Case Presentation

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HPI: S.P. is a 67 y.o. male with history of glaucoma who follows up for decreased vision and glare
• **POHx:**
  - Refractive error (hyperopia)
  - Cataracts
  - Pseudoexfoliative glaucoma
    - s/p SLT OS 02/2009
    - s/p SLT OD 01/2008

• **Ocular Meds:**
  - Cosopt BID OU; Travatan qHS OU
- **PMHx:**
  - Hypertension
- **FHx:**
  - Diabetes mellitus
  - Cancer
- **SocHx:**
  - No tobacco or IVDU; unremarkable
- **Meds:**
  - Atenolol
  - Zesteretic
- **Allergies:**
  - NKDA
• OD
  ◦ VA: 20/25
  ◦ IOP: 23
  ◦ Extnl
    ▸ Hypertrichosis
  ◦ SLE
    ▸ 2+ nuclear sclerosis
    ▸ Fibrillary deposits
  ◦ Fundus
    ▸ C:D 0.65 x 0.65

• OS
  ◦ VA: 20/25
  ◦ IOP: 18
  ◦ Extnl
    ▸ Hypertrichosis
  ◦ SLE
    ▸ 2+ nuclear sclerosis
    ▸ Fibrillary deposits
  ◦ Fundus
    ▸ C:D 0.5 x 0.5
• **Assessment**
  - Pseudoexfoliative glaucoma
  - Cataracts, visually significant

• **Plan**
  - Cataract extraction with endoscopic cyclophotocoagulation, (ECP) right eye
• CC: no complaints
• VA: 20/30
• IOP: 31
• SLE:
  – Irregular pupil
  – AC w/ viscoelastic ; 1+ cells
  – IOL well positioned
  – Fundus WNL
• A/P:
  – s/p CE/IOL and ECP with post-op elevated pressure
    – Travatan, Combigan, and Azopt given → IOP 15
    – Continue hypotensives
    – Continue post-op regimen of Xibrom, Vigamox, Durezol
11/5/09 POD#3 - Emergency

- **CC:** vision black out x30 min. after rubbing eye
- **VA:** 20/30
- **IOP:** 7
- **SLE:**
  - AC deep/quiet; no active leak
  - IOL in good position
  - Fundus WNL
- **A/P:**
  - s/p CE/IOL and ECP with post-op elevated pressure, now low IOP
    - May have “burped” his wound, causing lower IOP
    - Avoid eye rubbing, given self-sealing wound
  - Continue post-op regimen: Vigamox, Xibrom, Durezol
  - F/U 1 week
• CC: No complaints
• VA: 20/20
• IOP: 18
• SLE
  – AC deep/quiet
  – IOL in good position
  – Fundus WNL
• A/P
  – s/p CE/IOL and ECP
    – Excellent post-op course
    – D/C Vigamox; continue Xibrom, Durezol
    – F/U 3 wks for dilated examination
11/10/09 POD#8 - Emergency

- CC: eye pain o/n; blurry vision in AM
- VA: 20/25 (PH: 20/20)
- IOP: 15
- SLE:
  - No lid edema
  - AC deep; 4+ cells with hypopyon
  - IOL in good position
  - Fundus WNL
Differential of severe post-op inflammation
Differential of severe post-op inflammation

- Infectious endophthalmitis
  - Progressive, often severe pain (NOT always)
  - Deteriorating vision
  - Inflammation – fibrin in AC, hypopyon, vitreous cell
Differential of severe post-op inflammation

- Infectious endophthalmitis
  - Progressive, often severe pain (NOT always)
  - Deteriorating vision
  - Inflammation – fibrin in AC, hypopyon, vitreous cell

- Retained lens material
  - Autoimmune reaction to lens protein
  - Mutton-fat KP
• Differential of severe post-op inflammation
  ○ Infectious endophthalmitis
    ▫ Progressive, often severe pain (NOT always)
    ▫ Deteriorating vision
    ▫ Inflammation – fibrin in AC, hypopyon, vitreous cell
  ○ Retained lens material
    ▫ Autoimmune reaction to lens protein
    ▫ Mutton-fat KP
  ○ Aseptic endophthalmitis/sterile endophthalmitis
    ▫ Sterile postoperative uveitis caused by excessive tissue manipulation or toxic substance
    ▫ May present with hypopyon and mild vitreous reaction
    ▫ Lacks profound pain and visual loss
CC: eye pain o/n; blurry vision in AM
VA: 20/25 (PH: 20/20)
IOP: 15
SLE:
  - No lid edema
  - AC deep; 4+ cells with hypopyon
  - IOL in good position
  - Fundus WNL
11/10/09 POD#8 - Emergency

