combination therapy of fortified antibiotics.

SCUT: Steroids for Corneal Ulcer Trial

- Multicenter, double-masked, placebo-controlled
- clinical trial
- 500 patients with culture-confirmed bacterial keratitis
 - all patients received topical moxifloxacin 0.5%
 - randomized to either topical prednisolone phosphate 1% or placebo
- Outcome measures: BCVA @ 3 months, time to complete reepithelialization, infiltrate/scar size and perforation.

Srinivasan M, Mascarenhas J, Rajaraman R. Corticosteroids for bacterial keratitis: the Steroids for Corneal Ulcers Trial (SCUT). *Arch Ophthalmol*. 2012 Feb;130(2):143-50

SCUT

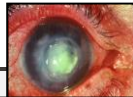
- **Conclusions:** "We found no overall difference in 3-month BCVA and no safety concerns with adjunctive corticosteroid therapy for bacterial corneal ulcers."
- **Application to Clinical Practice:** "Adjunctive topical corticosteroid use does not improve 3-month vision in patients with bacterial corneal ulcers."

Shortcomings of SCUT

- Corticosteroid regimen was too conservative.
 - Prednisolone sodium phosphate 1% QID X 1 wk, then BID X 1 wk, then QD X 1 wk
 - Initiated 48 hours after moxifloxacin therapy
- Considerations were not made for subjective measures such as:
 - Patient comfort & QOL
 - Functional visual recovery time
- How quickly did vision improve in the steroid group vs. the placebo group?
 - "At 3 weeks, corticosteroid treated patients had a 0.024 better logMAR acuity (approximately one-fourth of a line)..."

Shortcomings of SCUT

- A MINOR footnote:
 - "Corticosteroid treatment was associated with a benefit in visual acuity compared with placebo in the subgroups with the worst visual acuity and central ulcer location at baseline. These subgroup analyses suggest that patients with severe ulcers, who have the most to gain in terms of visual acuity, may benefit from the use of corticosteroids as adjunctive therapy."



Microbiologic evaluation

- Traditional cultures (TC)
- In vivo confocal microscopy (IVCM)
- Polymerase chain reaction (PCR)
- Recent study comparing all 3 for microbial keratitis:
 - Traditional cultures were best for bacteria
 - IVCM outperformed PCR and TC for fungus
 - Both IVCM and PCR better than TC for acanthamoeba
 - Recommends multimodal approach

Hoffman et al. *Eye (Lond)* November 2022

The Herpes that wasn't

- 63 YOF
- Sudden onset of unilateral blurred vision x 2 days
- No improvement
- Moderate discomfort
- 20/200 in the involved eye
- Rare cell in chamber
- Epithelium intact
- Profound corneal edema and folds in Descemet's membrane
- Suspicion: herpes (zoster or simplex) endothelialitis

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What about the history?

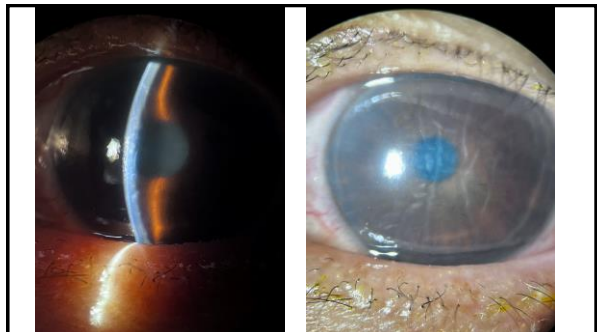
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Specific history

- When specifically asked, admitted to being lepidopterist
 - I personally consider myself a "lepidopterist"
- Had been replanting all of her milkweed
- Diagnosis: milkweed toxicity
- Characteristic: folds in Descemet's membrane and stromal edema with largely intact epithelium
- Milkweed plants produce Cardenolides, which are cardiac glycosides akin to Digitalis capable of binding to Sodium/Potassium ATPases (Na^+/K^+ -ATPases). As a result, direct ocular exposure can inhibit corneal pump function with resultant corneal edema and ocular irritation



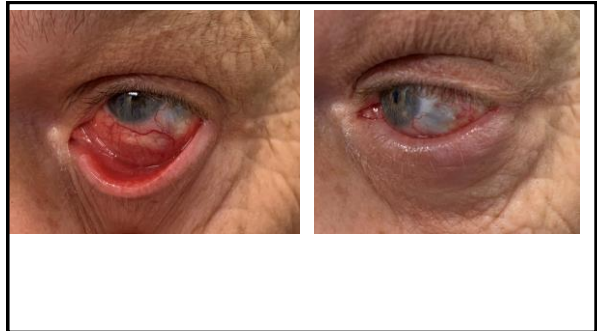
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Not a BRITE Idea

