Managing corneal defects:

Marginal keratitis and Recurrent erosion

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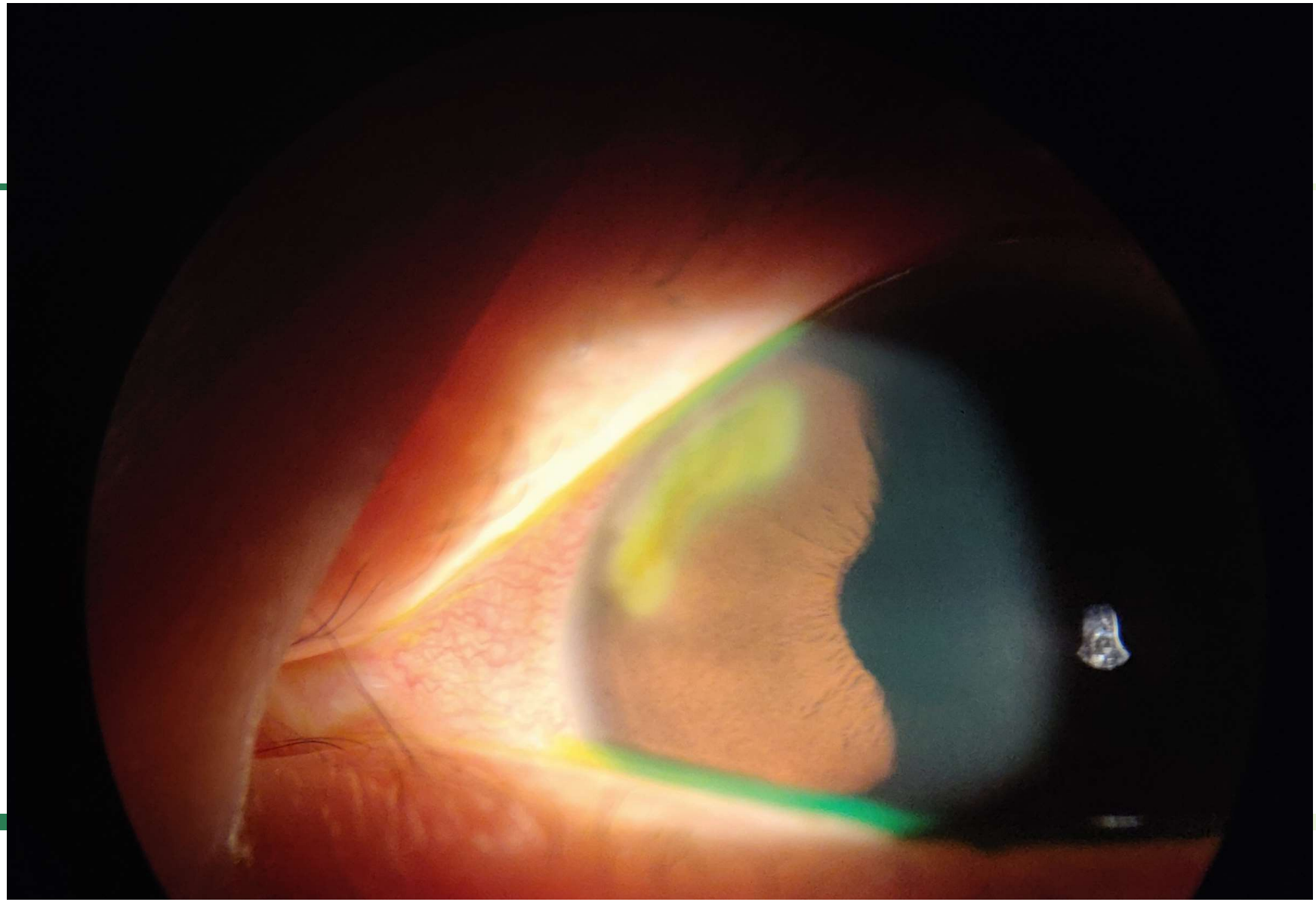
Case 1: JW

- Mrs JW; 48yo female non-CL wearer (prev worn 10 years prior)
- Presented to optom with 1 day history of mild red left eye and FB sensation
  - Referred onwards for “subepithelial/anterior stromal opacification”, epithelial ulceration and mild hyperemia. Started on 2-hourly preservative free lubricants
- “lubricant helps a bit a times but not all the time”
- “Pain in the bright light in the morning”; photophobic
  - No recent trauma or injury
  - Feels a bit like pressure on the eye

Examination

- Left eye:
  - Moderate conjunctival hyperemia
  - Epithelial ulcer and stromal infiltrate
  - No AC reaction
  - Moderate SPK
- Mild bilateral MGD and blepharitis
- BCVA R 6/7.5+, L 6/7.5-
- IOP R 13.5 L 12mmHg (NCT)



- What’s your diagnosis?
- Management?

