Recurrent Corneal Erosion Syndrome - update
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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.”

Epidemiology

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

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- 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- 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- 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-guage 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

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
- Retrospective, 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


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


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


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

References from over 100