CC: eye pain o/n; blurry vision in AM
VA: 20/25 (PH: 20/20)
IOP: 15
SLE:
  - No lid edema
  - AC deep; 4+ cells with hypopyon
  - IOL in good position
  - Fundus WNL
A/P:
  - Severe intraocular inflammation in early post-op course
    - Change Durezol and Zymar to q1hr
    - Add Atropine
    - F/U 1 day
11/11/09 – POD# 9

- **CC:** blurry vision; mild discomfort – no pain
- **VA:** 20/50
- **IOP:** 21

**SLE:**
- Conjunctival injection 1+
- AC w/ 4+ cell, fibrin at lens; hypopyon
- Fundus WNL

**A/P**
- Severe post-op inflammation, possible endophthalmitis
  - AC tap and culture
  - AC antibiotic injection – Vancomycin and Amikacin
11/12/09 – POD#10

- CC: pain and blurred vision
- VA: CF, close
- IOP: 38
- SLE:
  - AC w/ 4+ cell, fibrin
  - Limited view; red reflex only
- A/P
  - Diamox 500mg PO given
11/12/09 – POD#10

- CC: pain and blurred vision
- VA: CF, close
- IOP: 38
- SLE:
  - AC w/ 4+ cell, fibrin
  - Limited view; red reflex only
- A/P
  - Diamox 500mg PO given
  - MEEI microbiology: gram negative rods seen, sensitivity pending
11/12/09 – POD#10

- CC: pain and blurred vision
- VA: CF, close
- IOP: 38
- SLE:
  - AC w/ 4+ cell, fibrin
  - Limited view; red reflex only
- A/P
  - Diamox 500mg PO given
  - MEEI microbiology: gram negative rods seen, sensitivity pending
  - Hospitalize for bacterial endophthalmitis
    - IV Abx; intravitreal injections today
11/12/09 – POD#10

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- VA: CF, close
- IOP: 38
- SLE:
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- VA: CF, close
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- SLE:
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  - Diamox 500mg PO given
  - MEEI microbiology: gram negative rods seen, sensitivity pending
  - Hospitalize for bacterial endophthalmitis
    - IV Abx; intravitreal injections today
- ID consult as patient now reveals ➔ he is HIV positive
  - IV Levaquin and Ceftriaxone
Bacterial Endophthalmitis

• Definition
  - Inflammatory reaction of intraocular fluids caused by microbial organisms

• Pathophysiology
  - Bacterial entry via breakdown of ocular barriers (penetration via cornea or sclera); may be endogenous infection seeded hematogenously

• Epidemiology
  - U.S. Seen in <0.1% after intraocular surgery
    - Cataract surgery: 0.1%
    - Pars plana vitrectomy: 0.05%
    - Bleb-related: 0.2 – 9.6%
    - Post-trauma: 2.4 – 8.0%
    - Intraocular foreign body: 30%

• Morbidity
  - Vision loss, persistent pain
  - Rare extension beyond the globe
• Clinical presentation
  – Blurry vision
  – Red eye
  – Increasing, deep ocular pain

• Physical findings
  – Decreased acuity
  – Lid edema
  – Conjunctival hyperemia
  – AC cells/flare, ± hypopyon, ± fibrin
  – Vitritis; loss of red reflex

• Specific findings
  • Delayed onset: white plaque at lens capsule equator
  • Bleb-related: purulent bleb
  • Endogenous: systemic illness
Classification

- **Exogenous**
  - Acute post-operative (<6 wks)
  - Delayed onset post-operative (>6 wks)
  - Filtering bleb-associated
  - Post-traumatic

- **Endogenous**
  - Septicemia
  - Debilitated state
  - Indwelling catheter
  - IVDU
**Pathogenesis**

- **Acute**
  - Coagulase-negative Staph
    - *S. epidermidis* (most)
  - *S. aureus*
  - Enterococcus
  - Gram-negative (30%)
- **Delayed**
  - Propionibacterium acnes
  - Coagulase-negative Staph
  - Corynebacterium
- **Bleb-related**
  - Streptococcus
  - Haemophilus influenzae