Management

- Diagnosis; left marginal keratitis
- Management:
  - Maxidex qid 1 week then short taper
  - Chlorsig qid 1 week
- Reviewed 10 days later
  - Much improved but still mild infiltrate
  - Epithelial defect nearly resolved
  - MGD and moderate SPK remains
  - Continue tapering Maxidex
  - Chlorsig continued until epithelial defect closes

- Final resolution 4 weeks after presentation
  - No infiltrate or epithelial defect remains
  - Continue lubricants and blepharitis management
  - Mild IOP spike (26.5mmHg)
    - Resolved after ceasing steroid
    - No glaucomatous neuropathy currently evident
    - Counselled regarding future steroid eyedrop/oral intake use
    - Discharge to optometry care for annual review

Marginal keratitis

- First described by Thygeson in 1946
- Peripheral corneal inflammatory response
  - Bacterial antigens trigger immune response in sensitized cornea
- Affects peripheral corneal tissue
  - Particularly susceptible to immune-mediated responses due to proximity to limbal vasculature and conjunctival lymphoid tissue
- Antigen/antibody complexes deposited in peripheral cornea
  - Antigen from Staphylococcal bacteria in tear film and on lid margin
  - Antibody to this derived from limbal blood vessels
  - Inflammatory cascade, neutrophil recruitment and infiltrate formation
  - Eventually overlying epithelium breaks down causing defect

Signs and Symptoms

- Symptoms variable from asymptomatic to severe including FB sensation, epiphora, burning, grittiness, photophobia
- Findings:
  - Round or curvilinear infiltrate on the peripheral cornea
  - Clear margin between limbus and infiltrate of 1-2mm
  - Epithelial breakdown overlying with SPK or ulcer
  - Injection of bulbar conj and mild chemosis of palpebral conj
  - Lid erythema and reactive ptosis
  - Blepharitis (all forms) usually present
  - Mild AC reaction rare but does occur