- 59-year-old man
- Red, painful, photophobic left eye- 10 days duration.
- Past hx: Cosmetic eye whitening procedure 5 years previous
- Dental work- removal of two decayed teeth
 - Spread of infection?
 - Topical polytrim- no improvement
- 20/40 OD and finger counting OS
- OS profound deep injection
- Grade 3 cell and flare reaction, stromal corneal edema, endothelial keratic precipitates, near complete posterior synechiae, dense nuclear cataract, IOP 18 mm Hg OD and 34 mm Hg OS, temporal conjunctival and scleral thinning, calcific plaque. No fundus view.

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- Anterior scleritis OS
- Topical difluprednate 0.05% QID, atropine 1% BID, Combigan BID, and oral ibuprofen 800 mg QID PO.
- His medical history was significant only for diabetes and no suggestion of autoimmune or rheumatologic diseases. He was referred for medical evaluation with a rheumatologist to search for a potential underlying cause.
 - Never went
- History becomes important

- I-Brite™ (conjunctivoplasty) is designed to remove sun-damaged tissue
- Involves both the surgical removal of conjunctiva and resection of tenon's capsule with application of Mitomycin C. Also can involve avastin. I-Brite developed by Beverly Hills Ophthalmologist
 - Now calls it WhiterEyes®
 - Also Cosmetic Eye Whitening™, performed commercially in South Korea
- One review of 1713 patients undergoing cosmetic whitening procedures noted an overall complication rate of 83%, of which 55.6% were considered severe. These severe complications included fibrovascular conjunctival tissue proliferation, scleral thinning, scleral thinning with calcified plaques, intraocular pressure elevation, diplopia, and recurrence of hyperemic conjunctiva.

Lee S, Gu J, Blum S, Shihong RD, et al. Cosmetic regional conjunctivectomy with postoperative mitomycin C application with or without bevacizumab injection. *Am J Ophthalmol*. 2013 Sep;156(3):616-22.

- 231 patients undergoing cosmetic eye whitening, 4 patients developed necrotizing scleritis.
 - Average time was 51 months
 - All had unilateral findings.
 - No underlying systemic autoimmunity or infectious etiology found.
 - Due to large area treated with MMC, necrotizing scleritis more extensive and severe
- 48 patients undergoing procedure, 92% had complications.
 - Chronic conjunctival defects, scleral thinning with or without calcified plaques, fibrovascular conjunctival adhesion at the muscle insertion site, chronic dysfunctional tear syndrome, avascular zones, abnormal vessel growth, lymphangiectasis, adhesions of Tenon capsule and the conjunctiva at the extraocular muscle insertion site, extraocular muscle fiber exposure, and diplopia

Ji YW, Park SY, Jung JW, et al. Necrotizing Scleritis After Cosmetic Conjunctivectomy With Mitomycin C. *Am J Ophthalmol*. 2018 Oct;194:72-81.
 Rhee S, Shim J, Kim EK, Chung SK, Lee JS, Lee JB, Seo KY. Complications of cosmetic wide conjunctivectomy combined with post-surgical mitomycin C application. *Cornea*. 2012 Mar;31(3):245-52.

