To Remove or Not to Remove… *That is the Question!*

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University of the Incarnate Word

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Today's Game Plan

Review FOUR different cases of anterior segment pathologies that often warrant removal so that you can better diagnose, manage, and treat your patients

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Case 1

"My left eye is blurry with my glasses"

3

Case 1 – 53 yo HF

- Complains of blurred vision and occasional light sensitivity, redness, irritation OS
- KCS OU treated with cyclosporine 0.05% BID x 3 years, PFATs
- (-) CLs
- (-) eye surgeries
- (-) systemic meds

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Case 1 – 53 yo HF

Habital Spec Rx (2 yrs)
OD: +0.75-1.00x100 ***20/25***
OS: +0.50-1.25x086 ***20/60***
+2.00 ADD ***J3***

MRx
+0.75-1.25x105 ***20/20***
+1.25-3.00x107 ***20/20***

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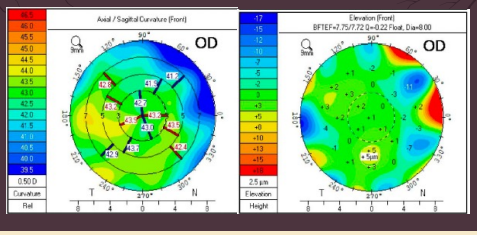
Case 1 – 53 yo HF



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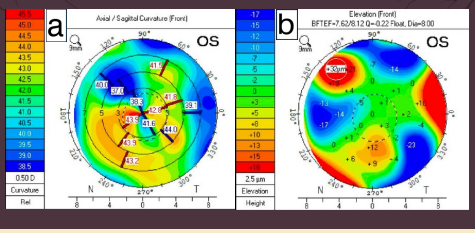
Case 1 – 53 yo HF



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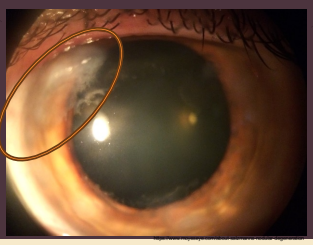
Case 1 – 53 yo HF



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Case 1 – 53 yo HF

What do we have?

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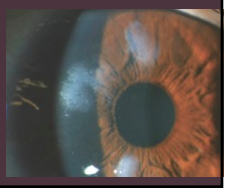
Case 1
Salzmann Nodular Degeneration

- Noninflammatory, progressive corneal condition affecting Bowmans membrane
- First discovered by Maximillian Salzmann in 1925[1]
- Affects 1 in 2400 vs 1 in 60?
  - 2018: 1 in 60 pts with OSD had nodule before cataract surgery[2]



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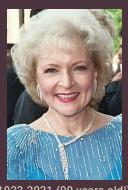
Case 1
Salzmann Nodular Degeneration

- The classic SND patient
- Of 108 eyes…[1]
  - 66% bilateral
  - 76% Caucasian
  - 72% female
- Bimodal: 50s-60s vs 80s-90s
- Lack of androgens



1922-2021 (99 years old!)

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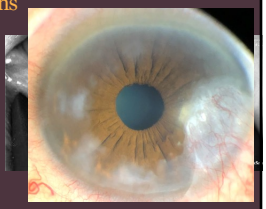
Case 1
Salzmann Nodular Degeneration
Associations

- Meibomian gland dysfunction
- OSD
- CL wear
- Pterygium
- Previous inflammation
- Trauma/Surgery



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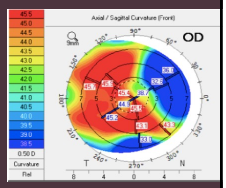
Case 1
Salzmann Nodular Degeneration
Symptoms

- Blurred vision
  - Central nodule
  - Irregular astigmatism
  - Corneal flattening due to epithelial hyperplasia adjacent to nodules → hyperopic shift
- Foreign body sensation
  - Ocular lubrication
  - Topical steroids, cyclosporine 0.05%
  - Surgery



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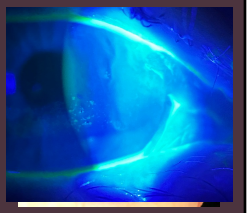
Case 1
Salzmann Nodular Degeneration
Signs

- Best seen at the slit lamp
- Round, blue-ish grey nodules
  - May be vascularized
- 1-2mm+
- Often midperiphery
  - Along incisions[1]
- Negative NaFl staining/pooling



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Case 1
Salzmann Nodular Degeneration
Diagnosis

- Slit lamp biomicroscopy
- Corneal topography
  - Area of flattening on the curvature map corresponding to an area of elevation
  - Determine amount of astigmatism

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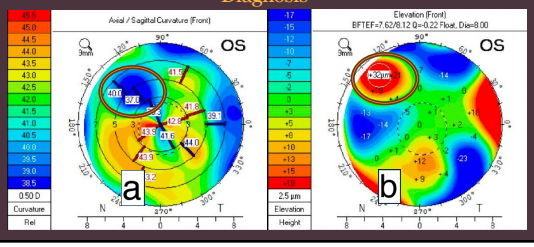
Case 1
Salzmann Nodular Degeneration
Diagnosis



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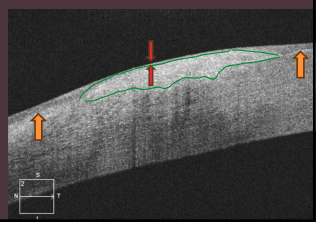
Case 1
Salzmann Nodular Degeneration
Diagnosis

- Slit lamp biomicroscopy
- Corneal topography
- **Anterior segment-OCT**
  - Hyperreflective lesion
  - Irregular/missing basement membrane
  - Attenuated epi above lesion



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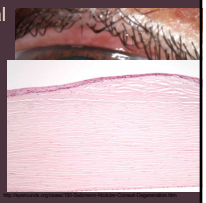
Case 1
Salzmann Nodular Degeneration
Diagnosis

