Botched: Now What?

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2024 Vision Expo West

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- Visus Pharmaceuticals: Advisory Board

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Optometric Comanagement

- High quality eye care
- Benefits to patient care
  - Patient comfort
  - Patient convenience
  - Efficiency
  - Cost effective
- Utilize skills and expertise of each practitioner

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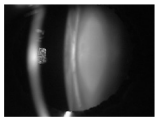
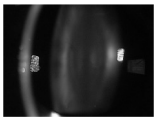
My Vision is Worse

- CC: Referred for cataract evaluation, blurred VA OD>OS
- BCVA:
  - OD -5.50+1.25X015 20/50
  - OS -1.25+1.50X180 20/20-1

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Post-Operative One Month Follow-up

- OD phone consult – Reports decreased VA OD
- Reported VA at 1 week was uncorrected 20/20
- No observable inflammation/swelling
- Recommended f/u to clinic for OCT and start NSAIDs/Steroids

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2nd Opinion Post Surgery

- VA OD was blurry, compliant w/ drops
- BCVA OD 20/40-1 PH/NI
- SLE: 2+SPK OD / PCIOL – 1+ PCO / Macula edema??

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Traditional Complications

- Ocular surface disease
- Posterior capsular opacification
- Cystoid macula edema
- Vitreous prolapse

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Cystoid Macular Edema

- OCT Findings
- Fluorescein Angiography
  - If OCT findings unclear
- Assessment
  - CME OD
  - PCO OD
  - DES OD
- Plan
  - Difluprednate QID / Bromfenac BID
  - F/u One Month OCT-M

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Cystoid Macular Edema

Courtesy of University of Pittsburgh Visual Imaging

- CME is the most frequent cause of visual decline following *uncomplicated* cataract surgery
- Late on-set (*4 to 6 weeks* post-operatively) [1]
- Estimated to occur in 1-3% of low-risk cataract cases
- CME development is due in part to prostaglandin-mediated breach of blood-retinal barrier[3]

1. Samiy N, Foster CS. The role of nonsteroidal antiinflammatory drugs in ocular inflammation. *Int Ophthalmol Clin.* 1996;36(1):195-206.
2. 2. Mishima H, Masuda K, et al. The putative role of prostaglandins in cystoid macular edema. *Prog Clin Res* 1989;31:251-264.

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Risk Factors for CME

- Pre-existing ocular inflammation
- Diabetic retinopathy
- Any ocular vascular disease
- Cardiovascular disease
- Epiretinal / vitreoretinal membrane

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Cystoid Macular Edema

- Self-limiting for the first several weeks
- Diagnosis: SLE, OCT, IVFA
- Treatment: *treat aggressively*
  - Steroids / NSAIDS qid X 1-3 months
    - 50% recover in 6 mos
  - Consider oral steroid, periocular steroid injection, pars plana vitrectomy
  - Acetazolamide po

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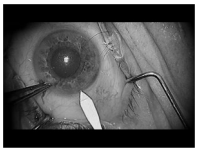
Operative Complications

- Inadequate pupil size
  - IFIS (tamsulosin)
- Iris prolapse
  - Poor wound construction
  - Posterior vitreous pressure
  - Hyperopic eyes
- Zonular dehiscence
  - Trauma
  - Pseudoexfoliation
- Dropped nucleus
- Capsular tear



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What to Look for After Cataract Surgery?

- 1 day – low IOP
  - Wound leak - BCL vs. Suture
- 3-7 days – Endophthalmitis
- 4-6 weeks – CME
- 2 months – Posterior capsule opacification

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2/09/23
85 YOWF Referred for blurry vision OD

- Reports falling a week ago and vision seems to be blurry since the fall. Reports redness inside the eye. No pain.
- Oc Hx: Phaco 2017 OU, AMD Dry OU
- Med Hx: RA, Hypothyroid, HTN
- Medications: ASA, hydrochlorothiazide, propranolol, benazepril, AREDS 2, levothyroxine
- Allergies: None

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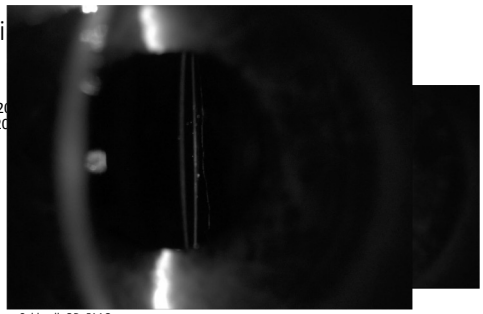
Exami

- BCVA:
  - OD 2
    OS 2



Photos Courtesy of Greg Caldwell, OD, FAAO

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Capsular Distention Syndrome

- Rare
- Fluid accumulates in between the intraocular lens and posterior capsule
  - Originates from LEC products and becomes more opaque/milky
- Can be asymptomatic
- Possible myopic shift
- Risk Factors: Retained OVD, insufficient sub-incisional cortical cleaning, IOL and the anterior capsular bag apposition and postoperative inflammation and IOL sequestration with *Propionibacterium acnes*.
- Treatment: YLC

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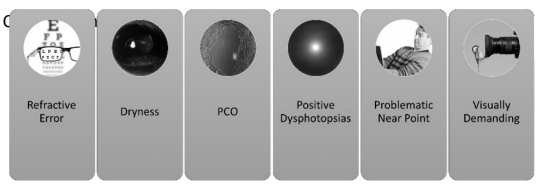
20/Unhappy

C



Woodward MA, Randleman JB, Stulting RD. Dissatisfaction after multifocal intraocular lens implantation. Journal of cataract and refractive surgery. 2009;35(6):992-997. doi:10.1016/j.jcrs.2009.01.031.

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What would you do?

- Cataract surgery with MFIOL performed 3.21.19 OS and 4.4.19 OD
- June 3rd, referred back by OD for YAG eval
  - c/o blur, trouble with fluorescent lights and difficulty with night driving due to halos. Vision doesn't seem right since after surgery
  - SC: 20/50 OD, 20/25 OS
  - BCVA: 20/30 OD, 20/25 OS
  - PCO noted on examination
  - Examined 8.8.19 by Surgeon - 2+ PCO noted OU

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So, Why Not Perform a YLC Yet?