Management

1. Extinguish the inflammatory response
2. Treat the underlying cause

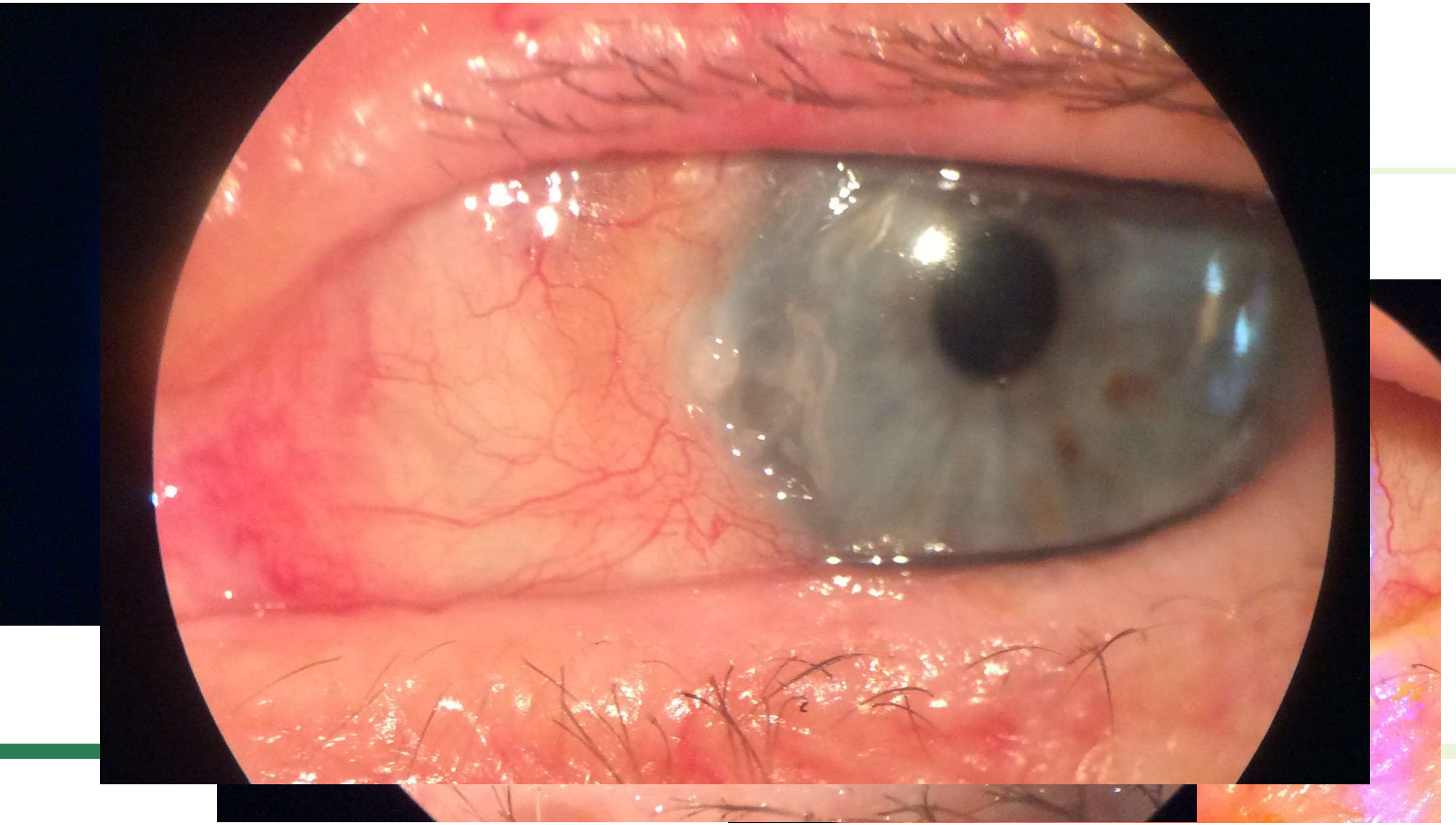
- Inflammation treated with topical steroid
  - Flarex or Maxidex are often good choices applied 3-4 times daily
  - Study: predsol more effective than no tx;
    - neomycin not more effective than no tx
- Reduce antigen burden
  - Manage blepharitis (improve lid hygiene)
    - Add tea tree oil to lid hygiene for demodex blepharitis
    - Consider oral doxycycline/azithromycin management for ocular rosacea
  - Topical antibiotic (Chlorsig) whilst epithelium heals
  - Treat any underlying ocular surface issues
  - Consider any contributing systemic issues

Differential diagnoses

- Microbial keratitis
  - Generally more central, unilateral, often singular large lesion
  - Severe inflammatory response with AC reaction, severe hyperemia, possible hypopyon
  - Increased symptoms with severe photophobia, decreased vision, epiphora
- HSV keratitis
  - Branching ulcer or diffuse SPK often with less dense infiltrate and no clear zone
  - Unilateral, no blepharitis, prior history, reduced corneal sensitivity
  - Consider no topical steroid if unclear marginal keratitis vs HSV
- Drug hypersensitivity:
  - Dorzolamide, atropine, pilocarpine, gentamicin, phenylephrine
- CLIPU; contact lens-related

DDx: PUK

- Peripheral inflammatory keratitis
  - Necrotizing scleritis, epithelial ulceration, corneal thinning
    - Rapid corneal melting and perforation if untreated
- Variable presentation
  - Pain on eye movements (scleritis), hyperemia, blurred vision, photophobia, epiphora, other anterior/posterior inflammation may be present
  - often unilateral, limited to one sector of cornea, within 2mm of limbus, can extend over limbus onto sclera with no clear zone
- Can be due to infection
  - 50% of non-infectious cases have underlying autoimmune condition
  - Review history and ask questions



