

## Recurrent Corneal Erosion Syndrome -update

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### Epidemiology

- Case Series; Brown, BJO 60:84-96,1976
  - Age 24-73 (highest 3<sup>rd</sup> and 4<sup>th</sup> decade)
  - Initial abrasion to 1<sup>st</sup> recurrence: 2days – 16 yrs
  - Dominant inheritance in 3%
- Laibson, IOVS, 1975;14:397-9
  - “familial occurrence of MDF”

### History- RCES

- Recognized disease entity >100 years
- 1872- Hansen
  - “intermittent neuralgic vesicular keratitis”
  - antecedent trauma
- 1900- Szili: “epithelial irregularities and gray dots”
- 1901- Stood: “trauma to corneal epithelium and anterior stroma → inability of new epithelium to form normal attachments to injured anterior Bowman’s layer.”
- 1921- Vogt: “fine white dots on Bowman’s layer; fluorescein staining lines; irregular epithelial surface with localised edema.”

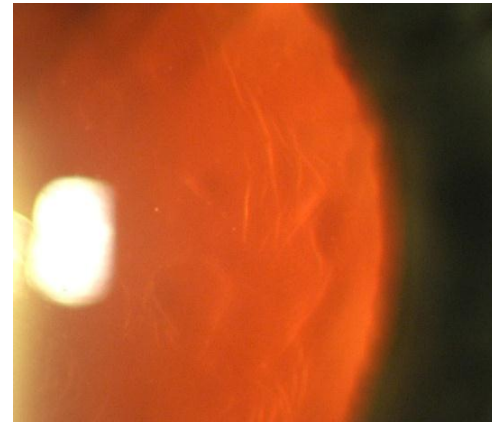
### Etiology/Pathogenesis

- Primary
  - Epithelial basement membrane dystrophy
    - Map-dot-finger
  - Dystrophies involving Bowman’s layer
    - Reis-Bucklers
    - Thiel-Behnke
  - Stromal dystrophy
    - Lattice
    - Macular
    - Granular
- Secondary
  - Degeneration, trauma, after refractive surgery



## Etiology/Pathogenesis-2

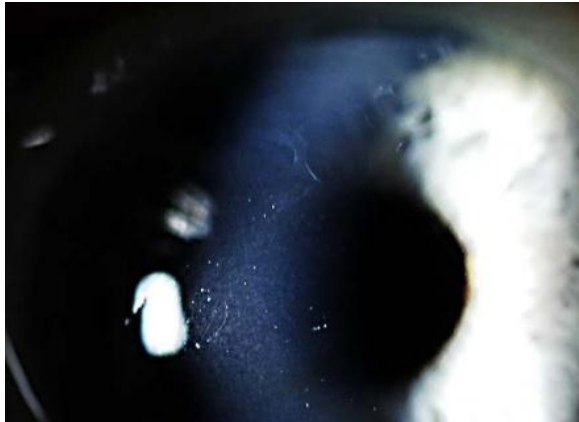
- Damage to superficial squamous cells of epithelium
- Ultrastructural changes reduce adhesion of corneal epithelium
  - Deficient epithelial basement membrane
  - Absence/abnormal hemidesmosome
  - Loss of anchoring fibrils



## Histopathology

- ABMD (primary)-
  - Abnormal epithelial basement membrane protruding forward into corneal epithelium
    - Epithelial microcysts but normal superficial epithelial cells and stroma
- Trauma (secondary)-
  - abnormal (altered) epithelial cells
  - Activated keratocytes in shallow stroma
  - Inflamed mid-stromal keratocytes

## Diagnosis



- Irritation
  - Major complaint
- Foreign body sensation
- Pain
  - Recurrent episodes, especially when awakening
- Previous trauma
- Clinical- careful slit lamp exam (may be subtle findings):
  - indirect illumination
  - Retroillumination with dilated pupil
  - basement membrane dystrophy
  - Loosely adherent epithelium



## Treatment- Medical

- Lubrication
  - Maximize health of tear film
- Lid hygiene
  - Warm compresses
  - Topical antibiotics (erythromycin, bacitracin)
- Hypertonic solutions
  - NaCL ointment or drops
- Bandage contact lens
  - Prevent acute erosion
  - Prevent future erosions

## Treatment- Medical2

- Oral doxycycline- 100 mg bid
- FML 0.1% qid
  - Poor corneal penetration → concentrates effects on corneal epithelium

## Treatment- Medical4 Misc

- Matrix metalloproteinase (MMP) inhibitors
  - Upregulated in tears in pts with RCE
  - Can degrade part of extracellular matrix: MMP-9, MMP-2 → degradation of type IV collagen, type VII collagen, and laminin, components of basement membrane
- Substance P-derived peptide with insulin-like growth factor I (ILGF-I)

## Treatment- Medical3 Autologous Serum

- Autologous serum
  - Prospective, single center (Aristotle University, Thessaloniki, Greece)
  - 33 eyes in 33 pts
  - 6x/day for 3 months; 4x/day for 3 months
  - No recurrences while on treatment
  - 5 recurrences (15%) 3-12 months after end of treatment
  - “safe and efficient” treatment
- Substance P-derived peptide with insulin-like growth factor I (ILGF-I)