- Takes time for brain to adapt to MFIOL
  - Symptoms noted: halos, difficulty with bright lights
- Not all people can adapt, may need an IOL exchange
- Cannot perform YLC until IOL exchange is ruled out
  - Would need capsular bag in place to replace the lens
  - Plan: RTC 3 months for BAT/MRX/re-evaluate

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Neuroadaptation of Multifocal IOLS

- Patients' expectations of time frame needed to adapt needs to be managed
  - These patients require more counseling post-op
  - Neuroadaptation can take as long as 6-12 months
  - About 10% never neuroadapt (will need IOL exchange)
  - No way of testing before surgery which patients will be able to adapt vs not
- Multifocal IOLs will induce more aberrations than monofocal IOLs

Take away: no YLC to be performed until rule out that IOL exchange is necessary

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Refractive Enhancement: Laser Vision Correction (LVC)

- **Timing is everything!**
- Wait at least 2-3 months after cataract surgery for wounds and LRIs to settle
- Nd:YAG posterior capsulotomy BEFORE LVC
  - **No YAG in multifocal IOL that was never happy**

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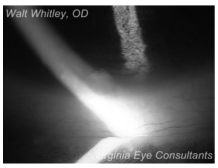
Case Example

- 62 yowm, cataract sx three weeks prior
- VAsc OD: 20/25
- IOP OD: 15 mmHg
- SLE: Mild K edema / 1 + cells / IOL centered



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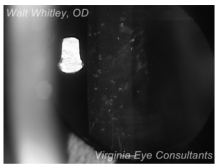
Case Example

- 77 yowf
- S/P Phaco OS 6 months prior
- VAsc: 20/30
- IOP: 12 mmHg
- SLE: tr cells



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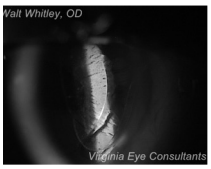
Case Example

- 68 yowm
- s/p ACIOL OD
- Mild low grade inflammation



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Why So Stubborn?

- 47YOM presents for 1 day post op PRK OU
  - Prior LASIK in 2004
- 1 day post op UCVA
  - OD 20/80
  - OS 20/100
- BCLs noted and in place
- Medications
  - Moxifloxacin QID for 7 days
  - Prednisolone QID, TID, BID, QD each for 1 week
  - Bromfenac BID for 7 days
  - Gabapentin 300mg TID for 4 days
    - Shown to decrease post operative pain after PRK[1]
    - Gabapentin is a schedule V medication in some states
  - 2 tablets of Ativan called in to take as needed
    - Lorazepam is a schedule IV medication
  - PF ATs a minimum of QID
- RTC 3 days for BCL removal OU

Treatment	Sph	Cyl	Axis	BCDVA
OD	-1.25	-0.75	118	20/20 -2
OS	-0.50	-1.00	020	20/20

1. Lichtinger, A, et al. "Gabapentin for postoperative pain after photorefractive keratectomy: a prospective, randomized, double-blind, placebo-controlled trial." J Refract Surg. 2011: 27(8): 613-617.

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Case #2

- Emergency weekend call
  - "My left eye is extremely painful so I started rubbing it. I think when I rubbed it my contact lens fell out."
    - To the office we go!
  - Anterior segment findings
    - OD: BCL in place, epithelium healing well
    - OS: No BCL present, loose epithelium noted
  - What do we do now?
    - Replace BCL?
    - Debride loose tissue and then BCL?
      - Loose tissue debrided at this time
        - Epithelial defect of 4mmV x 2mmH
        - BCL replaced

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Case #2

- 4 day p/o PRK OU, 1 day p/o debridement OS
  - UCVA OD 20/30
    - BCL removed OD
      - Epithelium fully healed
        - Some early studies show that keeping BCL on until day 7 may yield faster visual rehabilitation and lower rate of postoperative pain compared to removal at day 4.[2]
      - Most studies recommend removal at day 3-4 to lower risk of infection.[2]
  - UCVA OS 20/60-
    - BCL replaced OS
      - Would you have done that?
  - Continue all meds as previously prescribed

2. Mohammadpour M, Shakoor D, Hashemi H, Aghaie Meybodi M, Rajabi F, Hosseini P. Comparison of bandage contact lens removal on the fourth versus seventh postoperative day after photorefractive keratectomy: A randomized clinical trial. Journ of Current Ophthal. 2017 29(2) 103-107.
3. Zheng Y, Zhai CB. Performance of Bandage Contact Lens in Patients Post-ocular Surgeries: A Systematic Literature Review. Eye Contact Lens. 2023 Nov 1;49(11):449-458. doi: 10.1097/ICL.0000000000001021. Epub 2023 Oct 9. PMID: 37816246; PMCID: PMC10734785.

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Case #2

- Day 6 post op PRK
  - UCVA OD 20/40
  - UCVA OS 20/70
  - 2mmV x 0.5mmH epithelial defect noted centrally
    - Epithelial defect improved but not completely healed
    - Continue all meds as previously prescribed
    - RTC 2 days for BCL removal

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Case #2

- Day 8 post op PRK
  - UCVA OD 20/30
  - UCVA OS 20/60-
    - 2mmV x 0.5mmH epithelial defect noted centrally
      - Exactly the same size/appearance as 2 days prior
    - Switch antibiotic from fluoroquinolone to polytrim at this time
      - Fluoroquinolone eyedrops show to delay corneal epithelial healing in some patients.[4]
      - Trimethoprim-polymyxin B provides coverage for over 95% of MRSA strains and 90% of methicillin-resistant coagulase-negative staphylococci strains.[5]
      - BAK?
        - Has been shown to have toxicity to corneal epithelium.[6]
          - Bromfenac 0.005%
          - Prednisonlone 0.01%
      - Mitomycin C?
        - Used in all of our PRK procedures for decreased corneal haze
          - Mitomycin C toxicity has led to delayed corneal epithelial healing.[6]
  - RTC 2 days for recheck

4. Moreira LB, Lee RF, de Oliveira C, LaBree L, McDonnell PJ. Effect of topical fluoroquinolones on corneal re-epithelialization after excimer laser keratectomy. J Cataract Refract Surg. 1997 Jul-Aug;23(6):845-8. doi: 10.1016/s0886-3350(97)80241-6. PMID: 9292666.
5. Weiner G. MRSA Ophthalmic Infection, Part 1: Current Realities. Amer Acad of Ophthal. June 2013. https://www.aao.org/eyenet/article/mrsa-ophthalmic-infection-part-1-current-realities.
6. Moshirfar M, West WB Jr, Milner DC, McCabe SE, Ronquillo YC, Hoopes PC. Delayed Epithelial Healing with Corneal Edema and Haze After Photorefractive Keratectomy Using Intraoperative Mitomycin C. Int Med Case Rep J. 2021 Dec 24;14:863-870. doi: 10.2147/IMCRJ.S342774. PMID: 34992474; PMCID: PMC8714007.