Moorens ulcer

- Rare; estimated 0.03% incidence in Chinese population study
- Circumferential progressive and rapid thinning and ulceration
  - Can result in perforation
  - 25%-30% of cases bilateral
- No clear zone between limbus and ulcer
  - Undermined and infiltrated leading edge of ulcer
- Severe pain, progressive, chronic autoimmune condition
  - Sometimes idiopathic
  - Some association with prior infection with HepC, trauma, parasitic infection

Terrien's degeneration

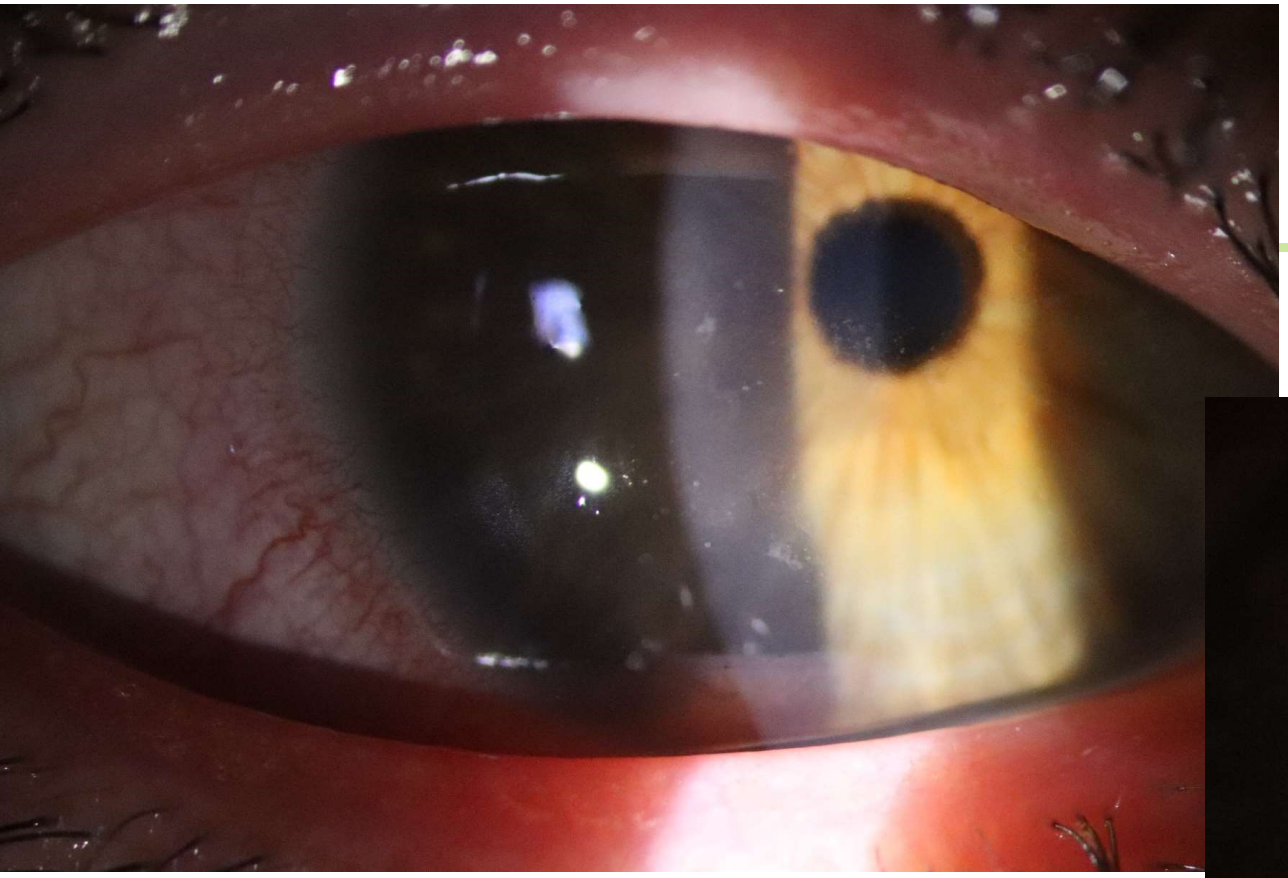
- Bilateral painless degeneration of peripheral cornea
  - Vision loss due to increasing corneal astigmatism
- Eye white and quiet
- Idiopathic
- Fine yellow-white stromal opacities separated from limbus by clear zone
- No epithelial defect
- May look like arcus senilis