- Often difficult to distinguish from corneal scarring or other lesions
- Biopsy if suspicious
  - Histopathology confirmation
  - Mounds of extracellular matrix[1]
  - Irregular collagen fibrils, fibroblasts, basal lamina



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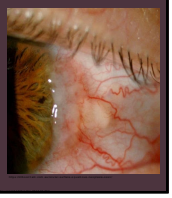
Case 1
Salzmann Nodular Degeneration
Differential

- **Ocular surface squamous neoplasia**
  - Any growth of neoplasms derived from squamous cells from conjunctiva or cornea[1]
    - Epi dysplasia
    - Conjunctival intraepithelial neoplasia
    - Squamous cell carcinoma (SCC)
    - Mucoepidermoid carcinoma
  - Caucasian male in 60s
  - UV-B radiation and cigarette smoking
  - Located interpalpebral near limbus
  - Can be elevated with abnormal vasculature



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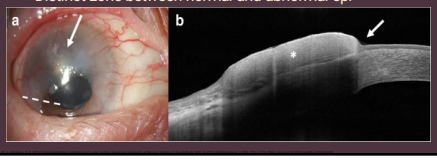
Case 1
Salzmann Nodular Degeneration
Differential

- Ocular surface squamous neoplasia
  - Nodular form found to be of higher severity than flatter forms[1]
  - AS-OCT shows thickened, hyperreflective epithelial layer
  - Distinct zone between normal and abnormal epi



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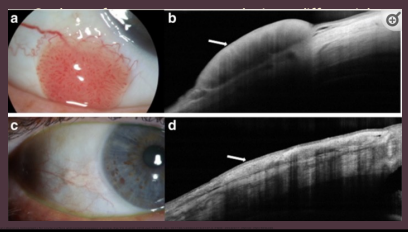
Case 1
Salzmann Nodular Degeneration
Differential



Papillomatous OSSN

After 2 rounds of topical 5-fluorouracil

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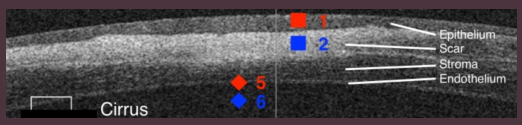
Case 1
Salzmann Nodular Degeneration
Differential

Corneal Scarring



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Case 1
Salzmann Nodular Degeneration
Differential

Peripheral Hypertrophic Subepithelial Corneal Degeneration[1]

- Peripheral circumferential-elevated white subepithelial opacities at the limbus
- Discovered in 2003, etiology unknown, inflammation?
- Middle aged, female
- Cover more than one quadrant, most often superior nasal (93%),
- If bilateral, always symmetric
  - If 8 to 10 o'clock OD, 2 to 4 o'clock OS

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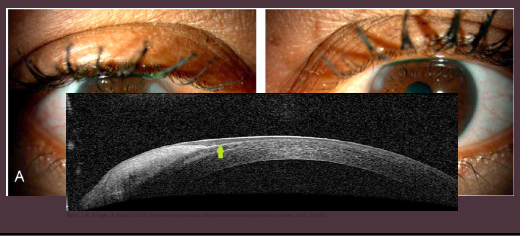
Case 1
Salzmann Nodular Degeneration
Differential



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Case 1
Salzmann Nodular Degeneration
Differential

Peripheral Hypertrophic Subepithelial Corneal Degeneration[1]
- Lesions are larger than SND
- Located near limbus, not mid peripheral
- Fine, superficial vessels with PHSCD
- Suspect less of an inflammatory cause with PHSCD
- Can still remove with SK

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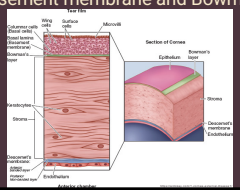
Case 1
Salzmann Nodular Degeneration
Pathophysiology

- Epithelium is continuously regenerating w/ growth factors
- Epithelial basement membrane and Bowman's layer act as barrier



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Case 1
Salzmann Nodular Degeneration
Pathophysiology

- Epithelium is continuously regenerating w/ growth factors
- Epithelial basement membrane and Bowman's layer act as barrier
- A **break occurs** between these two layers
  - Growth factors travel from epithelium to stroma and activate fibroblasts
  - Fibroblast formation → deposition of unorganized ECM beneath epithelium

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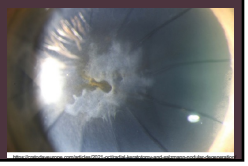
Case 1
Salzmann Nodular Degeneration
Pathophysiology

- Mechanical break caused by surgery or trauma
  - Pterygium removal
  - LASIK flap interface
  - Cataract surgery main incision
  - Along RK incisions
- OSD
  - Chronic friction
  - Induces overactive cell repair and remodeling



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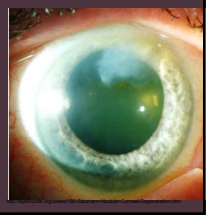
Case 1
Salzmann Nodular Degeneration
To remove or not to remove…

- Asymptomatic? Mild?
  - Ocular surface management
  - Scleral lens fitting for improved vision and comfort[1]
- Reasons for surgery
  - FBS and failed medical therapy
  - Blurred vision/irregular astigmatism
  - Nodules in/near visual axis
  - Preparing for cataract surgery



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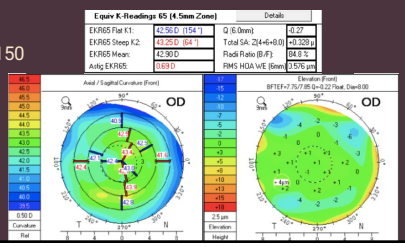
Case 1
Salzmann Nodular Degeneration
To remove or not to remove…

85yo Female
OD +2.00 -1.00 x150



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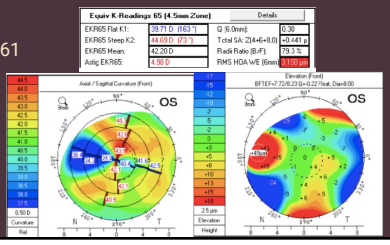
Case 1
Salzmann Nodular Degeneration
To remove or not to remove…

85yo Female
OS +6.00 -6.75 x161



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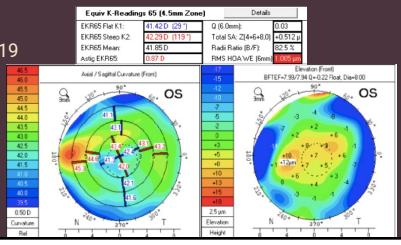
Case 1
Salzmann Nodular Degeneration
To remove or not to remove…

85yo Female
OS +0.75 -0.75 x019

Large myopic shift and reduced corneal astigmatism!