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Case #2

- Day 10 post op PRK
  - UCVA OD 20/30
  - UCVA OS 20/60
  - Corneal epithelial defect 2mmV x 0.5mmH
    - Same size, same appearance
  - What now?
    - Debridement
      - Treatment should increase in aggressiveness after 10 days of persistent epithelial defect[7]
    - Amniotic membrane
      - Promotes re-epithelialization by preventing apoptosis and releasing growth factors that stimulate and support epithelial cells[8]
  - RTC 2 days for recheck

7. Vaidyanathan U, Hopping GC, Liu HY, Somani AN, Ronquillo YC, Hoopes PC, Moshirfar M. Persistent Corneal Epithelial Defects: A Review Article. Med Hypothesis Discov Innov Ophthalmol. 2019 Fall;8(3):163-176. PMID: 31598519; PMCID: PMC6778469.
8. M, Lodhia V, Lake D, Hamada S, Elalfy M. Management of Persistent Corneal Epithelial Defects with Human Amniotic Membrane-derived Dry Matrix. Clin Ophthalmol. 2021 May 28;15:2231-2238. doi: 10.2147/OPTH.S299141. PMID: 34093006; PMCID: PMC8169046.

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Case #2

- Day 12 post op PRK
  - UCVA OD 20/30
  - Amniotic membrane removed for evaluation of epithelium and to check vision
  - UCVA OS 20/400
    - No epithelial defect noted at this time
    - Epithelial healing line noted
    - Replaced amniotic membrane with BCL to promote further epithelial adherence
    - Continue polytrim QID, prednisolone QID, and bromfenac BID
  - RTC 2-3 days for BCL removal and discontinuation of antibiotic/NSAID and tapering of steroid

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Case #2

- 1 month post-op PRK OU
  - UCVA OD 20/25+
  - UCVA OS 20/20
  - Discontinue steroid OD at this time
  - Continue steroid QD OS for 1 week
  - Continue PF ATs a minimum of QID
  - No corneal haze noted, epithelium intact OU
- RTC 2 months for 3 month p/o PRK OU

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Case #2

- What could we have done differently?
  - BAK free drops?
    - Loteprednol 0.5% ointment- BAK free
    - Discontinue NSAID?
  - Amniotic membrane sooner?
  - Not replaced BCL?
- Considerations
  - Delayed epithelium healing due to topical fluoroquinolones
  - 4 day BCL removal vs 7 day BCL removal post PRK
  - Amniotic membrane use for persistent epithelial defects

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Case #3

- 40YOF diabetic patient presents for 1 day cataract post-op OD with dropless medication
  - Pre-surgical findings:
    - VA OD HM 2 ft
    - Hypermature cataract noted OD only
    - Recommended KPE w/ IOL with base lens
  - 1 day post-op OD
    - UCVA 20/40-
    - IOP 13mmHg with iCare
    - 1+ microcystic edema
    - Trace AC cell
    - Dropless medication noted in posterior chamber
      - Triamcinolone/Moxifloxacin 0.2 mL

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Case #3- Dropless cataract surgery

Pros	Cons
• Increased patient compliance	• Floater complaints
• Decrease in cost to patient	• Breakthrough inflammation
• Decrease in endophthalmitis[9]	• Drops needed at that time
• No preservatives on ocular surface	• Difficulty controlling IOP spike
	• Possible increase in TASS[10]

9. Ibach M. "Less is More: What You Need to Know about Dropless Cataract Surgery." Review of Optometry. 15 May 2017. https://www.reviewofoptometry.com/article/less-is-more-what-you-need-to-know-about-dropless-cataract-surgery.
10. Patel, Kishan, Abbey, Ashlan. "A Toxic Side Effect of Dropless Surgery." Retina Today. Nov/Dec 2022. https://retinatoday.com/articles/2022-nov-dec/a-toxic-side-effect-of-dropless-surgery.

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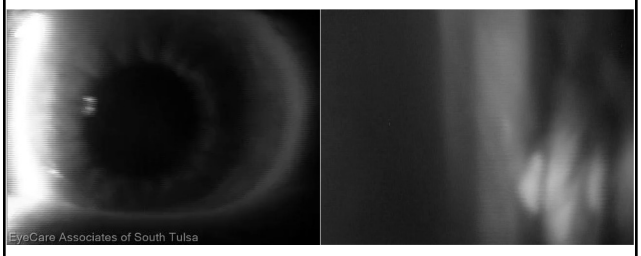
Case #3



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Case #3

- 2.5 days post surgery
  - 10:15pm- "My significant other had cataract surgery the other day and about 2 hours ago the eye started to become incredibly blurry and painful and it is continuing to get worse."
    - VA HM 3ft
    - Fibrin noted in anterior chamber
    - No hypopyon noted
    - Patient reports 10/10 pain
      - Patient will not/cannot keep eye open to check pressure due to pain
    - 1+ corneal edema
  - Now what?

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Case #3

2.5 days post surgery

10:15pm- "My significant other had cataract surgery the other day and about 2 hours ago the eye started to become incredibly blurry and painful and it is continuing to get worse."

Common differentiating features of TASS with Endophthalmitis [11]

	Toxic anterior segment syndrome	Endophthalmitis
Pathogenesis	Chemical reaction to various products used in surgery / IOL/ bacterial endotoxin	Intraocular colonization with microbial agents and associated inflammatory reaction
History		
Time course	< 48 hours	3 – 7 days
Pain	Uncommon	Common
Examination		
Visual Acuity	Mild to severe reduction	Severe reduction
Corneal edema	Limbus to limbus	Focal / variable in extent
Fibrin	+++	Variable in extent
Hypopyon	+ / ++	+++
Cells	+/ ++	+++
Intraocular pressure	Usually normal	commonly elevated
Posterior segment involvement (vitritis)	Rare	Always
Management		
Treatment	Dramatic response to steroids	Antimicrobial agents
Prognosis	Good	Poor

11. Simakurthy S, Tripathy K. Endophthalmitis. Jan 2024. https://www.ncbi.nlm.nih.gov/books/NBK559079/figure/article-21112.image.f4/

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Case #3

- Endophthalmitis rates:
  - On drops: 0.5-3.0 cases per 1000 cases[12]
  - Studies show a 5-22x decrease in endophthalmitis rates with using dropless[9]
  - The rate of endophthalmitis post cataract surgery in diabetic patients can be up to 1%.[13]

12. Endophthalmitis risk can increase after cataract surgery https://www.ophthalmologytimes.com/view/endophthalmitis-risk-can-increase-after-cataract-surgery#:~:text=Endophthalmitis%20is%20rare%20after%20cataract,cases%20per%201000%20cataract%20surgeries.
13. [redacted]

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Case #3

- Complicating factors
  - Timeline- is this TASS or endophthalmitis
  - 1. The ophthalmologist who did the surgery 2.5 days ago? His plane just landed in Denver
  - 2. The other ophthalmologist in the practice? He was taken to the hospital for a hypertensive crisis earlier that day
- As ODs at 10:15 at night, what are our options?
  - Emergency room
  - Drops
    - For now?

