

Eye Infections

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Case 1

- 19 yr-old college student presents to his student health service with a 1 day history of R eye redness, but no eye discharge. He has no history of prior eye problems and doesn't wear contact lenses.
- He is diagnosed with conjunctivitis and prescribed topical ointment.

Case 1, continued

- Over the next 3 days, he notes blurring in his peripheral vision OD and pain, especially with eye movement. He returns to the health service.

Case 1, continued

- He has been otherwise well
- PMH: herpetic whitlow recurrences on R hand since age 2 (acquired in day care). Last outbreak was 2 years ago.
- General PE negative

Is this conjunctivitis?

Is this conjunctivitis?

- No, because he has eye pain and decreased vision – neither are features of conjunctivitis.
- The rapid progression and unilateral involvement make a serious eye infection likely.

Case 1, eye examination

- Vision OD = 20/70; cornea clear, but view of fundus is hazy.
- Vision OS = 20/20; cornea and fundus appear normal.

Case 1, continued

- Retina specialist sees patient and calls you.
- She relays that OD exam shows a clear cornea, “3+ cells in AC (anterior chamber), 3+ vitritis (WBC’s in vitreous), blurred disc margins, and peripheral retinal whitening with vasculitis”.
- What is his diagnosis?

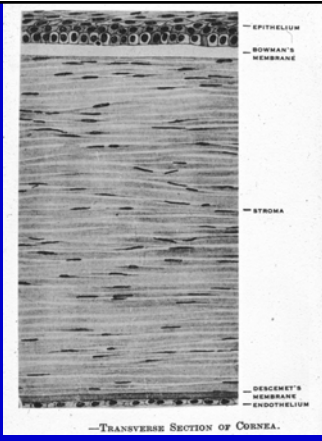
Vision-threatening eye infections

- Keratitis
- Endophthalmitis
- Uveitis

Keratitis

- Infection of the cornea.
- Symptoms: eye pain, decreased vision.
- The cornea usually appears abnormal, even to flashlight examination
- 3 types:
 - epithelial
 - interstitial
 - ulcerative

- Cornea = 0.5 mm thick
- Avascular, but many sensory nerve fibers
- 75% of refractive power of eye
- 5-cell thick epithelium = barrier to infection.
- endothelium – keeps aqueous out of cornea



Keratitis: contact lens wear = major risk factor for keratitis

- Pseudomonas, Fusarium, Acanthamoeba
- Use daily wear disposables, or carefully disinfect contact lenses
- Change your lens cases often: they develop biofilm (supports Acanthamoeba)
- Never sleep in contact lenses

Case 1: Does he have keratitis?

- No, the cornea is normal on exam.

Endophthalmitis

- Bacterial or fungal infection inside the eye that involves the vitreous and/or aqueous
- Exogenous or endogenous

Endophthalmitis: exogenous vs. endogenous

- Exogenous: bacteria or fungi enter the aqueous and/or vitreous from keratitis, trauma, or surgery.
- Endogenous: bacteremic or fungemic seeding of the vitreous. Common sources: endocarditis, urosepsis, liver abscess, indwelling lines, IVDU

Endophthalmitis

- Note that systemic infection may seed the eye, but not the other way around – endophthalmitis never causes bacteremia or fungemia.

Case 1: Does he have endophthalmitis?

- Unlikely.
- No reason for exogenous endophthalmitis (no eye trauma or surgery)
- No reason for endogenous endophthalmitis (no systemic symptoms, no indwelling lines, no history IVDU, etc.).

Uveitis

- Inflammation of the uvea or retina
- Most cases are non-infectious
- Uvea: highly vascular, pigmented, middle layer of the eye:
 - iris
 - ciliary body
 - choroid

Uveitis categories

- Uveitis is classified into 4 categories by the primary anatomic site of inflammation
- Anterior (iris and/or ciliary body)
- Intermediate (anterior vitreous and pars plana)
- Posterior (choroid, retina or both)
- Panuveitis

Infectious Uveitis

- Most cases of uveitis either have a rheumatologic etiology or are idiopathic
- Only 20% of all uveitis cases have an infectious etiology, but the frequency varies by category

Causes of anterior uveitis

- 90% autoimmune or idiopathic
- 10% infectious causes:
 - HSV (9%)
 - syphilis or mycobacteria (<1%)

Case 1: Does he have anterior uveitis?