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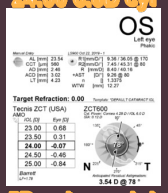
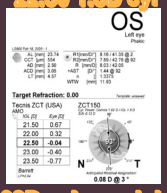
Case 1
Salzmann Nodular Degeneration
To remove or not to remove…

24.00 6.0D cyl



3.5D cyl remaining!

22.50 1.5D cyl



0.08D cyl remaining!

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Case 1
Salzmann Nodular Degeneration
To remove or not to remove…

Nodule removal is recommended prior to **cataract surgery** if it appears to be affecting the corneal topography, if it is inducing irregular/high astigmatism, or if the patient desires spectacle independence

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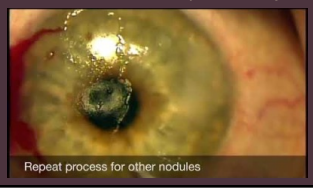
Case 1
Salzmann Nodular Degeneration
HOW to remove?

- Superficial Keratectomy (SK) aka Epi-peel
  - Remove the nodule and allow epithelium to grow back more regular



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Case 1
Salzmann Nodular Degeneration
HOW to remove?

- Superficial Keratectomy (SK) aka Epi-peel
- Reoccurrence rate ~22%[1]
- Follow-up management
  - Cryopreserved amniotic membrane (CAM) placed immediately following procedure
  - Start polytrim QID and pred-moxi QID while CAM is on
  - Patient returns for CAM removal 5-7 days later
  - Switch from Abx drops to pred acerate 6-week taper
    - 4/3/2/2/1/1
  - Patient seen for 1-month follow-up
    - If getting ready for cataract surgery, obtain new baseline corneal tomography biometry measurements

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Case 1
Salzmann Nodular Degeneration

Questions?

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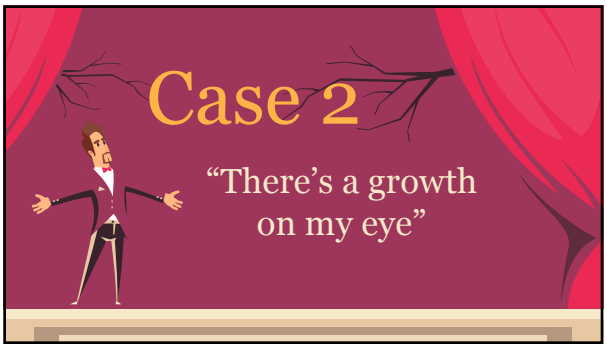

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Case 2 – 38 yo AF

- **Reports a white spot on her left eye**
- (-) Glasses or CLs
- (-) eye surgeries
- (+) lorazepam 1mg po BID for anxiety

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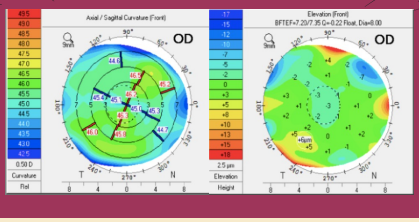
Case 2 – 38 yo AF

Entering scDVA:
OD **20/25**
OS **20/30**

MRx:
+0.75-0.50x105 OD **20/20**
+1.00-1.00x173 OS **20/20**

40

Case 2 – 38 yo AF



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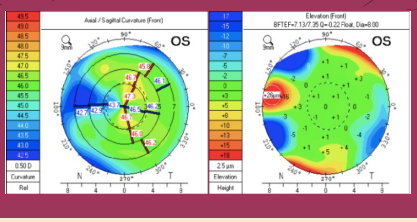
Case 2 – 38 yo AF



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Case 2 – 38 yo AF

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Case 2 – 38 yo AF

What do we have?

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Case 2
Pterygium

- Triangular, fibrovascular, sup-epithelial growth from bulbar conjunctiva over the limbus
- Discovered by Susruta as early as 1000 BC[1]
- 5-15% prevalence worldwide
  - Up to 22% in "Pterygium Belt"

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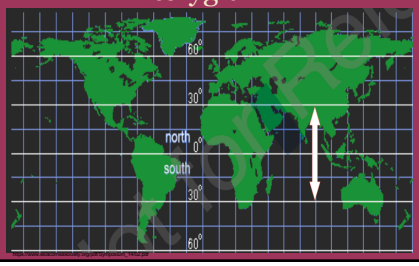
Case 2
Pterygium



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Case 2
Pterygium

- Typically bilateral
- Older, male patients with increased outdoor sun exposure
- Cause?
  - UV exposure[1]
  - Dust, dirt wind[2]
  - OSD[2]

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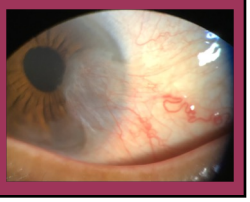
Case 2
Pterygium
Symptoms

- Blurred vision
  - Involvement of visual axis
  - Induced WTR astigmatism
  - Tear film disruption
- FBS/irritation
- Poor cosmesis



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Case 2
Pterygium
Signs

- More often occur nasally >temporally
  - Temporal light focuses on the nasal limbus at 20x intensity compared to incident light intensity temporally[1]
  - UV light reflecting off of the nose

