Improvement Strategies:
Biometry, Topography
Power Calcs to
↓↓↓ Ref
Surprises

The Promise of No
Glasses or
Contact
Lenses!

Requirements
- Accurate Biometry – Optical
  (IOL Master or LenStar)
- Accurate K’s- Repeatable
- 4th Generation Formula (WTW)
- Personalized Lens Constant
- Eliminate Corneal Astigmatism

Zaldivar-Holladay JCRS May 2000
Zeiss - IOL Master - 2000

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IOL Power Calculations

- Pentacam can measure FRONT & BACK SURFACE POWER
- Can Calculate:
  - Equivalent K-Reading (EKR)
    - 65% Mean, Peak & Average
  - NET POWER

EKR

- Reports Keratometry value but adjusts for Back Surface Power from Normal (Current IOL Formulas)
- If corneal front surface is 7.5 mm (45 D), but if back surface -0.3 D > normal:
  \[ EKR = 45.0 - 0.3 = 44.7 \text{ D} \]
  Note: Net Power = 43.3 D

Holladay Report

IOL Calcs – Abnormal Cornea (Use 65% MEAN EKR)

- Post Refractive Surgery
- Post PKP
- Keratoconus
- Corneal Scar
- Any Irregular Astigmatism

Use 65% Mean EKR ( @ 4.5, 4 & 3 mm zones)
Post LASIK CALC

- $K_{\text{mean}} = 39.8$ D
- Used $39.8$ D => $SEQ = +1.12$ D
  ($+1.00 + 0.25 \times 155 = 20/20$)
- $65\%$ mean = $38.8$ D => $+0.12$ D
- Use $65\%$ mean $K$

Conclusions

- EKR – Use $65\%$ Mean for all IOL Calcs
- Look @ smaller zones than 4.5 mm if pupil very small
  (< 3.0 mm in dim light)

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Vergence Formula

$$IOL = \frac{1336}{AL-ELP} - \frac{1336}{1000} - ELP + \frac{K(\text{Post } R)}{1000} - \frac{V}{D_{\text{Post } Rx}}$$
CONCLUSION: 9 EYES

Anterior Segment Size

<table>
<thead>
<tr>
<th>Axial Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
</tr>
<tr>
<td>Long</td>
</tr>
<tr>
<td>Megalocornea</td>
</tr>
<tr>
<td>+ axial hyperopia</td>
</tr>
<tr>
<td>(0%)</td>
</tr>
<tr>
<td>(80%)</td>
</tr>
<tr>
<td>Normal</td>
</tr>
<tr>
<td>Long</td>
</tr>
<tr>
<td>Megalocornea</td>
</tr>
<tr>
<td>+ axial myopia</td>
</tr>
<tr>
<td>(2%)</td>
</tr>
<tr>
<td>(96%)</td>
</tr>
<tr>
<td>Long</td>
</tr>
<tr>
<td>Megalocornea</td>
</tr>
<tr>
<td>+ axial myopia</td>
</tr>
<tr>
<td>(10%)</td>
</tr>
</tbody>
</table>

Measurements taken for Predictors of ELP

1. Axial Length
2. Average K (Pre Ref)
3. Horizontal WTW
4. ACD
5. LT
6. Pre-op Refraction
7. Age

FORMULA PERFORMANCE

Mean Absolute Error (D)

- Holladay 1
- Holler Q
- SRKT
- Holladay 2

N = 997

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Personalized Lens Constant

- Never use Manufacturer’s Constant except to start
- 20 to 40 cases and continue
- Factors
  - IOL Style
  - Lens placement
  - Post op medications
  - Biometer, keratometer, …
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TORIC IOL Calculations

- Commercial Calculators use a constant ratio (1.46) for the corneal cylinder to the IOL cylinder
- Exact Calculation depends on IOL SEQ Power and ELP … to correct 2D of corneal astigmatism
  - 10 D IOL => 3.5 D Cylinder
  - 22 D IOL => 2.9 D Cylinder
  - 34 D IOL => 2.4 D Cylinder
- A 1.1 D difference from 10 D to 34 D!

Toric Optimization

PREOP 6 D Toric IOL

LE

Thank You!