- No. Findings were not confined to AC (anterior chamber).
- Although there were WBC's in AC, the primary findings were in the back of the eye – 3+ vitritis, peripheral retinal whitening and vasculitis
- Does he have posterior uveitis?

Posterior uveitis

- Usually painless (unless there is spillover of inflammation into aqueous)
- 40-50% of cases are due to infection
- Major causes:
 - Toxoplasmosis (25%-40%)
 - ARN = acute retinal necrosis (6%), due to VZV, HSV, rarely CMV
- Less common: CMV retinitis, toxocara, syphilis, Candida

Ocular toxoplasmosis

- Most common cause of posterior uveitis in U.S.
- Exam: active (yellow-white) lesion next to old black scar
- vitritis is present in nearly all cases
- 2/3's of patients have recurrences (treatment doesn't kill toxoplasma cysts)

Acute Retinal Necrosis (ARN)

- Acute, necrotizing retinitis – mainly affects immunocompetent patients
- HSV, VZV (also CMV in immunocompromised)
- Typically starts with unilateral anterior uveitis, then retinitis
- Retinitis starts in peripheral retina, followed by a rapid circumferential progression of necrosis
- sharp demarcation of retinal whitening; marked inflammation in vitreous and aqueous, vasculitis
- Symptoms: mild eye pain, then decreased vision

ARN, continued

- Unilateral in most, but 1/3 develop ARN in other eye within 6 wks if untreated
- retinal detachment in 1-5 mos. in 50%
- Treatment is a medical emergency
- Rx IV acyclovir 10mg/kg q8h (use ganciclovir if CMV likely) x 2 wks, then valacyclovir x months
- If rapid progression is not halted quickly (e.g. 24 hours), inject intravitreal ganciclovir or foscarnet.

Case 1: Does he have posterior uveitis?

- Yes. Exam: "3+ vitritis, blurred disc margins, and peripheral retinal whitening with vasculitis."

Case 1, ARN

- Rx IV acyclovir – retinitis halted rapidly
- After 2 weeks, switched to po valacyclovir to be continued x months
- 4 weeks later, vision 20/30

Case 2

- 22 yr-old presents with 1 week of decreased vision and eye pain OD. She had seen a retina specialist 4 days ago, who diagnosed posterior uveitis and started empiric therapy for toxoplasmosis (clindamycin, pyrimethamine, sulfadiazine) and ARN (valacyclovir). Her vision worsened, and she was referred to MEEI.

Case 2, continued

- She had a cold 2 weeks ago, but this was gone. She denied any medical problems except oxycodone addiction, for which she took methadone. She initially denied IVDU, but with family member out of room, acknowledged using heroin once, 1 month ago.
- Exam: afebrile, normal PE except vision OD = CF at 1 foot.

Measuring low vision

- 20/200 – legal blindness
- 20/400 – big “E” on Snellen chart
- “count fingers” vision (e.g. CF @ 1 foot)
- “hand motion” (HM) vision
- “light perception” (LP)
- NLP = no light perception

Case 2, continued

- Funduscopic appearance looks subacute, so not typical of ARN.
- The vitreous inflammation is in clumps, and there are deep retinal infiltrates (as if infection is coming from the choroid).
- No old scar, so not typical of toxoplasmosis.

Case 2: Is this endogenous endophthalmitis?

- You suspect endogenous endophthalmitis due to a subacute organism, such as fungus. The “clumps” and “strands” in vitreous are typical of fungus.
- Seeding in bacteremia or fungemia is usually to the highly vascular choroid first, so endogenous endophthalmitis may present as a posterior uveitis.

How do you make the diagnosis?

- Draw blood cultures
- Sample the vitreous

Case 2, diagnosis?

- BC's are negative
- Vitrectomy performed, and empiric vancomycin, ceftazidime, amphotericin are injected at end of case
- Vitreous culture: *Aspergillus niger*
- Dx: endogenous fungal endophthalmitis
- Rx voriconazole x several months.

Case 3

- A 75 yr-old man with IDDM presents to the EW with L eye pain and blurred vision for 2 days. He has had chills for 3 months and sweats for 2 nights, but no fevers. Exam is normal except for his L eye.

Case 3 -- continued

- Vision OS: hand motion at 2 feet.
- Exam: normal cornea, hypopyon, 4+ vitritis.

Case 3: Diagnosis?