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Case #3

- In a perfectly managed case:
  - Vitreous aspiration/vitrectomy for culturing
  - Intravitreal antibiotics
    - Coverage for gram + and gram –
      - Typically vancomycin and ceftazidime
    - Possible repeat of intravitreal injections if eye worsens or fails to improve
  - At 10:15pm at night
    - No compounding pharmacies are open
    - Immediate ER referral
      - To an ER with ophthalmology coverage
      - Patient given Moxifloxacin drops to instill q30m until seen/treated in the ER

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Case #3

Endophthalmitis treatment[11]

- Vitreous culture
  - Culture results can take from 2-12 days
- Intravitreal antibiotics or antifungals
- Repeat intravitreal injection in 48 hours if no or limited improvement
- Vitrectomy
  - Some theory behind reducing inflammatory load = acceleration of visual recovery[14]
    - Weakened peripheral retina?
    - Study in 2021 declared it the "gold standard" of endophthalmitis treatment[15]
- Steroids
  - Not on fungal infections
- Cycloplegic

TASS treatment[16]

- Topical steroids q1h
- Oral steroids?
  - Given in severe cases
- Drops for intraocular IOP spike
- Possible irrigation of anterior chamber/vitrectomy/IOL removal
- Cycloplegic

14. Huang Q, Fu A, Wang Y, Zhang J, Zhao W, Cheng Y. Microbiological diagnosis of endophthalmitis using nanopore targeted sequencing. Clin Exp Ophthalmol. 2021 Dec;49(9):1060-1068. doi: 10.1111/ceo.13992. Epub 2021 Sep 15. PMID: 34463015; PMCID: PMC9292959. [redacted]
15. Peng, KL, Kung, YH, Tsai, HS, Wu, TT. Treatment Outcomes of acute postoperative infections endophthalmitis. BMC Ophthalmol. Oct 2021. 21; 384. [redacted]

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Case #3

- Patient never seen in ER after 8 hour wait
- Patient referred to retina as soon as retina office opened
  - Had her leave ER and immediately report to retina specialist
  - UCVA OD HM
  - IOP 18 with tonopen
  - Anterior segment findings:
    - Sclera W&Q
    - AC Fibrin noted with trace hypopyon
    - Cornea trace edema
- Injected with intravitreal vancomycin at approximately 10am
  - 14 hours post symptoms beginning
  - Retina specialist reports that he was unable to perform 2nd intravitreal injection (ceftazidime) due to patient pain intolerance
  - Continue moxifloxacin q1h and begin Difluprednate q1h- alternating
  - RTC 1 day

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Case #3

- 1 week post op
  - UCVA HM 2ft
  - IOP OD 14mmHg with iCare
  - Patient reports significant improvement in pain
  - Fibrin still present in AC but improved
  - No view to retina due to fibrous membrane
- Continue to follow-up with retina
- Cataract surgery OS cancelled until OD is healed

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Case #3

- What could we have done differently?
- Series of unfortunate events!
- With endophthalmitis, you are on the clock!
  - Delayed care leads to:
    - Permanent vision loss
    - Irreversible ocular damage
    - Potential need for evisceration/enucleation

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What is the Most Common Organism Found in Bacterial Endophthalmitis?

A. S. aureus
B. S. epidermidis
C. S. pneumonia
D. H. influenza

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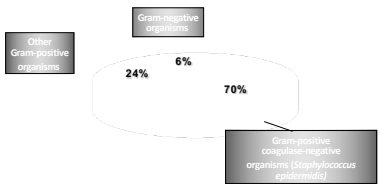
Endophthalmitis Vitrectomy Study

- **69% of patients with bacterial endophthalmitis were culture-positive**



1. Han DP, Wisniewski SR, Wilson LA, et al. Spectrum and susceptibilities of microbiologic isolates in the endophthalmitis vitrectomy study. Am J Ophthalmol 1996;122(1):1-17.
2. Speaker MG, Milch FA, Shah MK, et al. Role of external bacterial flora in the pathogenesis of acute postoperative endophthalmitis. Ophthalmology 1991;98:639-649.

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Endophthalmitis Vitrectomy Study

		VA Outcomes			
Presenting VA		20/40 or better	20/100 or better	Les than 5/100	Recommend Treatment
HM or better	TAP	62%	84%	3%	TAP
	PPV	66%	86%	5%	
Light Perception	TAP	11%	30%	47%	PPV
	PPV	33%	56%	20%	

PPV = pars plana vitrectomy and intravitreal injection of antibiotics
TAP = vitreous tap and intravitreal injection of antibiotics

http://www.nei.nih.gov/neitrials/viewstudyweb.aspx?id=29#Results

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Comparative Effectiveness of Antibiotic Prophylaxis in Cataract Surgery

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Purpose: Intracameral injection is an effective method for preventing infection, but no controlled study has been published in the United States.
Design: We conducted an observational, longitudinal cohort study to examine the effect of topical and injected antibiotics on risk of endophthalmitis.
Participants: We identified 315 246 eligible cataract procedures in 204 515 members of Kaiser Permanente, California, 2005–2012.
Methods: The study used information from the membership, medical, pharmacy, and surgical records from the electronic health record.
Main Outcome Measures: The adjusted odds ratio (OR) and 95% confidence interval (CI) for the association of antibiotic prophylaxis (route and agent) with risk of endophthalmitis was estimated using logistic regression analysis.
Results: We confirmed 215 cases of endophthalmitis (0.07% or 0.7/1000). Posterior capsular rupture was associated with a 3.68-fold increased risk of endophthalmitis (CI, 1.89–7.20). Intracameral antibiotic was more effective than topical agent alone (OR, 0.58; CI, 0.38–0.91). Combining topical gatifloxacin or ofloxacin with intracameral agent was not more effective than using an intracameral agent alone (compared with intracameral only: intracameral plus topical, OR, 1.63; CI, 0.48–5.47). Compared with topical gatifloxacin, prophylaxis using topical aminoglycoside was ineffective (OR, 1.97; CI, 1.17–3.31).
Conclusions: Surgical complication remains a key risk factor for endophthalmitis. Intracameral antibiotic was more effective for preventing post-cataract extraction endophthalmitis than topical antibiotic alone. Topical antibiotic was not shown to add to the effectiveness of an intracameral regimen. *Ophthalmology 2016;123:287-294* © *2016 by the American Academy of Ophthalmology.*

See Editorial on page 226.