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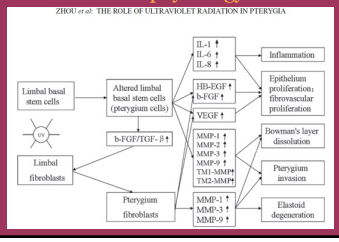
Case 2
Pterygium
Pathophysiology

Altered limbal basal stem cells increase inflammation



Breaking the barrier between conjunctiva and cornea

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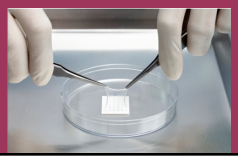
Case 2
Pterygium
To remove or not to remove…

- Conservative measures
- PTY removal with auto graft or amniograft
  - Ocular surface lubricants
  - UV protection



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Case 2
Pterygium
Mitomycin C

- Derived from bacteria Streptomyces caespitosus[1]
- Selectively inhibits DNA synthesis preventing cellular division
  - Chemotherapy drug
- Inhibits fibrovascular growth
- Typically saved for recurrent PTY since it can lead to scleral thinning/melt

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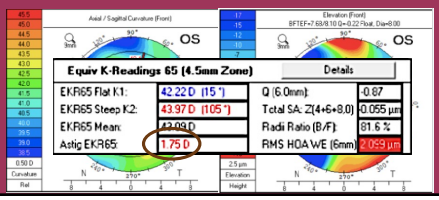
Case 2
Pterygium
To remove or not to remove…

OS: +3.00 -1.00 x017



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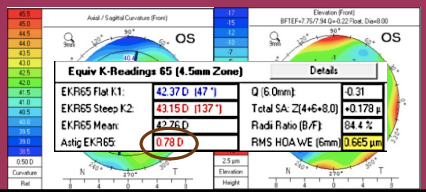
Case 2
Pterygium
To remove or not to remove…

OS: +2.00 -0.50 x057



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Case 2
Pterygium
To remove or not to remove…

Analysis of Pterygium Size and Induced Corneal Astigmatism

Payman A.-K. Mohammad-Salih, MsOphth (UM), and Ahmad Fauzi M. D. Sharif, MsOphth (UM)†*

- How big does a PTY have to get before it makes a significant visual impact?
  - 77 eyes of 77 patients
  - PTY induced 2D of corneal astigmatism if:
    - Its length ≥ 2.2mm onto cornea
    - Width was ≥ 5mm
    - Total area ≥ 6.25mm^2
  - **Length and total area>> width**

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Case 2
Pterygium
To remove or not to remove…

Pterygium removal is recommended prior to **cataract surgery** if it appears to be affecting the corneal topography, if it is inducing irregular/high astigmatism, or if the patient desires spectacle independence

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Case 2
Pterygium
HOW to remove?

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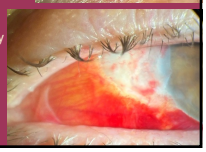
Case 2
Pterygium
To remove or not to remove…

- Setting post-op expectations
  - Out-patient surgery ~30 mins
  - Eye will look very red and angry for ~1 month
  - 6 weeks of gtts
    - Tobradex q2h x 2 weeks, then 4/3/2/1
  - May still see scarring on cornea
    - If scarring, can still have impact on vision quality
  - They **can** come back!



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Case 2
Pterygium
To remove or not to remove…

- Setting post-op expectations
  - Risk of **binocular diplopia**
    - A rare complication if the medial rectus muscle is affected during PTY removal due to adhesion of fibrotic tissue
    - Important to assess binocular function
    - May need additional surgery postoperatively

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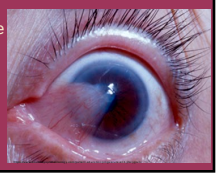
Case 2
Pterygium
To remove or not to remove…

- Risk of recurrence of **primary PTY**
  - Post-op recurrence rates vary from 0% to 67% based on surgical technique, PTY sizes, follow-up periods[1]
  - Many factors have been linked to reoccurrence
    - Fleshiness of PTY
    - Exposure to UV
    - Younger age
    - Surgical technique
    - Race
    - Surgeon experience



60

Case 2
Pterygium
To remove or not to remove…

- Recurrent pterygium
  - Similar histological features to primary PTY, but proliferation of fibrovascular tissue is more severe and prominent making dissection more challenging
  - 2024: Recurrence rate in recurrent PTY surgery was 12.6%[1]
    - Increased risk with more corneal involvement and a higher number of previous PTY surgeries
    - 80% had recurrence within 12 months

61

Case 2
Pterygium

Questions?

62

Case 3

"My doctor told me I have cataracts…Oh and I see double"

63

Case 3 – 71 yo WM

- **Sent for cataract evaluation by optometrist**
- **Monocular "double" vision/ghosting OD**
- (-) CLs
- (-) eye surgeries
- (-) systemic or ocular meds
- EOMs/ductions, (-) tropia/phorias
- Pupils normal

64

Case 3 – 71 yo WM

Habitual Spec Rx (1 yr):
-3.25-0.75x015 OD **20/50**
-2.50-1.00x017 OS **20/40**
+2.50 ADD J3 OU

PH:
20/20 OD
20/20 OS

65

Case 3 – 71 yo WM

Lens:
OD: 2+ NS, tr PSC
OS: 1+ NS, 2+ cortical

ONH:
OD: 0.6 round
OS: 0.5 round

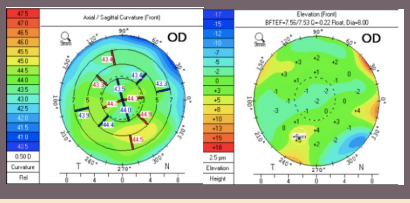
Macula:
Normal OD,OS confirmed with OCT

Vitreous
(+) PVD OD,OS

Periphery:
(+) cobblestone degeneration OU

66

Case 3 – 71 yo WM



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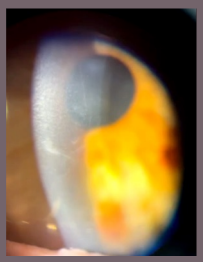

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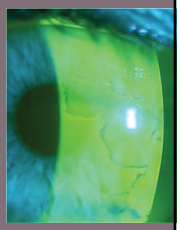
Case 3 – 71 yo WM

What do we have?

