Custom Ablation Outcomes with NAVEX

George O. Waring, III, MD
Acknowledgement

- Arturo Chayet, MD
- Howard Gimbel, MD
- Omid Kermani, MD
- Mihai Pop, MD
- Paolo Vinciguerra, MD
NAVEX Components

- NAVWave
  - OPD-Scan
  - Final Fit Software
- NAVScan
  - EC-5000CXII Laser
- NAVFocus
  - Automated microscope
- NAVTome
  - MK-2000 Keratome
Range of Treatment

- Primary Surgery
- Custom Enhancements
- Night Vision Disturbances
NAVEX Primary Treatments

Clinical Outcomes
## Patient Population

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of eyes</strong></td>
<td><strong>314</strong></td>
</tr>
<tr>
<td><strong>Mean Sphere</strong></td>
<td><strong>0-8.25</strong></td>
</tr>
<tr>
<td><strong>Cylinder</strong></td>
<td><strong>0-3.00</strong></td>
</tr>
</tbody>
</table>
Treatments

- All eyes targeted for emmetropia
- No nomogram adjustment
### Post Operative Results

<table>
<thead>
<tr>
<th>Description</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gain 1 or more lines of BCVA</td>
<td>54%</td>
</tr>
<tr>
<td>20/15 ≤ UCVA</td>
<td>48%</td>
</tr>
<tr>
<td>20/20 ≤ UCVA</td>
<td>90%</td>
</tr>
<tr>
<td>± 0.50 D</td>
<td>86%</td>
</tr>
<tr>
<td>Post Op UCVA ≥ Preop BCVA</td>
<td>92%</td>
</tr>
<tr>
<td>Loss of 1 or more lines</td>
<td>0%</td>
</tr>
</tbody>
</table>
Total High Order

Conventional LASIK induced 2-5X increases
Custom Enhancements
MultiPoint Ablation
Patient Population

- 20 eyes (Ten patients)
- Primary Myopia, Hyperopia, and Mixed Astigmatism
- Primary Refractive Surgery
Patient Population

- All patients with sub-optimal outcomes from previous refractive surgery
- Halos/Glare- Symptomatic
- Decrease in the Quality of Vision
Experience with NAVEX Custom Enhancements

- Decentered ablations
- Irregular astigmatism
- Previous incisional surgery
- Lensectomy
- Patients who suffer from debilitating night vision symptoms
Custom Wavefront Enhancement: Pre-Op Data

- Myopia, Hyperopia, or Mixed Astigmatism, N = 20
- Mean Sph -4.08 D (-6.25 to +.75)
- Mean Cyl. -0.75 D (-1.25 to 0.00)
Custom Wavefront Enhancement
Pre-Op Data

• Mean S.E. -4.46 D (-6.75 to +.25)

• Mean Pre-Op RMS 0.7637

• Mean Pupillary Diameters: 4.5 mm, Mesopic/ 6.0 mm, Scotopic
NAVEX Custom Enhancement: Pre-Op vs. Post-Op Distribution

- Pre enhancement
- Post enhancement

Bar chart showing distribution with categories 20/15, 20/25, 20/40, 20/60.
NAVEX Custom Enhancement Results

Pre Custom Enh VA sc 20/25 to 20/400

Post Custom Enh VA sc 20/15 to 20/60

Pre Custom Enh Ave HO RMS 0.6582 (0.435 to 1.2024)

Post Custom Enh Ave HO RMS 0.5960 (0.420 to 0.779)
NAVEX Custom Enhancement Summary

- Successful in reducing residual wavefront errors in patients who have undergone primary refractive surgery
NAVEX Custom Enhancement Case Example

- 1999 LASIK OU
- Flaps repositioned on day one p/o visit
- Feb 2000 OS re-cut and repositioned
- Summer 2000 LASIK enhancement OU
Multiple LASIK Surgeries

- VA OU “poor” particularly in dim light
- Not comfortable driving at night
- OS worse than OD
- UCVA OS 20/30+
- BCVA OS 20/25+ “blurry”
- Mild fibrosis at flap margin
Preop OPD-Scan
Post NAVEX Custom Enhancement

- Refractive parameters stayed the same
- VA OS has “Improved”
- OS the “best” eye now
LM Mesopic Contrast Sensitivity

- Post NAVEX
- Pre Enhancement
Aspheric Ablation

Night Vision Disturbances
Spherical Aberration

- Induced by ablation
- Increases 40-60%
- Causes night vision symptoms
- Decrease quality of vision
Aspheric Cornea

Spherical Ablation
Large Pupil and Treatment Zones

- Treatment MUST be tapered to mesopic pupil diameter
Other Manufacturer’s Custom Ablation

Pre-Op: -5.5 D @ -2 cyl.
Aspheric Ablation

- Decrease OZ
- Increase TZ
- Create a seamless transition between treatment zones
- A gradual curvature gradient Post-Op
NIDEK Aspheric Treatment after a -6D@ -1.5D cyl. Treatment 5mm OZ. 10 mm TZ
5mm pupil - Note the simulated sharpness of high and low contrast charts
## Patient Population

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of eyes</td>
<td>87</td>
</tr>
<tr>
<td>Mean Sphere</td>
<td>-1.00 to -11.00</td>
</tr>
<tr>
<td>Mean Cylinder</td>
<td>0 to -3.50</td>
</tr>
</tbody>
</table>
Contrast Sensitivity

Aspheric Post Op
Aspheric Pre Op

NIDEK NAVEX
Aspheric Ablation
Indications

• Primary candidate
• Large pupils
• Patients at risk for night vision symptoms
Conclusion

• Decreases spherical aberration

• Increases effective optical zone

• More likely to maintain visual quality
Range of Treatment

- Primary Surgery
- Custom Enhancements
- Night Vision Disturbances