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So Impersonal

- 74 YOWM presents for evaluation of a fog like vision and increased floaters OS since an intravitreal injection of Avastin two days prior
- Ocular History: Dry AMD OD, wet AMD OS, pseudophakic OU, macular edema OD
- Systemic Disease: Arthritis, HTN, hypercholesteremia, atrial fibrillation, hypothyroidism,
- Medications: Toprol XL, Omeprazole, Lyrica, Crestor, Synthroid, Co Q-10 and Klonopin.

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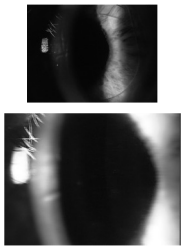
Case Example - KS

- BCVA: OD 20/20-2 OS 20/60+2 NI with pinhole.
- Pupils: Irregular pupil OS, (-) APD
- SLE:
  - Tr injection OS
  - Fine KP and trace edema OS
  - Iris: PI @ 4:00 OS.
  - AC: 3+ cell OS
  - Lens: ACIOL in good position OS
  - 2+ Cells in PC



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Diagnosis

- Acute postoperative endophthalmitis
  - Staphylococcus epidermidis accounts for nearly 60% of cases
  - Staphylococcus aureus accounts for another 20%
  - Incidence after intravitreal injection between 1/1300 to 1/10,000

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Work Up

- Complete ocular history and examination
- Consider a B-Scan which may confirm marked vitritis and establishes a baseline against which success of therapy can be measured
- Perform culture and sensitivity studies on aqueous and vitreous samples
- TAP vs. PPV???

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Treatment

- Intravitreal antibiotics
- Consider intensive topical steroids and intensive topical fortified antibiotics
- Atropine 1%
- Immediately pars plana vitrectomy if LP or worse
- IV antibiotics are not routinely used
- Some oral antibiotics may be considered an alternative

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Role of Antibiotics

- Yin et al. Abx resistance of ocular surface flora with repeated use of topical abx after intravitreal injection JAMA opht. Apr 2013.
- Bascom Palmer ARVO 2011 - Topical Abs pre/post provided no benefit for reduced endophthalmitis

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Follow-Up

- Monitor q12h
- Relief of pain is a useful early sign of response to therapy. After 48 hours patients should show signs of improvement
- Consider oral steroids
- If patient is responding well, topical fortified antibiotics may be slowly tapered after 48 hours and then switched to regular strength antibiotics
- Fortunately, endophthalmitis after intravitreal injection is rare, but clinicians should maintain a low threshold for treatment.

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Clinical Pearls

- If patient calls with symptom of sudden decrease VA or pain during the first week: the doctor *must* see the patient
- Treat as infectious until proven otherwise
- Importance of communicating with surgeon

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Case #5

- 72YOM patient presents for cataract pre-op with complaints of nighttime glare, inability to see as clearly as before, and difficulty seeing when he's driving
  - BCVA OD 20/30- OS 20/30-
  - Glare OD 20/100 OS 20/60
  - Anterior segment:
    - OD 3+ NS, PSC, cortical changes
    - OS 3+ NS, cortical changes, trace PSC
  - Posterior segment:
    - WNL

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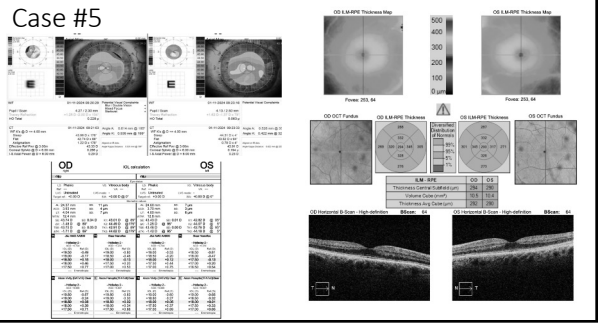
Case #5



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Case #5

- Base vs Toric vs Premium IOL
  - Low HOA OU (< 0.32D)
  - > 0.75D corneal cylinder
- Patient decides to proceed with KPE w/ trifocal IOL OU with dropless medication
  - OD first and OS to follow 2 weeks later

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Case #5

OD postops

- 1 day
  - UCVA 20/50
  - IOP 19mmHg
  - 1+ corneal edema and AC reaction
- 1 week
  - UCVA 20/30+2
  - IOP 15mmHg
  - Trace corneal edema and AC reaction
- 1 month
  - UCVA 20/20
  - IOP 16mmHg

OS postops

- 1 day
  - UCVA 20/20-2
  - IOP 21mmHg
  - 1+ corneal edema and AC reaction
- 1 week
  - UCVA 20/20-2
  - IOP 15mmHg
  - Trace corneal edema and AC reaction
- 1 month
  - UCVA 20/40 ?
  - IOP 16mmHg

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Case #5

- OS findings:
  - Partial macula on detachment
  - Immediate referral to retina specialist
- Retinal detachments occur in approximately 1 in 500 cataract sx in patients >40yoa within 1 year of surgery[17]
  - Possible increase with dropless cataract sx
  - Problematic with dropless due to patients increase in floaters from medication

17. Morano MJ, Khan MA, Zhang Q, Halfpenny CP, Wisner DM, Sharpe J, Li A, Tomaiuolo M, Haller JA, Hyman L, Ho AC; IRIS Registry Analytic Center Consortium. Incidence and Risk Factors for Retinal Detachment and Retinal Tear after Cataract Surgery: IRIS® Registry (Intelligent Research in Sight) Analysis. Ophthalmol Sci. 2023 Apr 18;3(4):100331.

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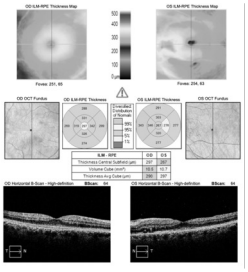
Case #5

- 1 month post vitrectomy with retina repair
  - UCVA OS 20/50+
  - BCVA OS: +0.50, -0.25 x 028 20/25
  - Posterior segment:
    - Multiple hemorrhages noted around retinal scarring
    - ERM with mild macular edema noted



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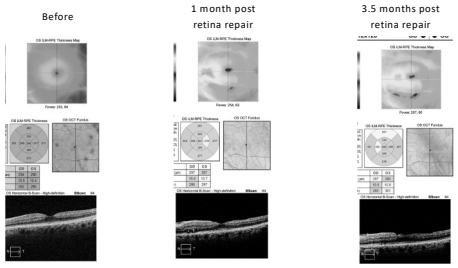
Case #5



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Case #5

- Considerations:
  - Discussion over risks and what healing time looks like
    - Can take up to a year for retina to fully heal[18]
  - Premium IOLs in high risk patients
  - Dropless vs traditional drops post surgery
    - Previous retinal issues?
    - Glaucoma patient?
    - Diabetic?