A Stealthy Situation

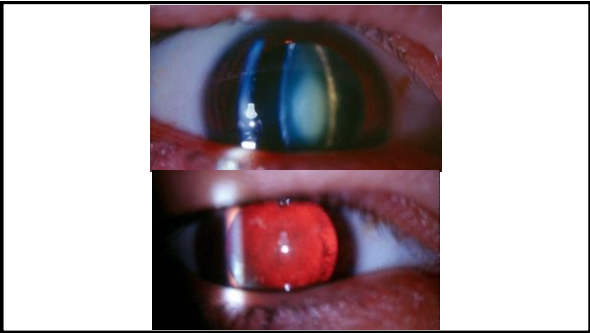
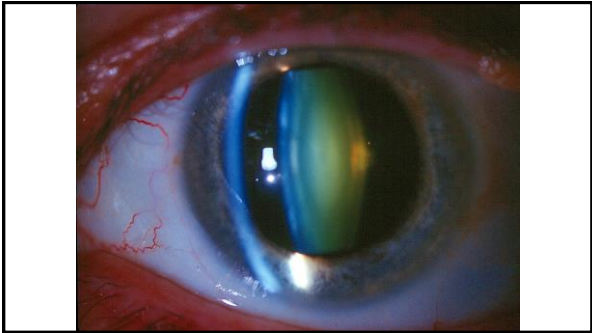
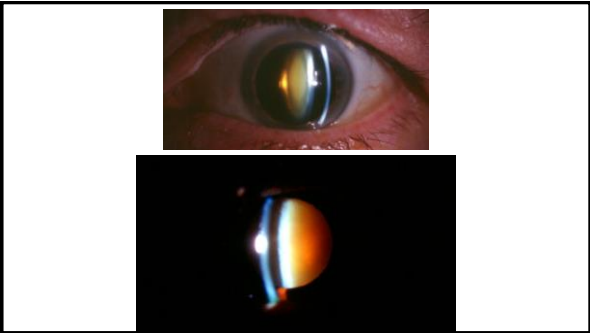
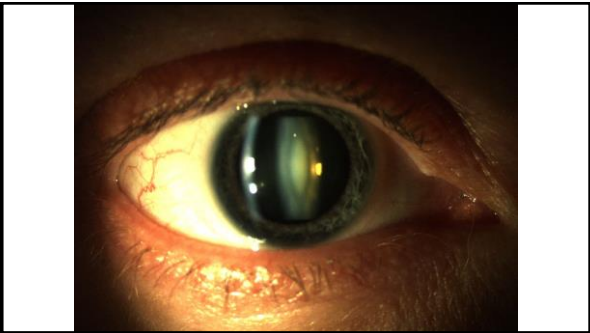
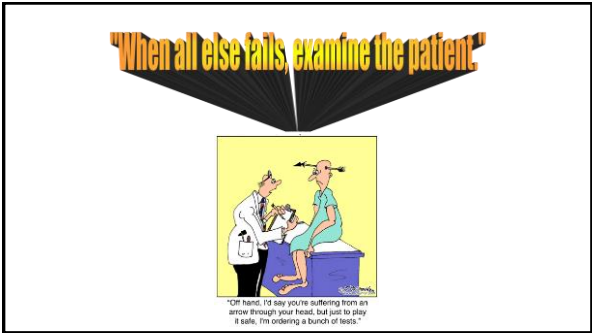
- 47 year old White male
 - 13 years post-LASIK surgery; prior Rx -10.00 OU
- CC: decreasing vision OD X 18 months
 - Gradual "regression" in the right eye ONLY over the last 3-4 years
 - Reduced BVA OD from 20/15 to 20/70
 - Monocular diplopia OD
- Medical history unremarkable

Additional testing

- Pupil testing – normal, without afferent defect
- Color vision testing – full & symmetrical
- Anterior segment biomicroscopy – normal
 - No corneal thinning or endothelial disease
 - Lenses graded as clear and symmetrical by several ECPs
- Corneal topography – normal
 - No irregular astigmatism
 - RGP lens with over-refraction – no improvement.
- Threshold perimetry – full OU
- OCT – normal macular architecture
- Fundus evaluation by retinal specialist – “perfect”
- MRI- deferred...for now

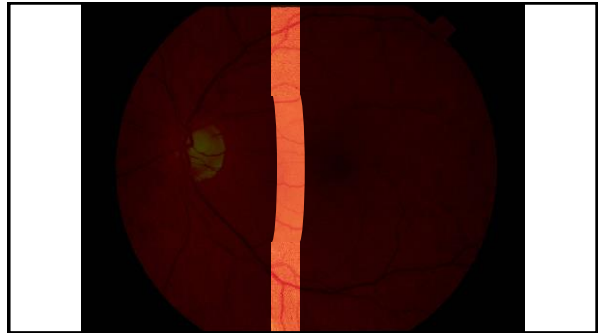
Refractive History (post-LASIK)

- 1998... Rx: OD -0.25 sph; 20/15. OS plano 20/15
- 2008... Rx: OD -0.75 sph; 20/25. OS -0.25 sph; 20/15
- 2009... Rx: OD -1.50 sph; 20/30. OS -0.25 sph; 20/15
- 2010... Rx: OD -3.00 sph; 20/50. OS -0.25 sph; 20/15
- 2011... Rx: OD -5.00 sph; 20/70. OS -0.25 sph; 20/15



“Milky” Nuclear Sclerosis

- A.K.A. “white” NS or nuclear opalescence
- Delineates a unique type of cataract
 - Not often described in the literature as a distinct clinical entity
- Specific and unusual properties:
 - Dramatic **myopic shift**
 - Significant visual impairment
 - Unobstructed view of the fundus, but differing refractive indices can produce a “bowing” effect of the slit beam



Case Continued

- Patient initially refuses to accept diagnosis
 - Eventually acknowledges cataract as possible cause
- Undergoes phaco with SV IOL
- VA 20/20 six hours after surgery
- VA 20/15 uncorrected
- Pt now accepts cataract as diagnosis

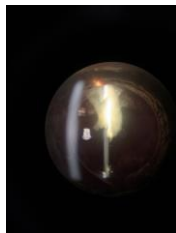
So what did we learn...?