69

Case 3
EBMD

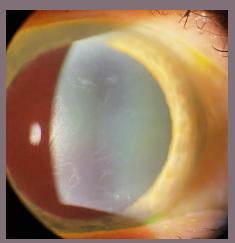
- Epithelial Basement Membrane Dystrophy
  - AKA:
  - ABMD
  - Map-dot-fingerprint
  - Cogan's Dystrophy
- First described by Cogan in 1964[1]
- **Most common anterior corneal dystrophy**
- Affects 2-6% of general population[2]
- Redundant epithelial basement membrane extends into corneal epithelium



70

Case 3
EBMD

- Bilateral, asymmetric
- 3rd to 5th decade[1]
- Women>Men
- Associations
  - OSD
  - Recurrent corneal erosions
    - ~10% develop RCEs[1]



71

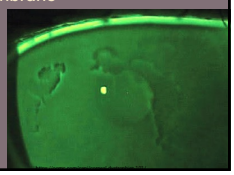
Case 3
EBMD
Symptoms

- Blurred vision
  - Irregular astigmatism/HOA[1]
- Ghosting/shadowing
- Photophobia/Starbursts/Halos
- FBS
- Occasional pain immediately upon waking

72

Case 3
EBMD
Signs

- Pinpoint spots, irregular shaped greyish/white opacities, fingerprint-like curved parallel lines
- Rows of thickened basement membrane
- Negative NaFl staining/pooling
  - **Less is more!**
- Scarring from past RCEs



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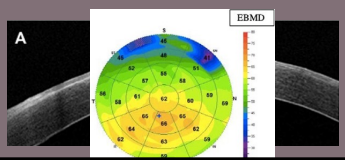
Case 3
EBMD
Diagnosis

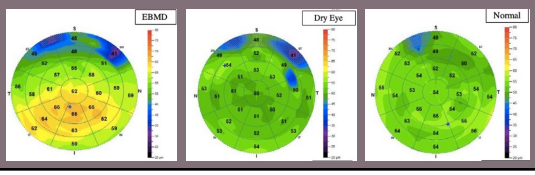
- Slit lamp biomicroscopy
- AS-OCT
- OCT epithelial thickness mapping
  - 2020 study comparing EBMD vs DED vs normal patients[1]



74

Case 3
EBMD
Diagnosis

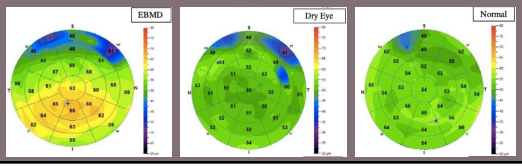
- Evaluated for:
  - Epithelial thickness irregularity
  - Difference between superior and inferior epithelium



75

Case 3
EBMD
Diagnosis

- Concluded:
  - Epithelial thickness irregularity EBMD> DES> normal corneas
  - Superior/inferior difference EBMD>> DED
  - No epithelial difference between DED and normal corneas



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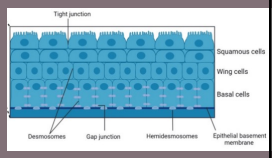
Case 3
EBMD
Pathophysiology

- Normal basal epithelial cells secrete continuous basement membrane (BM)
  - Aka Basal Lamina
- Hemidesmosomes form between basal cells and BM
- Basal cells turn into wing cells turn into squamous cells



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Case 3
EBMD
Pathophysiology

- Normal basal epithelial cells secrete continuous basement membrane (BM)
- Abnormal BM protrudes up into epithelium and prevents deeper epi cells from moving upwards, trapping the new epithelial cells beneath
  - Creates microcysts of cellular/nuclear debris
- Lack of adhesion of epi cells to BM with hemidesmosomes

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Case 3
EBMD
To remove or not to remove…

- How much of an impact is the EBMD making on vision quality?
  - Air/tear/cornea interface contributes 2/3 of eye's total refractive power

Irregular epithelium → Tear film irregularity → Light rays focused incorrectly → Reduction in vision quality

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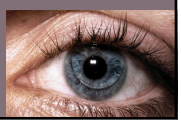
Case 3
EBMD
To remove or not to remove…

- How much of an impact is the EBMD making on vision quality?
  - Is it the EBMD or the cataracts?
- RGP or Scleral CLOrx
  - Tear film between CL and cornea simulates a smooth corneal surface
  - Manifest over hard CL
    - Soft CL won't work!
  - If image becomes clearer with CLORx vision disturbance is likely due to corneal surface



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Case 3
EBMD
To remove or not to remove…


Journal of Clinical Medicine
MDPI
Article
Acuity and Quality of Vision in Eyes with Epithelial Basement Membrane Dystrophy after Regular Pseudophakia

- 2023: Retrospective study evaluating patients diagnosed with EBMD *after* cataract surgery
  - 25 EBMD eyes, 25 control eyes
  - Each group had both monofocal and trifocal patients
- *All* EBMD pts requested unscheduled post-op visits complaining of blurred/fluctuating vision and ocular discomfort

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Case 3
EBMD
To remove or not to remove…

- The EBMD patients were Rx'd PFATs and ointment Rx'd for 3 months
  - All monofocal EBMD pts had subjective improvement
  - ***None*** of the trifocal EBMD pts had subjective improvement

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Case 3
EBMD
To remove or not to remove…

- Avg post-op scDVA:
  - EBMD group: 20/30
  - Control group: 20/25
  - (p = 0.016)
- Avg post-op ccDVA:
  - EBMD group: 20/30
  - Control group: 20/22
  - (p = 0.001)

Takeaways:

- EBMD group saw significantly worse both uncorrected and corrected
- EBMD can affect vision in *both* monofocal and trifocal patients

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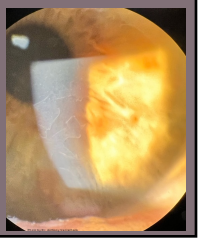
Case 3
EBMD
To remove or not to remove…

Removal of EBMD is recommended prior to **cataract surgery** if it appears to be affecting the corneal topography, is within the visual axis or is easily detected with SLE in the mid periphery



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Case 3
EBMD
HOW to remove?