- Vitrectomy
- Blood cultures

Case 3 -- conclusion

- BC's turn positive for *S. aureus* the next day. Source never found.
- Eye injected with antibiotics (the most important component of endophthalmitis treatment)
- Rx IV nafcillin x 6 weeks for occult Staph bacteremia.

Endophthalmitis treatment

- Intravitreal antibiotics are the most important component of treatment. Empiric: intravitreal vancomycin plus ceftazidime. The benefit of systemic antibiotics is unknown.
- Reinject 48 hours later if eye is not improving
- Perform vitrectomy (PPV) if initial vision poor or rapidly worsening, or if not better after "tap and inject". Randomized study (EVS 1995) of postcataract endophthalmitis showed much better outcomes in patients presenting with severe vision loss (LP) who had PPV rather than "tap/biopsy". Because of study design problems, this result may have applied to all cases.

Case 4: slowly progressive peripheral vision loss

- 63 yr-old man is referred to you by his PCP for painless peripheral vision loss OU (both eyes), worsening x 1.5 years. He wonders if there is an infectious etiology.
- Patient has had poor vision OD since BRVO 15 years ago, but now both eyes have poor peripheral vision. He takes no eye drops. He last saw an ophthalmologist 8 months ago.

Case 4, continued

- History of false-positive low RPR x 45 years; FTA's always negative.
- 8 months ago, the ophthalmologist he'd been seeing told him he had Q fever, although serology was negative. The patient was skeptical of dx. This ophthalmologist was known for his belief that all eye problems have an infectious etiology. He gave the patient prescriptions which he didn't fill. The patient shows you those prescriptions.

Case 4: med list

- Prescriptions given to patient 8 months ago by ophthalmologist (which patient didn't fill):
 - minocycline
 - clarithromycin
 - timolol eyedrops OU

Case 4: peripheral vision loss

- What diagnosis is your chief concern?

Case 4, continued

- You advise same day exam by an ophthalmologist.
- Vision: OD CF's (old), OS 20:20
- Bilateral constricted visual fields
- IOP: OD 30, OS 29 (normal 10-20)
- Cup to disc ratio: OD 0.8, OS 0.5 (nl 0.3)
- Diagnosis?

Case 4, conclusion

- Glaucoma
- Repeat serologies are negative for any infectious diseases
- He is treated for glaucoma. 1 year later, vision is stable with no further loss of peripheral vision.
- Not all eye disease is due to infection.

Case 5: Rapid vision loss

- 38 yr-old patient from India presents with 1 month of painless vision loss and bilateral retinitis. Despite Rx in India with high-dose steroids and then IV acyclovir, her vision had decreased from 20/20 to 20/400 in 4 weeks. The etiology was unknown, and she flew to the U.S. for a 2nd opinion.
- In India: negative Mantoux, chest CT, HIV, and PCR of vitreous biopsy for HSV, VZV, CMV.

Case 5, continued

- 2 expert ophthalmologists (Retina and Uveitis) have seen her in past 2 days and don't know the etiology of her uveitis. The exam worsened over the 1st 24 hrs so she was started on valganciclovir empirically, and referred to you.
- She gives you funduscopy photos.

Case 5: What do you do?

- Call ophthalmologists and ask them what their differential diagnosis is based on the eye exam alone.
- Answer:
 - sarcoidosis,
 - viral (HSV, VZV, CMV),
 - TB

? sarcoid, viral, or TB?

- Against sarcoid: neg chest CT, history of no response to high dose steroids
- Against viral: IV acyclovir should have treated HSV and VZV. CMV retinitis is unlikely in HIV-negative, healthy patient
- Against TB: Mantoux neg in India 1 month ago and chest CT clear.

Case 5: Do something

- Place PPD (even though negative 3 weeks ago in India), repeat labs, CXR
- Next day: uveitis specialist says retinitis now stable after 2 days po valganciclovir, so admit for empiric IV ganciclovir induction, even though CMV seems unlikely (Ag returns negative, IgM negative, HIV neg, labs normal).
- After 24 hrs IV ganciclovir, eye exam stable, but PPD positive 20mm (chest CT still neg); start INH, rifampin, PZA. Continue ganciclovir then valganciclovir.

Vision improved

- On anti-TB meds plus valganciclovir, retinitis clears and vision improves. No side effects from the meds.
- Diagnosis? Ocular TB vs viral retinitis?
- Why not biopsy the vitreous or retina? Too risky.
- 5 weeks later she returns to India, vision OD 20/50, OS 20/70.