18. Weiss, K, Lloyd, W. Recovering from a detached retina. https://www.healthline.com/health/eye-health/detached-retina-recovery.

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PK Problems

- 47year white male presents with blurry vision OS for the past couple of months. Denies eye pain.
- Current drops: prednisolone QD-BID OS
- Ocular Hx
  - s/p PK in 1998 OS d/t keratoconus
  - Localized vascularization of cornea OS in 10/2020
    - Bevacizumab injection + Argon laser

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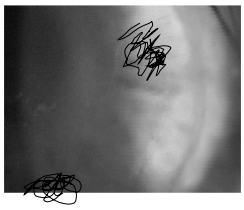
Examination

	OD	OS
Visual Acuity	20/30 PH 20/25	20/CF PH - NI
Sclera/Conj	White & Quiet	White & Quiet
Cornea	Keratoconus – scleral lens in place	1+ mid peripheral haze at 2, inf haze at 6, 1+ diffuse SPK, scattered vessels from 2-6, vortex lines, central epitheliopathy, no KPs
AC	Deep & quiet	Deep & Quiet
IOP	18	45



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Differentials??

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Diagnosis

- Steroid responder
- Angle closure glaucoma
- Herpes simplex keratitis
- Other??

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Assessment & Plan

- Herpes Stromal keratitis
  - Valacyclovir 500mg TID PO
  - Prednisolone QID OS
  - NaCL BID OS
  - RTC 3 days

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Follow up Visit 1

- IOP: 51 OS
- Pachy: 517 OS
- Brinzolamide, brimonidine/timolol, bimatoprost OS and two 250mg acetazolamide tablets in office
  - IOP lowered to 29 OS
- Continue
  - Valacyclovir 500mg PO TID
  - NaCL drops BID OS
  - Decrease prednisolone BID OS
- Add
  - Brimonidine / timolol BID OS
  - Brinzolamide BID OS
- RTC 3-5days for K check, IOP check and OCT-G
- Schedule SLT

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Follow up visit 2

- IOP: 15 OS
- OCT-G performed
- Cornea clearer than last week and haze has decreased
- Plan
  - Valacyclovir 500mg PO TID
  - NaCL drops BID OS
  - Prednisolone to BID OS
  - Continue Brim / Tim BID OS, Brin BID OS
- RTC 7-10 days

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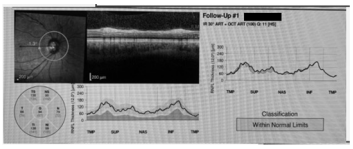
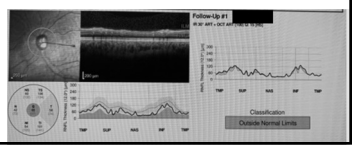
OCT-G

OD



OS



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So what did he have?

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Was it HSV???

- HSV is a neurotrophic virus that lies latent in trigeminal ganglion following initial infection. Reactivation causes latent virus mediated by T lymphocytes to travel back to corneal epi along the axon
  - Causes virus replication in corneal epi cells that causes production of inflammatory cells, cytokines and chemokines to gradually infiltrate the stroma
- Can result in irreversible vision loss due to corneal opacity, edema, scarring, and neovascularization
- Herpetic Eye Disease Study (HEDS)
  - Use of oral acyclovir reduced reoccurrence of any type of herpetic eye disease by 41% within 1yr and reduced stromal keratitis by 50%
  - Corticosteroids have a faster resolution of stromal keratitis

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Herpetic Eye Disease Study I

- Herpes Stromal Keratitis, Not on Steroid Trial
  - Pred Phosphate faster resolution and fewer treatment failures
  - Delaying treatment did not affect outcome
- Herpes Stromal Keratitis, on Steroid Treatment
  - No apparent benefit in the addition of oral acyclovir to the treatment of topical corticosteroid and topical antiviral
- HSV Iridocyclitis, Receiving Topical Steroids
  - *Trend in the results suggests benefit in adding oral acyclovir*

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Herpetic Eye Disease Study II

- HSV Epithelial Keratitis Trial
  - No benefit from oral ACV with topical trifluridine in preventing the development of stromal keratitis / iritis
- Acyclovir Prevention Trial
  - *Reduced by 41% the probability of recurrence*
  - *50% reduction in the rate of return of the more severe form*
- Ocular HSV Recurrence Factor Study
  - No results available

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Or Steroid Induced Glaucoma??

- Post-PK glaucoma may be related to collapse of TM, suturing technique, postop inflammation, use of corticosteroids, PAS formation, and preexisting glaucoma
- Franca et al. results showed that 49 of 228 (21.5%) of patients developed glaucoma after PK
- Uncontrolled IOP after PK is one of leading causes of graft failures and visual loss
- Pramanik et al. reported steroid-induced glaucoma in 4 of 112 eyes (3.6%) of patients with keratoconus after PK with a mean follow-up of 13.8 years

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Under Pressure

- 68YOF presents for 1 day post op following KPE w/ base IOL OD
  - UCVA 20/50-
  - 3+ stromal and microcystic edema noted
  - 2+ AC reaction
  - **IOP 45mmHg**
  - What do we do now?

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- Most common complication of cataract surgery[19]
- Most common cause: Retained viscoelastic[19]
  - Inhibits aqueous outflow through the TM
- As many as 18% to 45% of patients may experience an IOP greater than 28mmHg following phacoemulsification[20]
  - Most pressures will return to normal by 24 hours postoperatively
  - Oftentimes IOP will be WNL by 1-day postop appointment
    - Requires no treatment if it has returned to normal
- Increased corneal edema secondary to increased IOP
  - Lower the IOP = decrease the corneal edema = increase the visual potential

19. Mott, M, Aref, MA, Rachitskaya, AV, You, E. Cataract, Cornea, and Retina Surgeries: Strategies to Manage Postoperative IOP Events. EyeNet Mag. June 2021. https://www.aao.org/eyenet/article/strategies-to-manage-postoperative-iop-events
20. Francis P, Bhar G, Little B. Postoperative intraocular pressure spikes: the need to treat. Eye. 2004;18:673-679.

80

Case

- Risk factors for IOP spike post cataract surgery:[21]
  - Pre-existing glaucoma
  - Highly myopic patients
  - Difficult surgical cases
  - Patients who had intraoperative complications
  - Steroid responders

21. Dengan, Libby. Managing IOP issues after cataract surgery. Ocul Surg News. Jan 2019. https://www.healio.com/news/ophthalmology/20190104/managing-iop-issues-after-cataract-surgery.