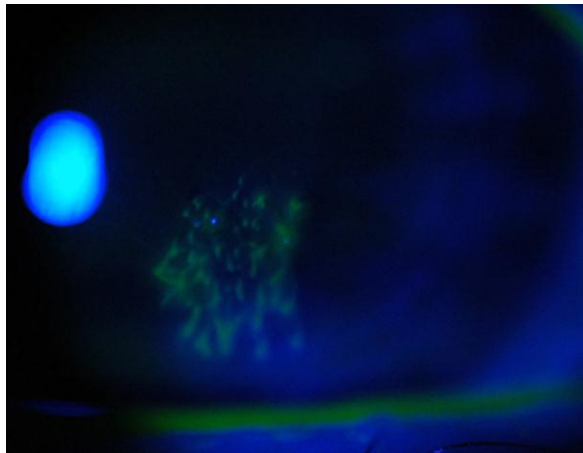
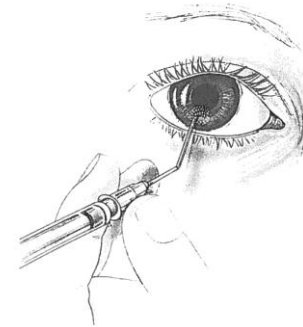
## Treatment- Surgical

- Re-establish normal adherence between irregular epithelium and Bowman’s membrane
- Surgical procedures
  - Anterior stromal puncture
  - Mechanical debridement
  - Diamond burr debridement
- Evidence:
  - Retrospective chart review- Sridhar, Ophthalmology 2002;109:674-9
  - RCT- Wong, Cornea 2009;28:152-6

## Treatment- Surgical

### Anterior stromal puncture (ASP)

- Improve epithelial adherence by inducing scar tissue formation
- Bend 27-gauge needle 90 degrees
- Anesthetize cornea
- 100 puncture site grid
  - Outside of visual axis
  - Needle tip long enough to penetrate Bowman's membrane but NOT long enough to enter anterior chamber



## Treatment- Surgical

### Anterior stromal puncture (ASP)- Risks:

- Scarring- best for disease that is not central
- Pain
- Infection
- Perforation

## Treatment- Surgical Comparative Trial- PTK vs. epi debridement

- PTK vs. epithelial debridement + DB polishing
- Restrospective, non-randomized comparative trial
- Inclusion (chart review; Wills Eye Hospital):
  - 39 pts (42 eyes) who had PTK or DB for RCE
  - 1992-2000
- Procedure- PTK (VISX excimer):
  - Debride loose epithelium with cellulose sponge & spatula
  - 5 um of Bowman's ablated; 21 pulses a 6 H
  - Scopolamine, Ketorolac, Erythromycin, patch
- Procedure- Epi debridement:
  - Debride loose epithelium with cellulose sponge & spatula
  - hand-held battery operated DB used to polish area of epithelial defect

Sridhar, Ophthalmology 2002;109:674-9.

## Treatment- Surgical Comparative Trial- PTK vs. epi debridement + DB

- Results
  - No difference in haze (Fisher's exact,  $P=0.38$ ), recurrence of erosions (Kaplan Meier log rank,  $P=0.73$ ) and vision (Fisher's exact,  $P=0.6$ )
- Conclusion:
  - Both PTK and DB treatment are effective
  - DB is cheaper and easier
- Limitations:
  - Retrospective chart review in single hospital over 8 year period in 42 eyes

Sridhar, Ophthalmology 2002;109:674-9.

## Treatment- Surgical RCT

Diamond burr vs. epithelial debridement

- Double masked, RCT for RCE
  - RCE from trauma or anterior basement membrane dystrophy
  - >1 episode in past month
  - Hong Kong Eye Hospital- Triage unit; General Eye Clinic; Cornea Clinic
- Comparing (at slit lamp):
  - diamond burr vs.
    - Polish with 5.0 mm diamond burr for ~30 secs in vertical manner
  - epithelial debridement
    - Remove loose epithelium with cellulose sponge
    - "sham" therapy with diamond burr therapy
- N=48 eyes
- Primary outcomes:
  - 6 months
  - RCE recurrences

Wong, Cornea 2009;28:152-6.

## Treatment- Surgical RCT- Results

Diamond burr (DBSK) vs. epithelial debridement

- DBSK- less recurrences and less need for repeated surgical interventions ( $P<0.001$ )
- DBSK- lower astigmatism ( $P=0.02$ )

Conclusion:

- DBSK is safe, convenient and inexpensive for RCE

Wong, Cornea 2009;28:152-6.

## References from over 100

1. Das S, Seitz B. Recurrent corneal erosion syndrome. *Surv Ophthalmol* 2008;53:3-15.
2. Ewald M, Hammersmith KM. Review of diagnosis and management of recurrent erosion syndrome. *Curr Opin Ophthalmol* 2009;20:287-91.
3. Sridhar MS, Rapuano CJ, Cosar CB, Cohen EJ, Laibson PR. Phototherapeutic keratectomy versus diamond burr polishing of Bowman's membrane in the treatment of recurrent corneal erosions associated with anterior basement membrane dystrophy. *Ophthalmology* 2002;109:674-9.
4. Wong VW, Chi SC, Lam DS. Diamond burr polishing for recurrent corneal erosions: results from a prospective randomized controlled trial. *Cornea* 2009;28:152-6.
5. Ziakas NG, Boboridis KG, Terzidou C, et al. Long-term follow up of autologous serum treatment for recurrent corneal erosions. *Clin Experiment Ophthalmol* 2010;38:683-7.