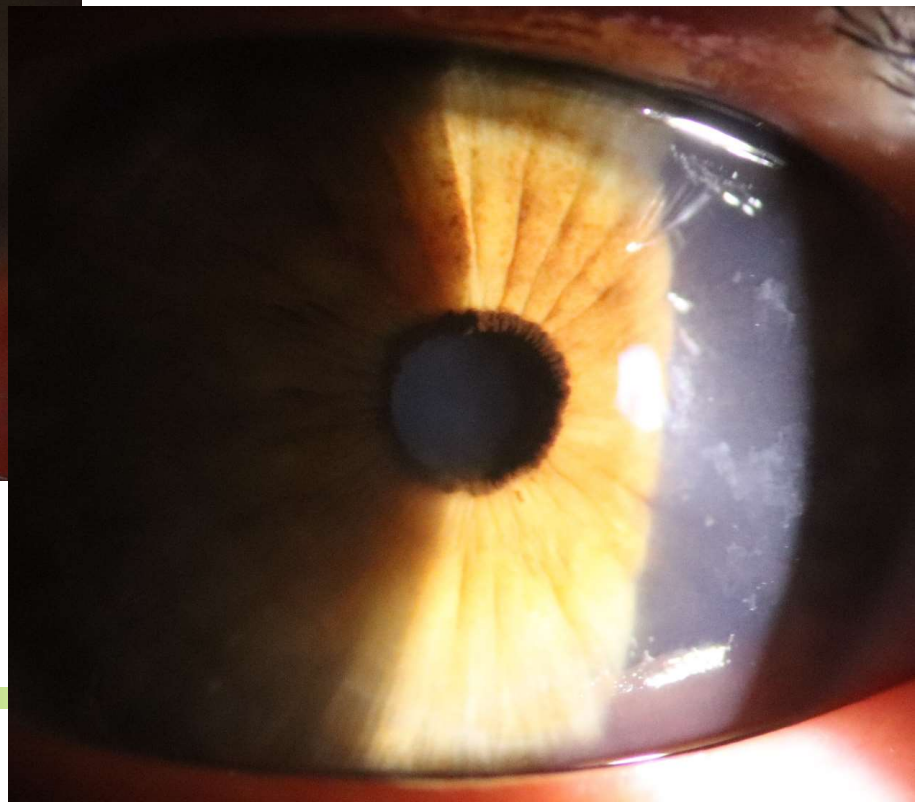
Case 2: RCE

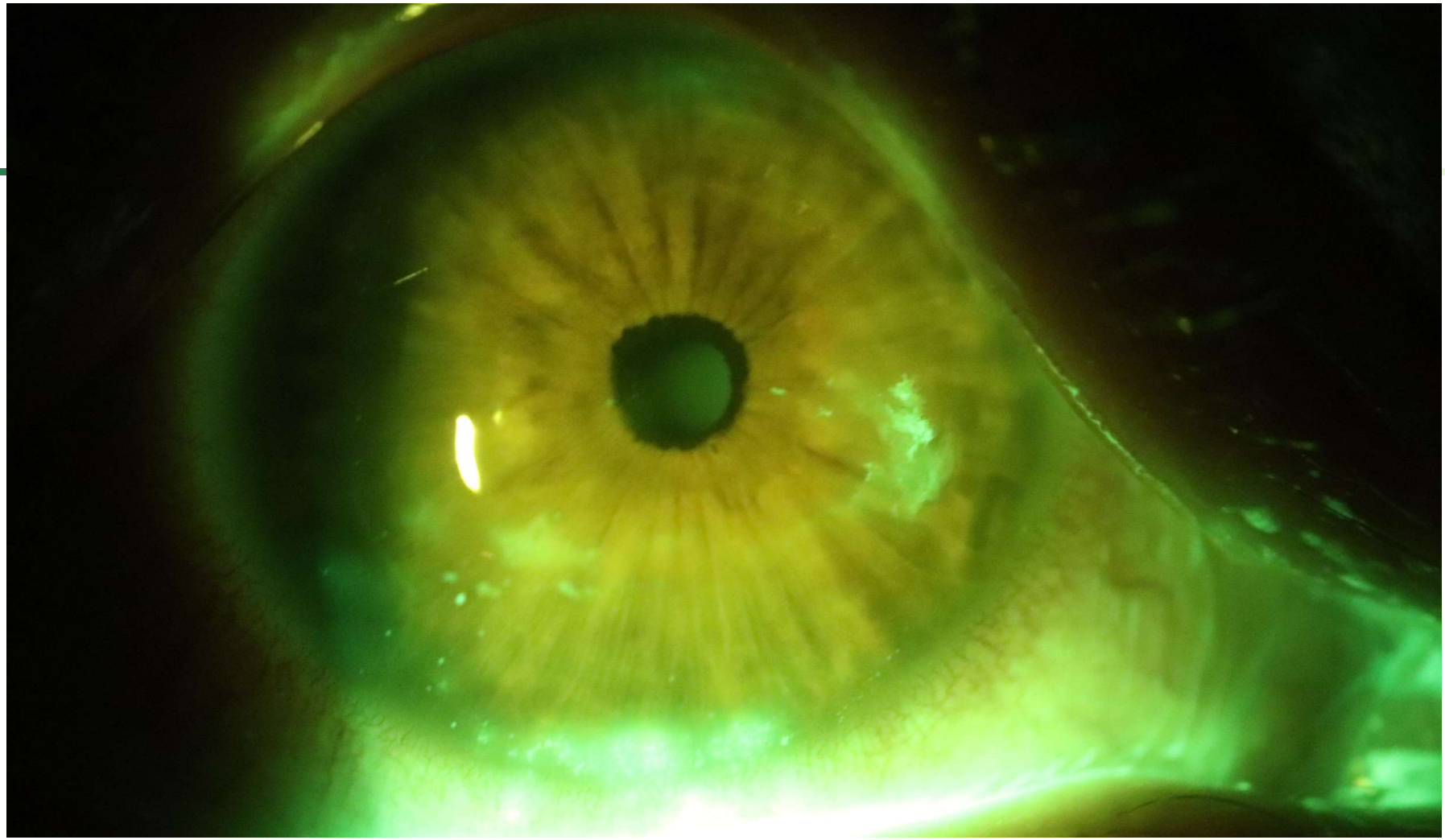
- Young man with 1 day history of pain on waking
  - Used VitaPos during the day and lubricants
  - Vision 6/7.5-
  - Inferior corneal RCE partially reepithelialized
  - No infectious keratitis visible
- BCL inserted. Gel at night. Topical lubricants

Review

- Vision worsened 6/12
- Red and inflamed
- Sloppy mobile epithelium
- Debrided worst area
  - BCL reapplied
  - Flarex and chlorsig qid
  - Plenty of lubricants
  - Review 2 days