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Case

- How do we manage these spikes?
  - Drops
    - Brimonidine
      - Increases uveoscleral outflow
      - Decreases aqueous production
    - Timolol
      - Decreases aqueous production
  - Orals
    - Acetazolamide 250-500mg orally
      - Immediate release tablets, not extended duration
      - Sickle cell risk
  - Burping the wound
    - Increases risk of endophthalmitis
      - Consider for IOPs:
        - Above 40mmHg that are not responding to drops and orals
        - Eyes at high risk for visual field loss

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- How do we burp a wound?[22]
  1. Numb the eye
     - With fluorescein helps to visualize the wound
  2. Administer 1-2gtts of an antibiotic
     - Fluoroquinolone preferred
  3. Stabilize patient
     - Consider using a tech to hold the patient's head in the slit lamp
  4. Find your sterile instrument
     - Spud, cotton tip applicator, weck-cel sponge, needle
  5. Use instrument to apply a VERY small amount of pressure to the wound
     - You can ALWAYS press again, you cannot put the aqueous back in
  6. Be prepared for the aqueous to move
     - The higher the IOP, the faster the aqueous will release
  7. Continue to check IOP until at desired mmHg
  8. Instill 1-2gtts of antibiotic at conclusion
     - Fluoroquinolone again

22. Ellis, R, Lightsizer, N. Learn to Burp Corneal Wounds Without a Hiccup. Rev of Opt, Feb 2016. https://reviewofoptometry.com/article/learn-to-burp-corneal-wounds-without-a-hiccup.com

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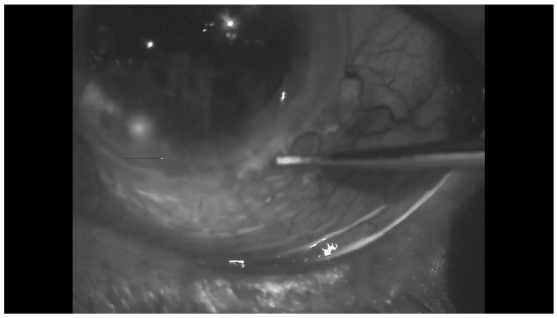

Video Courtesy of Justin Schweitzer

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Time	Method	IOP 15-30 minutes later
Arrival	Before treatment/intervention	45mmHg
Upon work-up	1 gtt brimonidine 0.1%	45mmHg
Minute 15	1 gtt brimonidine 0.2%/timolol 0.5%	43mmHg
Minute 30	1 250mg tablet of acetazolamide given	44mmHg
Minute 60	Burped the wound- 1 press with CTA	34mmHg
Minute 61	Burped the wound- 1 press with new CTA	19mmHg

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- Patient released at this time with instructions to follow-up in office the following day for IOP check
  - To take brimonidine 0.2%/timolol 0.5% TID
    - Sent home with drops to allow the eye time to dispel the viscoelastic from the TM
- 2 day follow-up
  - UCVA 20/30
  - IOP 17mmHg
  - 1+ microcystic and stromal corneal edema
  - 1+ AC reaction
- Discontinue IOP lowering med at this time.
- RTC for 1 week post-op

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How Does this Change with 1 Day PO Combined MIGS/Phaco?

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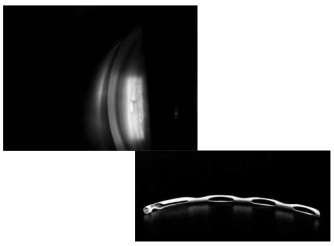
Post-operative Considerations with MIGS

- IOP Spikes
- Stopping glaucoma meds
- Hyphema
- Hypotony
- Establish new baselines



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Summary Points

- Advances in technology have allowed for many good options for our glaucoma patients
- When considering cataract surgery in patient with glaucoma, a thorough assessment first of the stage and status of glaucoma is imperative
  - Visual fields should be obtained PRIOR to cataract surgery
- Establish glaucoma comanagement protocols so everyone is on the same page.

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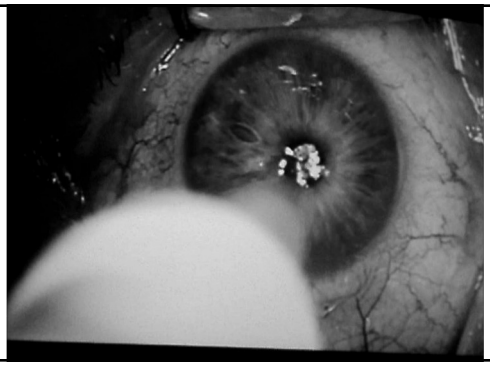

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Case Report

- 64 YO Caucasion female presents with painful, red, teary right eye
- Ocular Hx:
  - Lamellar keratectomy 7/12/24 OD
  - EMBD OU
  - Cataract Sx OU 2023

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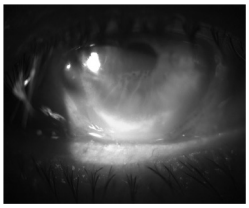
BCVA: 20/CF

SLIT LAMP	
	RIGHT EYE
Conjunctiva	2+ injection
Cornea	Inferior and superior infiltrate, 1+ endo folds, non-healed epi s/p lamK
AC	3+ cell
Iris	Normal
Lens	PCIOL



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- Assessment: K Ulcer OD
- Plan:
  - Culture
  - Subconjunctival injection ceftazidime + gentamicin
  - Besifloxacin q2H OD
  - Polytrim q2H OD
  - f/u one day

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BCVA OD: HM

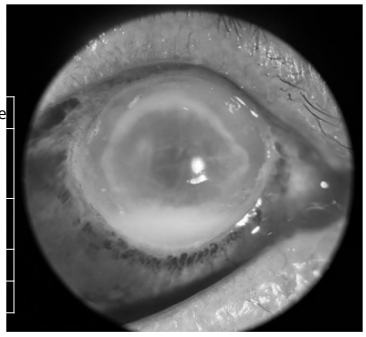
Subconjunctival hemorrhage

Peripheral ring ulcer, 3+ endo folds, non-healed epi s/p lamK

3+ cell, fibrin, 2.5mm hypopyon

Normal

PCIOL



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- Assessment: K Ulcer OD
- Plan:
  - Culture: Reuslts (+) gram negative rod
  - Medications
    - Tobramycin QID OD
    - Moxifloxacin q2H OD
    - Ceftazidime q2H OD
    - Doxycycline 100 mg PO
    - Levofloxacin 500mg x 7 days
    - Cyclopentolate TID OD
    - Polytrim q2H OD
    - **RTC:** tomorrow k check w/ possible injection w/ Dr. Cheung