- **Post-traumatic**
  - Bacillus
  - *S. aureus*
- **Endogenous**
  - *S. aureus*
  - E. coli
  - Streptococcus
<table>
<thead>
<tr>
<th>Origin</th>
<th>Prophylaxis</th>
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<tbody>
<tr>
<td>Eyelids/conjunctiva</td>
<td>10% povidone-iodine for skin</td>
</tr>
<tr>
<td>Secondary lacrimal system infection</td>
<td>5% povidone-iodine for ocular surface</td>
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<td>Contaminated eyedrops</td>
<td>Pre-operative topical broad-spectrum antibiotics to decrease bacterial load</td>
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<tr>
<td>Contaminated surgical instruments, IOLs, or irrigation fluid</td>
<td>Subconjunctival antibiotics at end of intraocular surgery</td>
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Work-up

- B-scan: if limited view of fundus
  - R/O detachment, retained lens material
  - May note choroidal thickening
- Systemic work-up if endogenous:
  - Pan-culture (blood, sputum, urine)
  - CXR
  - 2D ECHO
- Culture and sensitivity of aqueous & vitreous
Endophthalmitis Vitrectomy Study (EVS)

- 420 eyes post-cataract extraction w/ suspicion for bacterial endophthalmitis and VA 20/50 or worse
  - Randomized to intravenous antibiotics or not
  - Randomized to initial PPV w/ intravitreal Abx vs. initial AC/vitreous tap with intravitreal Abx (re-treatment w/in 36-60 hours if eyes doing poorly)

Conclusions

- Intravenous antibiotics not beneficial
- VA HM+ → medical treatment as effective as surgical
- VA LP- → PPV with intravitreal Abx injections
• **Treatment**
  - **Intravitreal antibiotics**
    - Vancomycin 1mg/0.1mL
    - Ceftazidime 2.25mg/0.1mL or Amikacin 0.4mg/0.1mL
  - **Intravitreal steroid**
    - Dexamethasone 0.4 mg/0.1 mL
  - **Cycloplegic**
  - **Fortified topical medications**
    - Vancomycin 50mg/mL
    - Ceftazidime 50mg/mL
    - Pred forte 1%
  - **Topical corticosteroid**
Treatment concerns

- Ceftazidime vs amikacin for gram negatives?
  - Concern regarding ceftazidime-resistant bacteria
  - Aminoglycosides associated with macular toxicity
    - Macular ischemia with capillary closure and telangiectasias following amikacin and vancomycin
    - Macular infarction after intravitreal injections of amikacin, vancomycin, and dexamethasone

- Toxicity from repetitive intravitreal injections?
  - Preretinal hemorrhages seen after two intravitreal injections of cephazolin and amikacin, 48 hrs apart
  - Rabbit study evaluating combined amikacin and vancomycin repetitive intravitreal injections, 48 hrs apart
    - No toxicity after single injection
    - 50% focal retinal toxicity on histologic study
    - 100% eyes with histologic evidence of advanced retinal toxicity, primarily at photoreceptor outer segments and RPE
• **Inpatient care**
  - May be needed depending on
    • Severity
    • Patient reliability/compliance
    • If underlying systemic disease

• **Outpatient care**
  - Factors denoting improvement
    • Decreased pain
    • Decreased inflammation/fibrin retraction
    • Improved vision
• **Complications**
  - Retinal necrosis
  - Retinal detachment
  - IOP elevation
  - Vascular occlusion
  - Panophthalmitis
• Prognosis
  – Factors influencing prognosis
    • Duration
    • Time to treatment
    • Virulence of bacteria
    • Etiology of entry
    • Existing ocular disease
  – Final VA 20/100+ in the EVS:
    – Percentage of patients achieving VA of 20/100+:
      – *S. aureus* - 50%
      – Streptococci - 30%
      – Enterococci - 14%
      – Gram-negative organisms - 56%
11/19/09 – POD#17

• CC: S.P. reports improved vision
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VA: 20/50
IOP: 16
11/19/09 – POD#17

- CC: S.P. reports improved vision
- VA: 20/50
- IOP: 16
- SLE:
  - Cornea w/ fine KP
  - AC w/ trace cell
  - PCIOL; 2+ PCO
  - 2.5+ vitreous cell; limited view of retina
• CC: S.P. reports improved vision
• VA: 20/50
• IOP: 16
• SLE:
  – Cornea w/ fine KP
  – AC w/ trace cell
  – PCIOL; 2+ PCO
  – 2.5+ vitreous cell; limited view of retina
• A/P
  – Post-operative Pseudomonas endophthalmitis, improving
    – Zymar QID and Pred Forte on slow taper
    – Future plan for YAG +/- PPV
    – Levaquin 500mg daily (10 day course)


Cornut PL, Chiquet C. [Intravitreal injection of antibiotics in endophthalmitis.]* J Fr Ophtalmol.* 2008; 31: 815-23.


• Thank you