- Not all cataracts are created equal.
- The “view in = view out” rule does not apply with milky NS.
- Be suspicious of extreme refractive shifts in older patients:
 - Hyperopic? Think retrobulbar mass.
 - Myopic? Think NS.
 - Fluctuating? Think diabetes.
- Cases commonly diagnosed by neuro-ophthalmologist
- Remember the M's
 - Myopic
 - Male
 - Middle-aged
 - Myopic shift
 - Milky NS



The Case of The Found Dinosaur

- 63 YOM c/o veiling over OD for past 2 days; VA 20/40
- Hx of lasered retinal tear- always worried about RD
- Hx cataract removal with YAG capsulotomy 15 years earlier
- Initial inspection reveals opacification behind IOL
 - But what about that YAG history?
- Grade 2 anterior chamber reaction
- IOP 32 mm OD, 15 mm OS



Phacoanaphylactic Uveitis/ Retained Lens Fragment

- Inflammatory secondary glaucoma usually due to antigenic lens materials inadvertently left in the eye.
- Autoimmunity to lens antigens, which may be left in anterior chamber following procedure.
- Occurs as a severe uveitis following cataract extraction- may be confused with endophthalmitis.
- In post-surgical cases, there will be either lens cortex or nucleus material (which may not be readily observable) that was not completely removed during the operation. When this happens, it is termed, “retained lens fragment”. Should penetrating lens trauma be the inciting factor, then the term lens particle glaucoma is used.

Phacoanaphylactic Uveitis/ Retained Lens Fragment

- Retained lens fragments may hide between IOL and posterior capsule and be protected until later.
- Initiates an open angle glaucoma without pupil block
- Nuclear lens fragments are much more likely than cortical fragments to induce this response.
- Initial inclination to increase/use steroids
 - Rarely effective in providing a cure. Short term only
 - Aqueous suppressants can be used but the material should be removed
 - Pt was placed on topical steroids and Combigan until the fragment was YAGed

The Non-Healing Abrasion:

- 30 YOWM
- Painful, red left eye x 2 weeks;
- Treated previously for "corneal abrasion"
 - Gentamicin gtt and ung with patching QHS by PCP
 - Minimal epitheliopathy
- Treated subsequently with Voltaren, debridement, bandage lens, Tobradex, E-mycin ung
 - Enjoyed Tobradex



SO...

WHAT'S THE DIAGNOSIS?

Herpes Simplex Disciform Keratitis: Signs and Symptoms

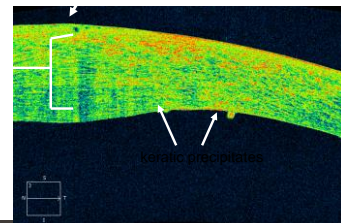
- Discrete disc shaped areas of focal stromal edema
- Stromal infiltration
- Central or peripheral
- Epithelium intact
- Pain
- Photophobia
- Lacrimation
- Vision loss
- Avascular



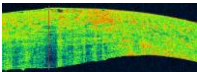
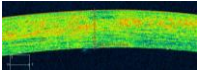
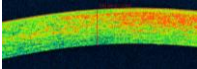
microcystic edema

stromal edema

keratic precipitates



OCT Progression

Date		Corneal Thickness
Sept. 21		900µm
Sept 24		564µm
Oct 12		540µm


Herpes Simplex Stromal Disease: Disciform Keratitis

- Discrete disc shaped areas of focal stromal edema
- Central or peripheral
- Typically mild, epithelium intact, avascular

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Herpes Simplex Disciform Keratitis

- Delayed hypersensitivity reaction to HSV
 - No active virus present
- Self limiting- manage conservatively
 - Cycloplegia & lubrication
- topical steroids
 - Lowest concentration to quell disease
- Prophylactic topical antivirals if steroids are used (more than BID)
- Oral antivirals not helpful

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