- **Superficial Keratectomy (SK)** aka Epi-peel
  - Remove EBMD and allow epithelium to grow back more regular
  - Same post-op management as Salzmann nodules
  - Cryopreserved amniotic membrane
- Counsel the patient
  - It CAN come back!
  - It may take months before cornea is stable enough for cataract surgery
  - Repeat corneal tomography scans every 3-4 weeks to determine corneal stability

85

Case 3 – 71 yo WM

Questions?

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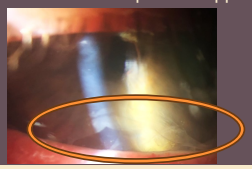
Case 4

"Extremely painful eye after waking this AM"

87

Case 4 – 45 yo AM

- **Extreme pain, photophobia OS**
- Started right when he woke up - has happened before



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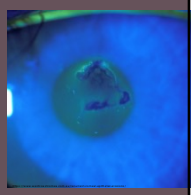
Case 4 – 45 yo AM

What do we have?

89

Case 4
RCEs

- A faulty, loose adherence of the epithelium to the underlying stroma
- Trauma most common cause
  - Inflammation from initial trauma disrupts proper hemidesmosome formation
- EBMD/other corneal dystrophies make up 19-29% of all RCE cases
  - 2000: 46% of all RCE patients had EBMD[1]



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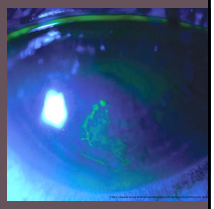
Case 4
RCEs

- Micro erosions
  - Milder in symptoms, shorter duration, more frequent
  - Often present to you with an intact epithelium
  - Likely due to EBMD
- Macro erosions
  - Persist for days at a time
  - Extreme pain, photophobia, eyelid edema
  - Often due to previous trauma
    - I.e. fingernail scratch, tree branch, paper cut



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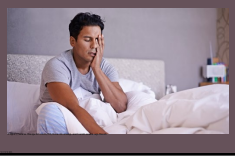
Case 4
RCEs

- Why do erosions happen first thing in the morning or while sleeping?
  - Normal cornea swells ~4% nightly[1]
  - Epithelial edema can disrupt adhesion to BM



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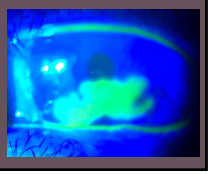
Case 4
RCEs

- Traumatic corneal abrasion is most common form of ocular injury presenting to ER[1]
- Accounts for 37.8% of all eye injuries[2]
- Followed by foreign body, 29.8%



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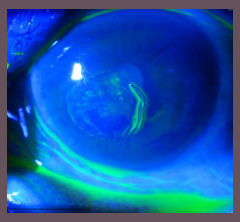
Case 4
RCEs

- **Treatment goals:**
  - Relieve pain
  - Facilitate rapid re-epithelialization
  - Allow hemidesmosomes to form Prevent reoccurrences



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Case 4
RCEs

- Corneal epi that heals over an initial abrasion often adheres poorly to the underlying stroma
- If BM still present and regular, firm adhesion in as early as 1 week[1]
- If not, firm epi adhesion can take 8 weeks to form!

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Case 4
RCEs
Treatments

- Topical antibiotics + BCL if epi defect
  - Risk of microbial keratitis
- Autologous serum tears
  - Isolating the blood serum from the WBCs and RBCs
  - Mimics the biochemical properties of the basal tears
  - Typically diluted to 20-50% concentration
  - Requires refrigeration

Use of Autologous Serum Eye Drops with Contact Lenses in the Treatment of Chemical Burn-Induced Bilateral Corneal Persistent Epithelial Defects

Yan-Ming Chen [1,2,3], Wei-Yu Wang [1], Yen-Chun Lin [1], Shih-Hao Tsai [1], Yun-Ting Lou [1]

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Case 4
RCEs
Treatments

Long-term follow up of autologous serum treatment for recurrent corneal erosions

Nikolaos G Ziakas MD PhD, Konstantinos G Boboridis MD, Chryssa Terzidou MD, Tatiana L Naoumidi MD, Dimitris Mikropoulos MD, Eirini N Georgiadou MD and Nick S Georgiadis MD PhD
1st Department of Ophthalmology, Aristotle University of Thessaloniki, Thessaloniki, Greece

- 33 eyes who failed previous treatments
- Serum gtts 6x/day for 3 months; then QID for 3 months
- 85% had no relapses over 2.5 years
- 15% had single recurrence 3-12 months and end of treatment

6-month treatment was sufficient for keeping patients symptom-free for 2.5 years

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Case 4
RCEs
Treatments

- Topical antibiotics + BCL if epi defect
- Serum Tears
- **Topical Steroids**
  - Reduce MMP-9
    - Dissolve the BM and adhesion fibrils of hemidesmosomes
- **Oral doxycycline**
  - Reduce MMP-9

98

Case 4
RCEs
Treatments

- MMP-2 and MMP-9 are upregulated in corneas with RCEs
  - Dissolve the BM and adhesion fibrils of hemidesmosomes
- Chronic activation may be a result of/cause of poor epi adherence → RCEs

Can take 8 weeks for hemidesmosomes to form between basal epithelial cells and basement membrane!