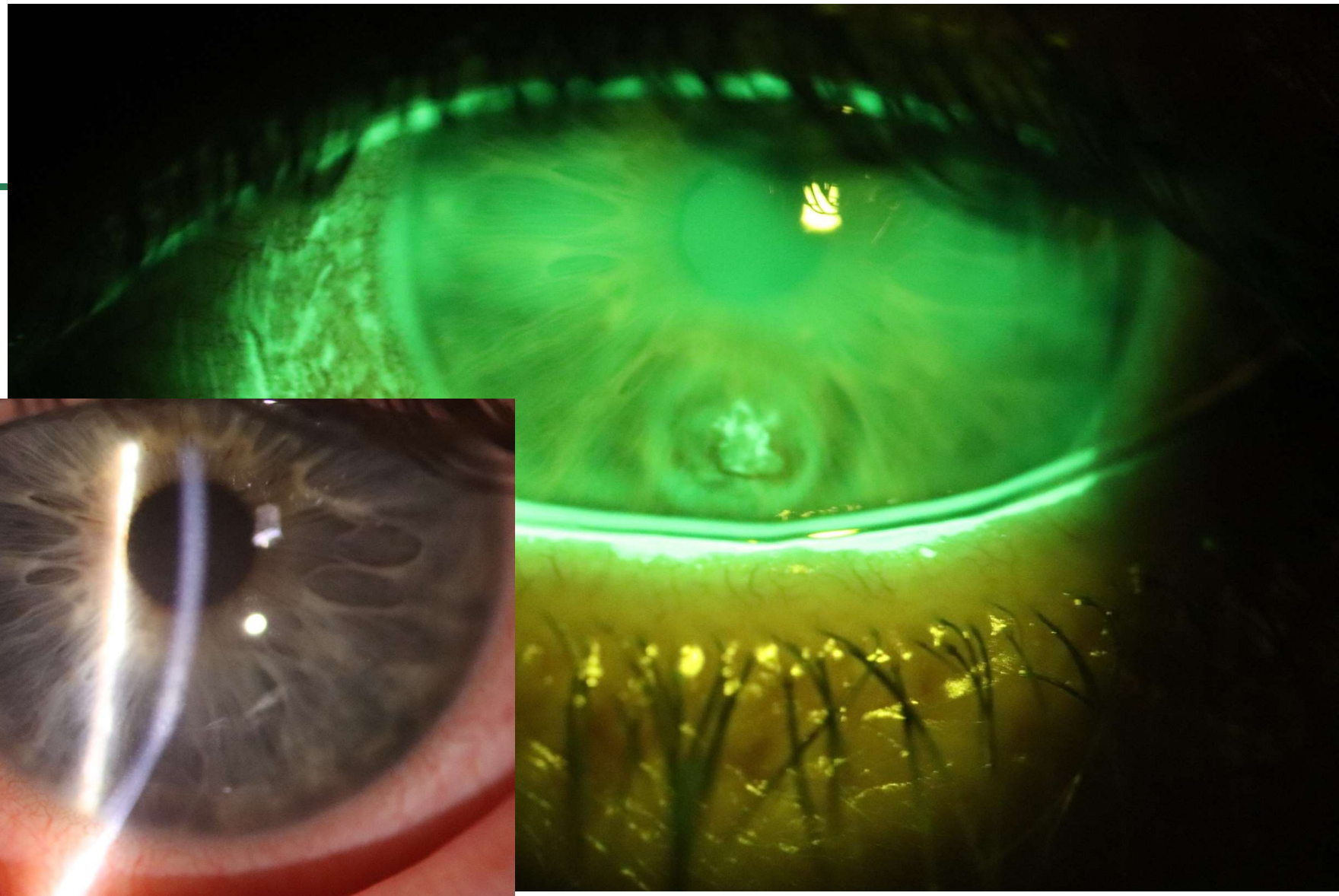


2nd review

- Improving, VA 6/10=
- Symptoms improved
- Eye quiet and white
- New BCL inserted
- Review 3 days and trial without BCL
  - Given size and mobility of erosion may require superficial keratectomy

Case 3

- 2-3 times weekly wakes with pain in the eye
- Using Hylo-forte and VitaPos ointment daily
- History; 2019 fingernail injury to eye
- 6/15 acuity today
- Gr 1+ AC reaction and moderate hyperemia
- RCE visible
- Started Maxidex and Chlorsig qid
  - BCL inserted
  - Continue Hylo-forte



Follow-up

- 1/52 review; vision 6/6, mild staining at centre of prior defect
  - Faint stromal haze
  - AC quiet
  - Cease Chlorsig, Maxidex bd , Vitapos at night without fail and Hylo-forte during day
  - BCL removed
- 1/12 review; vision 6/7.5-
  - No recurrence. Looks great
  - Lubricate and Vitapos without fail.
  - Cease maxidex

Recurrent corneal erosion

- Repeated epithelial defects sustained usually on waking due to poor adhesion of epithelium to basement membrane
- Typically lasts minutes to hours but can last days
  - Redness, photophobia, blurred vision, epiphora
- Diagnosed with clinical signs and history
  - Conjunctival injection, new or healing epithelial defect
  - Typically unilateral but may be bilateral
  - History of prior trauma
  - Px describes waking some mornings with significant pain as soon as they open their eyes

Risk factors and epidemiology

- Most common subsequent to minor shallow corneal trauma (45-64%)
  - Second most common cause underlying EBMD (19-29%)
  - Other factors include corneal dystrophy, denegeration (band keratopathy), prior ocular surgery (cataract, corneal transplant, refractive laser)
- Co-morbidities that increase risk include;
  - Ocular rosacea and MGD
  - Blepharitis and dry eye
  - Diabetes
- Common onset in px aged 40s and 50s
  - Slight female predominance