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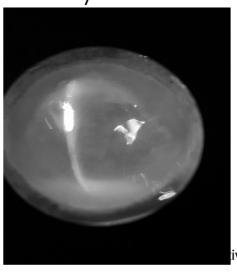
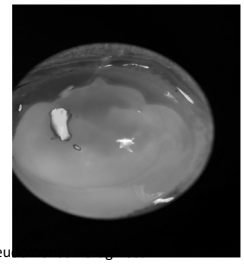
Next Day





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62YO WM Referred for K Eval

- Vision is cloudy and fluctuates throughout the day. Notices starburst, haloes and glare. Uses NaCl ung qhs OU, Ats TID OU.
- Oc Hx: Cat sx OU 2014
- Med Hx: Renal disease, HTN, heart disease, High cholesterol, NIDDM, COPD, RA and blood clots
- Meds: Many
- Allergies: Itraconazole, ramipril, trolamine salicylate

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- BCVA
  - OD 20/50+2 PH 20/40-2
  - OS 20/40-2 PH NI
- MR
  - OD +2.00+0.50x055
  - OS +2.50+0.50X060
- IOP: 15/14
- Pachy: 603 / 689

SLE

- OD
  - Central 6mm 3+ guttata
  - Anterior haze
  - 2+ edema
  - PCIOL
- OS
  - Central 5mm 3+ guttata
  - Anterior hase
  - 2-3+ edema

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100

1 Day PO s/p DMEK OD

- Did well overnight, no HA, patch stayed on last night
- BCVA OD: 20/CF
- IOP: 15
- SLE
  - 3mm epi defect
  - 2+ K edema
  - Graft attached
  - 40% bubble
  - PCIOL

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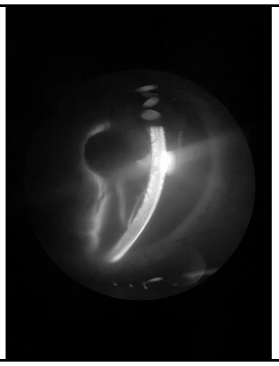
1 Week PO s/p DMEK OD

- Blurry vision OD. No pain. Using moxifloxacin qid OD and difluprednate qid OD.
- BCVA: 20/CF@5'
- MR: -0.50+0.50x150 20/400
- IOP: 16



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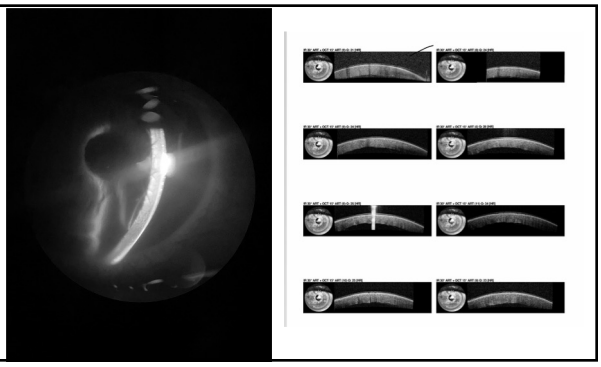

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What's the Next Step?

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DSEK/DMEK Complications

- Caused by any of the following
  - Graft-recipient interface
  - Fragile graft tissue
  - Graft location
  - Glaucoma
  - Infection
  - CME
  - Retinal detachment

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Long-term Maintenance DMEK and DSEK

- Long term topical steroid
  - Helps decrease rejection rate
  - Steroid Loteprednol, prednisolone acetate, FML 1 gtt QD typically
- Unknown length of graft viability
  - No long term data since started approx. 2003
  - In theory surpass PK ~20 years
- 5 year Graft survival similar at 93%[1]

1. Price DA, Kelley M, Price FW Jr, Price MO. Five-Year Graft Survival of Descemet Membrane Endothelial Keratoplasty (EK) versus Descemet Stripping EK and the Effect of Donor Sex Matching. Ophthalmology. 2018 Oct;125(10):1508-1514. doi: 10.1016/j.ophtha.2018.03.042. Epub 2018 May 3. PMID: 29731147.

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Meta-Analysis > Eur J Ophthalmol. 2019 Jan;29(1):15-22. doi: 10.1177/1120672118757431. Epub 2018 Apr 16.

DMEK versus DSAEK for Fuchs' endothelial dystrophy: A meta-analysis

Raquel Esteves Marques [1,2], Paulo Silva Guerra [1,2], David Cordeiro Sousa [1,2,3], Ana Inês Gonçalves [1,2], Ana Miguel Quintas [1,2], Walter Rodrigues [1,2]

Affiliations + expand

PMID: 29661044 DOI: 10.1177/1120672118757431

- 10 retrospective studies, evaluated visual outcomes and rebubbling
- 60% lower rejection rate with DMEK, more rebubblings
- Better BCVA, patient satisfaction, and graft-related issues

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Multicenter Study of 6-Month Clinical Outcomes After Descemet Membrane Endothelial Keratoplasty.

Oellerich S[1], Baydoun L, Peraza-Nieves J, Ilyas A, Frank L, Binder PS, Melles GRJ

Author information

Cornea, 01 Dec 2017, 36(12):1467-1476
DOI: 10.1097/ico.0000000000001374 PMID: 28957979

- 90.5% improved BCVA
- 75% reached a BCVA of >20/40
- 26% reached a BCVA of 20/20

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DMEK/DSEK Outcomes

- Hyperopic Shift
  - DMEK: <+0.50D after 5-12 months
  - DSEK: +1.00sph due to shape of donor tissue

J Cataract Refract Surg. 2011 Aug;37(8):1455-64. doi: 10.1016/j.jcrs.2011.02.033.

Refractive change and stability after Descemet membrane endothelial keratoplasty. Effect of corneal dehydration–induced hyperopic shift on intraocular lens power calculation

Lisanne Ham [1], Isabel Dapena, Kyros Moutsouris, Chandra Balachandran, Laurence E Frank, Korine van Dijk, Gerrit R J Melles

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Endothelial Cell Loss

- 19-36% loss of endothelial cells at one year

- At 5 years,
  - 39% in DMEKs
  - 53% in DSEKs
  - 70% in PKPs

Comparative Study J Cataract Refract Surg. 2014 Jul;40(7):1116-21. doi: 10.1016/j.jcrs.2014.04.023.

Air reinjection and endothelial cell density in Descemet membrane endothelial keratoplasty: five-year follow-up

Matthew T Feng [1], Marianne O Price [2], Jalee M Miller [1], Francis W Price Jr [1]

Affiliations expand

PMID: 24957432 DOI: 10.1016/j.jcrs.2014.04.023

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Clinical Pearls

- All visual fluctuations are related to ocular surface disease
- Consider time course of events
- Benefit of prophylactic NSAIDs
- Communication between surgeon / referring OD

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Thank You!!!

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