99

Case 4
RCEs
Treatments

- Topical antibiotics + BCL if epi defect
- Serum Tears
- Topical Steroids
- Oral doxycycline
- **Topical ointments for lubrication**
  - Hypertonic vs erythromycin
  - Theoretical advantage of osmotically drawing fluid from epithelium and promoting adherence to BM[1]

100

Case 4
RCEs
Treatments

- **Topical ointments for lubrication**
  - 2010: Ointment makes symptoms worse?![1]
    - 72 patients with traumatic corneal injury found actual worsening of symptoms when treated with bland ointment
  - Hypertonic ung can help decrease edema and reduce friction and patient RCE symptoms
  - Often using ung qhs x 3-6 months

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Case 4
RCEs
Treatments

- Topical antibiotics + BCL if epi defect
- Serum Tears
- Topical Steroids
- Oral doxycycline
- Topical ointments for lubrication
- **Topical insulin?**
  - Known for its effectiveness for treating persistent corneal epithelial defects[1]

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Case 4
RCEs
Treatments

- **Topical insulin**
  - Insulin is a peptide like insulin-like growth factor (IGF) and stimulates cell migration and is involved in wound healing
  - Insulin receptors are present on cornea and in tear film[1]
  - Not yet commercially available, need to be compounded
    - No guidelines on most effective dose or standardized preparation
  - 2023: 25 IU/mL concentration used QID in patients with RCE[2]
    - Recurrence rate with topical insulin (0%) vs gel tears (21.4%) over 3 months

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Case 4
RCEs
Treatments

- Patient comes in with macro erosion
  - If loose epi, not going to adhere well → **debride**!
  - Can use Weck-cel and proparacaine at the slit lamp
  - Debride loose epi until point of tight adherence
  - Avoid limbus (leave *at least* 1-2mm of protective epi)
- Cryopreserved amniotic membrane + Abx or BCL + Abx
- Oral doxycycline
- Once epi has healed, start topical steroid gtts

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Case 4
RCEs
Treatments

Taking the Recurrence out of Recurrent Corneal Erosions: A Case Series

Scott G Hauswirth; Milton M Horn

+ Author Affiliations & Notes

Investigative Ophthalmology & Visual Science June 2017, Vol.58, 2612. doi:

- Recurrence rates of RCE over 6 months in patients treated with:
  - BCL alone – 66.7%
  - Epi debridement + BCL – 50%
  - Epi debridement + CAM – 14.3%

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Case 4
RCEs
Surgical Treatments

- **Goal of surgery:**
  - To induce a healing response in the stroma that results in firmer epithelial adherence
  - Fibroblast proliferation in anterior stroma during wound healing may stimulate formation of new anchoring fibrils[1]
- Typically saved for recalcitrant cases

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Case 4
RCEs
Surgical Treatments

- Superficial keratectomy with or w/o diamond burr polishing
  - Remove irregularities of the epi and allow to grow back more regular
  - 50-60% effective[1]
  - Diamond burr polishing after the procedure has been found to be more effective than debridement alone[1]
  - Less expensive for surgeon than PTK

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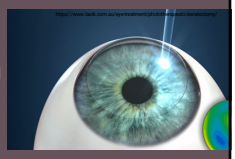
Case 4
RCEs
Surgical Treatments

- Phototherapeutic Keratectomy (PTK)
  - Excimer laser used to remove part of Bowman's layer to create a new, smooth surface
  - Allows newly generated epi to migrate and form attachments
  - ~70% effective[1]
  - Higher rate of success for RCEs from trauma than dystrophy[2]
  - More costly for surgeon and patient
  - Can lead to refractive error changes
    - Hyperopic shift with central flattening



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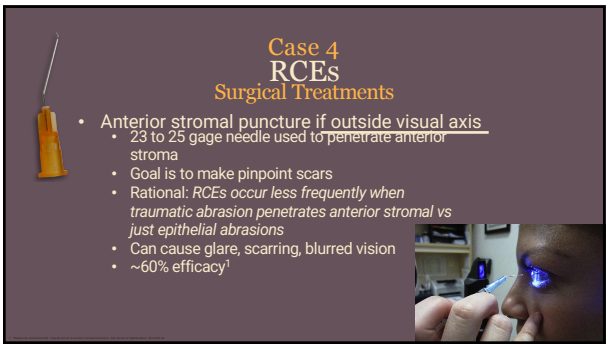

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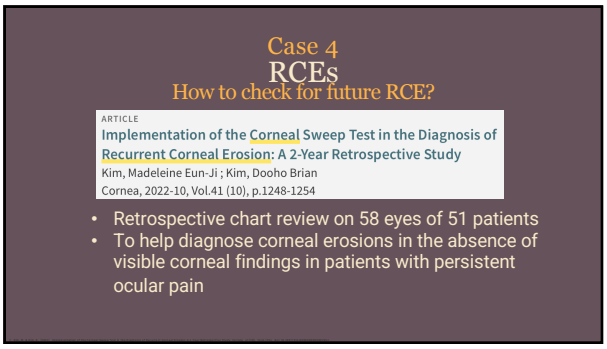

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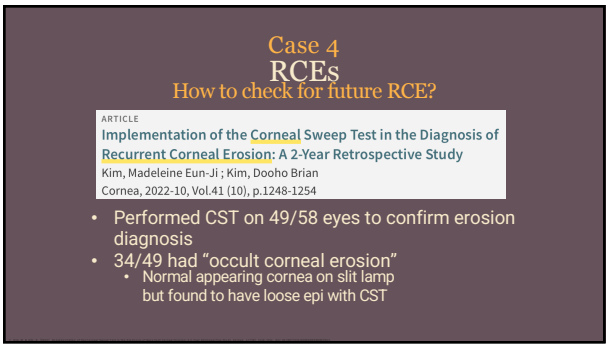

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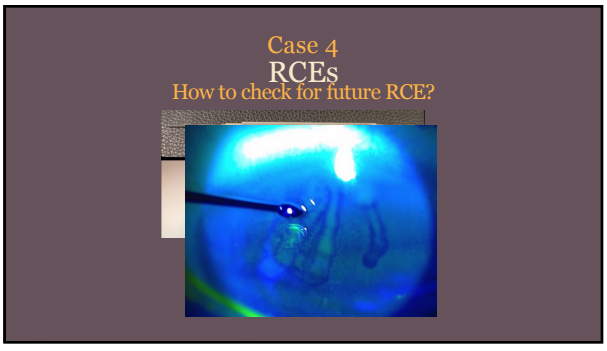

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Case 4
RCEs
How to check for future RCE?