Mechanism and pathophysiology

- Trauma results in inflammation and disruption of adhesion complexes (hemidesmosomes and anchoring fibrils)
  - Upregulation of MMP-2 and -9 further destabilises
- Corneal epithelium drying overnight increases force of adhesion between epithelium and lid
  - Shearing forces on waking rip off the already weak epithelium
- Presence of increased bacterial lipase combining with meibum
  - Produces toxic free fatty acids which disrupt healing and predispose px to erosions
- Corneal trauma more commonly results in RCE macroerosions
  - Hours to days to heal
  - Signs include large epithelial defect, pain and oedema
- EBMD more commonly related to RCE microerosions
  - Minutes to hours to resolve
  - SPK or no epithelial defect visible on exam; check fellow eye for EBMD

DDx of RCE

- Be wary of RCE patients with AC activity
  - Highly unusual in RCE although does occur
- Consider if infection present (microbial keratitis)
  - If signs of inflammation are greater than expected for RCE
  - Or symptoms (pain, reduced VA, photophobia) more intense than expected
- Carefully assess for dendritic ulceration
  - Especially where there is no definite epithelial erosion
- Consider other causes:
  - Neurotrophic ulcer, trauma, sterile ulcer (CLIPU, marginal keratitis)

Treatment of RCE

- Goals of treatment:
  - Pain relief
  - Promote epithelial healing
  - Prevent recurrences
- Consider patient symptoms, rate of recurrence and pathophysiology
- 60% of patients treated medically still have symptoms
- Rate of healing of complex adhesions is 3-6 months
  - Prophylactic treatment should continue for this period
  - Acute treatment can be ceased once initial erosion is healed
- Treat underlying comorbidities (MGD, rosacea, blepharitis)

Management: conservative

- Ointment at night and lubricate
  - Hylo-forte, theratears or other non-preserved at least 4-6 times daily
  - VitaPos or similar without fail every night
  - Consider cycloplegia or BCL for pain management
  - May require oral analgesia
- BCL
  - Excellent for pain management
  - Prevent shearing forces of lid on waking and scaffold for healing
  - Flat base curve (not too tight) and high O_2 transmissibility
  - 6-12 weeks for restoration of adhesion complexes
- Consider hypertonic ointment at night
  - Creates temporary osmotic gradient to dehydrate cornea and increase epithelial adhesion

- Debridement
  - Weck cell or spud and remove all loose epithelium
  - Remove loose epithelium to the point of tight adherence
  - Leave a margin of 1-2 mm from limbus to protect stem cells
  - Topical anaesthesia and avoid sharp instruments
  - BCL, cycloplentolate, lubricate, antibiotic and bedtime ointment 5-6 months
- Debridement and debur
  - Reduces major recurrences significantly
  - 5-10 seconds buffing of basement membrane until smooth
  - Don’t penetrate Bowman’s membrane

- Surgical options
  - Punctate adhesions
    - Applied with needle through loose epithelium to anterior stroma
    - 0.5-1mm apart and 1-2mm into normal tissue
    - Don’t puncture stroma; visualize with NaFl
    - Not across pupil margin due to scarring
  - PTK
  - Superficial keratectomy

Evidence for treatment

- Cochrane review:
  - No high quality evidence
  - BCL vs lubricants:
    - No significant difference in time to resolution of total participants with improvement
  - PTK vs alcohol delamination
    - Similar to resolution
    - Increased risk of recurrence for patients treated with PTK
  - Transepithelial vs subepithelial excimer laser ablation
    - Possibly increased risk of recurrence for trans vs sub but overlapping confidence intervals

- Hong Kong study, 48px
  - Diamond bur keratectomy vs debridement only
    - Recurrences less common in those treated with the bur
    - Similar corneal haze in both groups
  - 4% major recurrence in px with diamond bur tx vs 56% in debridement px
  - 20% minor recurrence in px with diamond bur tx vs 65% in debridement px
  - No px with diamond bur tx required re-treatment vs 52% with debridement
  - Concluded simple debridement can speed resolution but doesn’t prevent further episodes

Conclusions

- Think about the goals of treatment
- Educate the patient on
  - The potential outcomes and likelihood of complete resolution
  - The probability of requiring long-term lubricant management
- Think about the pathophysiology of RCE when selecting treatment
- Consider a step-wise systematic approach
- Refer if severe recurrences are continuing

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