Disclosures

Authors have no financial interests relevant to this talk
Refractive Shifts after EK

Conventional Wisdom

• **DSAEEK**
  – Hyperopic Shift of $\sim 0.75$ to $1.25$ D
  – Negative Lens (thick on the edges, thin in the middle)

• **DMEK**
  – Less of a hyperopic shift
  – Posterior curvature is flat preoperatively and curved anteriorly postoperatively
Reality

• Huge range of refractive & topographic shifts
• Index of refraction between posterior K and aqueous is minimal
  – 10 D needed to induce 1 D of refractive effect
• How do we explain MYOPIC shifts?
Devers Study: Analysis of DMEK Refractive Shifts

- 309 DMEK standardized technique surgeries from 2/5/13 to 6/2/15
- 200 had a triple procedure so excluded from analysis of shifts
- 102 eyes did not have a triple or IOL exchange or LASIK/PRK
- 61 eyes with preop and 6 month post op complete data
  - Age: 63.9 ± 7.2 years
  - 67% Female, 33% Male
- Pre-op Spherical Equivalent Mean:
  - -0.86 ± 1.8 (Range: -6.0 - +2.63)
- Post-op Spherical equivalent Mean:
  - -0.51 ± 1.78 (Range: -5.5 - +2.5)
- Mean SE change from preop to post op: hyperopic shift of +0.32
Devers Study: Analysis of DMEK Refractive Shifts

**Myopic Shifts**
- 30 eyes (49%)
- Average Shift: $-0.51 \pm 0.4$
- Median Shift: -0.38
- Range: -0.25 to -1.50 D

**Hyperopic Shifts**
- 31 eyes (51%)
- Average Shift: $+1.11 \pm 1.02$
- Median Shift: +1.0 D
- Range: 0 to +3.25 D
• **Melles** (van Dijk et al: Contact Lens & Anterior Eye 36 (2013) 13–21):
  • N= 167 pseudophakic eyes
  • Mean refractive change: +0.25 +/- 1.12 at 6 months
  • Range: -2.50 of myopic shift and +3.75 of hyperopic shift
  • % of eyes with myopic shift: not given
So What Causes The Variability in Shifts?

• Anterior Corneal Changes?
• Posterior Corneal Changes?
• Pachymetry?
Correlation of change in SE to changes in Anterior Mean K

\[ R^2 = 0.2112 \]

N=61
Correlation of change in SE to changes in Posterior Mean K

R² = 0.0106

N=61
Correlation of change in SE to Pachymetry Pre-op

N=61

R² = 0.0091
Correlation of change in SE to change in Pachymetry

$R^2 = 0.0317$

N=61
WEAK correlations between posterior corneal curvature changes and Spherical Equivalent Shifts

Conclusion

- **Myopic** refractive shifts occur half the time after DMEK alone.
  - Posterior curvature and pachymetry changes do not explain this myopic shift
  - Likely are most dependent on changes in anterior curvature
  - The use of multifocal IOLs and the promise of emmetropia to patients after DMEK (or DSAEK) is likely not warranted
Thank you!

Questions?