- Results:
  - 9/58 eyes were diagnosed with RCE at slit lamp based on obvious signs
  - 49/58 eyes underwent CST to locate area of loose epi
  - 34/49 had "occult corneal erosion" found by CST
- All occult erosion patients had a presumed mechanism of injury

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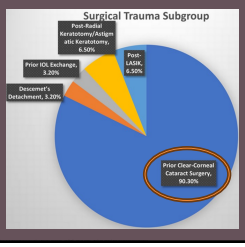
Case 4
RCEs
How to check for future RCE?



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Case 4
RCEs
How to check for future RCE?

- "Occult Corneal Erosion" Subgroup: (34/58 eyes)
- 8 categories of symptoms
  - FB sensation
  - Blurred vision
  - Photophobia
  - Tearing
  - Pain
  - Itching
  - Redness
  - Non-specific, vague symptoms
    - "The eye feels bigger"
    - "The eye just doesn't feel right"

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Case 4
RCEs
How to check for future RCE?

- Once erosion was identified, all patients received ocular surface treatment with lubrication, ointments, hypertonic saline drops/ung
- Secondary tx with BCLs, SK, ASM
- 85% of eyes responded to treatment with improvement or resolution of symptoms
  - Suggests that identifying loose epi with the CST does correlate and confirm diagnosis of RCE

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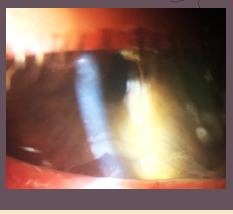
Case 4 – 45 yo AM

- **Extreme pain, photophobia OS**
- Started when he woke up - has happened before



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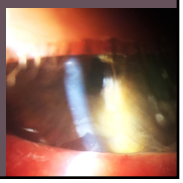
It has happened *many* times before!

Case 4 – 45 yo AM
RCEs

Visit 1:

- Put in 1 gtt of cyclopentolate and proparacaine for pain
- Debrided OS at slit lamp
- Put on a CAM
- Start moxifloxacin QID OS
- Start oral doxycycline (50mg BID po)
- RTC 1 week



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Case 4 – 45 yo AM
RCEs

Visit 2: 1 week later

- Remove CAM as epi defect closed
- Put on BCL – decreased Abx to BID for prophylaxis
- Start Pred Acetate gtts QID (with plans of weekly taper)
- Start hypertonic ung qhs
- Continue oral doxycycline
- RTC 2 weeks for BCL removal

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Case 4 – 45 yo AM
RCEs

Visit 3: 2 weeks later

- Remove BCL with forceps
- *Cornea looked PRISTINE!*
- Continue pred taper (now on BID OS)
- Continue hypertonic ung qhs
- D/c Abx
- Continue oral doxy
- RTC 2 weeks to reassess

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Case 4 – 45 yo AM
RCEs

Visit 4: 5 days later

Woke up with PAIN OS! Pt comes in with macro erosion AGAIN! ☹

- Debrided OS at slit lamp
- Put on another CAM
- Restarted moxifloxacin back to QID OS
- Continue oral doxy (50mg BID po)
- RTC 1 week for CAM removal

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Case 4 – 45 yo AM
RCEs

Visit 5: 1 week later

- Remove CAM as epi defect closed
- Put back on BCL – decreased Abx to BID for prophylaxis
- Increased Pred Acetate gtts back to QID (with plans of *biweekly* taper)
- Continue oral doxycycline
- Continue hypertonic ung qhs
- RTC 2 weeks for BCL *exchange*

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Case 4 – 45 yo AM
RCEs

Visit 6: 2 weeks later
Visit 7: 2 weeks after that

- Removed BCL with forceps
- Cornea looked PRISTINE, **but not stopping here!**
- **Put on another BCL**
- Continued biweekly pred taper
- Continue prophylactic Abx
- Continue hypertonic ung qhs
- Continue oral doxycycline
- RTC 2 weeks for BCL exchange

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Case 4 – 45 yo AM
RCEs

Visit 8: 2 weeks later
(6 weeks with a BCL)

- Remove BCL with forceps
- Cornea still looked good – **but should we do one more?**
  - It can take 8 weeks for hemidesmosomes to form!
- **Put on another BCL**
- Continued pred taper (pt to start QD OS x 2 weeks)
- Continue prophylactic Abx
- Continue hypertonic ung qhs
- Continue oral doxycycline
- RTC 2 weeks for *BCL REMOVAL*?!?!

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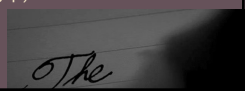
Case 4 – 45 yo AM
RCEs

Visit 9: 2 weeks later
(8 weeks with BCL)

- Remove BCL with forceps
- *Cornea still looked gooooood* ☺
- D/c pred taper
- D/c prophylactic Abx
- Continue hypertonic ung qhs for 6 more weeks
- Continue oral doxycycline (50mg qd) for 6 more weeks, then d/c
- RTC....??



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Take aways

- You will see patients with Salzmann Nodular Degeneration, Pterygium, and EBMD (and likely RCEs)
- They CAN impact vision quality and may require removal for best vision results

Questions?

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Thank you!

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