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Complex Wavefront Retreatments after Conventional LASIK

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WF Enhancement Case Series

• 11 eyes (9 patients) with histories of
  – conventional LASIK surgery
  – significant visual complaints of glare and halos
  – underwent CustomCornea wavefront treatment (Alcon LADARWave)

• Pre- and postoperative comparisons
  – Topographies (with difference maps)
  – Wavefront measurements (all at 6.5 mm OZ)
WF Enhancement Case Series

- Demographics of 11 eyes
  - 8 Male
  - 3 Female
  - Mean age: 48 (35 to 61)
  - Mean preop WF SE: -0.40 (-2.55 to -0.31)
  - Mean postop WF SE: 0.09 (-1.58 to 1.39)
WF Enhancement Case Series

• Of the 11 treated eyes:
  – 10 had a decrease in total RMS
  – 10 had a decrease in higher order RMS
  – 9 had a decrease in total coma
  – 10 had a decrease in spherical aberration
Mean Improvement in Root Mean Square

<table>
<thead>
<tr>
<th></th>
<th>Pre-Op</th>
<th>Post-Op</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total RMS</td>
<td>2.38</td>
<td>1.28</td>
</tr>
<tr>
<td>H.O. RMS</td>
<td>1.03</td>
<td>0.85</td>
</tr>
</tbody>
</table>

Diff: .18
(0.46 to -0.10)
P = .002
Mean Improvement in Spherical Aberration and Coma

**Total Coma**
- Pre-Op: 0.59
- Post-Op: 0.50
- Diff: 0.09
  - (0.31 to -0.21)
  - p = 0.06

**Spherical Aberration (Sper Ab)**
- Pre-Op: 0.67
- Post-Op: 0.50
- Diff: 0.17
  - (0.16 to -0.55)
  - p = 0.01
JC

51 y/o female
• c/o significant glare/halos OD
  - esp @ night
• s/p LASIK OD (2/99)

• UCVA OD: 20/20-
• MRx: pl -0.75 x 005 -> 20/15-
Notice:
- Vert/Horiz coma
- Spherical ab
Case Examples

Difference maps show “injection mold” of wavefront
Difference
- Notice the OZ expansion to treat spherical aberration
KW

- 44 y/o male presented in 2/03
- c/o significant glare/halos OS
  - esp @ night
- s/p LASIK OU (8/99)

- UCVA OD: 20/30 OD, 20/40 OS
- MRx OD: -0.25 -0.50 x 165
  - -> 20/25
- MRx OS: +0.75 -0.75 x 175
  - -> 20/30

Preop
Notice:
- Vert/Horiz coma
- Spherical aberration
Preop
HO RMS: 1.37
SpAb: 1.01

5 Mo
HO RMS: 1.13
SpAb: 0.74
Difference map: demonstrates the ablation pattern used to decrease coma and spherical aberration.
Now that OS is much improved, noticing relative difference OD:
- Haze
- Glare
- Night driving
**Notice:**
- Vertical coma
- Spherical aberration
Preop  HO RMS OD: 1.22  Coma: 0.90

4 Mo  HO RMS OD: 0.97  Coma: 0.63
Difference map: demonstrates the ablation pattern used to decrease coma and spherical aberration.
Subjectively: marked improvement in contrast sensitivity

CS (12 cpd):
- OD (2-11-03): 0.90
- OD (8-13-03): 1.10
MK

- 35 y/o male presented with c/o ghost images & halos day and night
  - Told by outside physician = 2° to astigmatism
- s/p LASIK OU (6/01)
- UCVA: 20/20 OU
- MRx OD: -0.75 xph

Preoperatively
**Preop HO RMS OD:** 1.19

Notice:
- Spherical Ab
<table>
<thead>
<tr>
<th>Time</th>
<th>HO RMS OD</th>
<th>SpAb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preop</td>
<td>1.19</td>
<td>1.02</td>
</tr>
<tr>
<td>3 Mo</td>
<td>0.75</td>
<td>0.57</td>
</tr>
</tbody>
</table>
Difference map: demonstrates the ablation pattern used to decrease coma and spherical aberration.
MK

• 3 mo postop exam
  – Some residual “ghost images” OD
  – Much improved VA: UCVA OD: 20/20
  – c/o double vision OS
    • Considering WF enhancement OS
JT

57 y/o female

- s/p LASIK OU
  - 11/01
- c/o poor distance
  VA & bad glare/halos
- UCVA OD: 20/25
- MRx OD:
  - pl -1.25 x 140
  -> 20/25

Preoperatively
Preop HO RMS OD: 1.35

Notice:
- Sp Ab
- Vertical Coma
- Horiz Coma
Preop  HO RMS OD: 1.35
      Coma: 1.01

3 Mo    HO RMS: 1.11
      Coma: 0.73
Difference map: demonstrates the ablation pattern used to decrease spherical aberration and coma.
MP

40 y/o male

• s/p LASIK (4-15-99)
• c/o “smeary” pattern in VA OU (OS>OD)
• UCVA: 20/25 OS
• MRx OS:
  – pl -1.00 x 005 -> 20/20

Preoperatively

Standard map
**Preop HO RMS OS: 0.75**

**Notice:**
- Sp Ab
- Coma
Preop HO RMS OS: 0.75  
3 mo HO RMS: 0.55
Difference map: demonstrates the ablation pattern used to decrease coma and spherical aberration.
MP

3Mo

Preop

Difference Map

Similar Results OD
• **Postop VA**: 20/20 OU

• **MRx OD**: pl -0.5 x 145 -> 20/15

• **MRx OS**: -0.25 -0.25 x 160 -> 20/15+2
  
  – Pt wanted SRx b/c he lives at the beach, near the marina and wishes to see better detail of the boats passing by
EB

29 y/o male

- s/p PK OD 2º to keratoconus
- c/o glare/halos
- UCVA OD: 20/80
- MRx OD:
  - pl -4.00 x 030
  -> 20/60-2
- Intolerant of RGP
EB

Difference made by microkeratome -> release of some astigmatism

3-14-03

12-13-02
Difference Map

7-7-03

LASIK c conv laser -0.25-3.50x031

3-14-03
Preop HO RMS OS: 1.55

Notice:
- Sp Ab
- Vertical Coma
- Horiz Coma
8-18-03

Difference Map

Difference -WF-guided asymmetric ablation pattern tx of sp ab & vert/horiz coma

8-18-03

Pre-WF (7/03)
EB

Difference Map

8-18-03

Pre all op’s (12/03)
Thank you!
Custom Cornea after Conventional LASIK: Lightning Rounds
Difference: coma and spherical aberration
Difference: coma and spherical aberration
Difference: coma and spherical aberration
Difference: coma and spherical aberration
Difference Map

Difference: coma and spherical aberration

3 Mo Post-op

Preop
Difference: coma, spherical aberration, and trefoil
1 Mo Postop

Preop

Difference:
coma and spherical aberration
WR

1 Mo Postop

Preop

Difference Map

Difference Spherical aberration
Difference: coma and spherical aberration

2 Mo Postop

Preop
BR

1 Mo Postop

Preop

Difference Map

Difference
Central island
Thank you!

Beverly Hills, CA
Intacs for Keratoconus Case
Keratoconus

1 day s/p Intacs

Difference Map

GB

Difference
LASIK after Penetrating Keratoplasty Case
1 day s/p flap

s/p PK

Difference made by microkeratome -> release of some astigmatism
GB

1 day s/p Conv LASIK

s/p PK And flap

Difference with conventional ablation