Smoothing highly aberrated eyes into a clinically measurable and treatable range

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Why PTK needs corneal wavefront? 1

• Cornea in such cases is frequently non transparent (total wavefront is unmeasurable)

• This cases needs a restoration of normal curvature on 11 mm or more not only in pupillary area (reducing healing bias)

• Topography (from which corneal wavefront is derived) have more data point than any commercially available aberrometer
Why PTK needs corneal wavefront? 2

- Highly aberrated eyes usually is very difficult to precisely measure with total aberrometer.
- Multi step approach is mandatory (epithelium or flap bias) total aberrometer are not capable to easily measure patients with no epithelium or lifted flap.
Topography: with vs without epithelium
Reducing irregularities reduces diffraction, post op pupil frequently smaller.

End point:
note the brightness
CSO, long distance

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Optikon, short distance
Advantages of intra-op corneal aberrometer

- Intraoperative control without moving the patients
- Multistep approach (tissue saving)
- High number of data point
- Possible subtraction of single aberration on maps

Advantages of Keratron

- Total corneal coverage
- Possible subtraction of single aberration on maps with consequent convolution of BCVA
- Sterile cover for safe intra-op use

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Contact lens scar
Differential map intra-op end point versus 3 mos

Differential

After 3 Mos

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Without Epithelium
Bacterial ulcer scar
RMS=7,072 μm

RMS=4,726 μm

RMS=4,302 μm

RMS=2,79 μm
Traumatic abrasion scar
Central island
number of eyes pre OP: 35

age average 44 years (from 25 to 104)

sex female 34,3% or 12 eyes
male 65,7% or 23 eyes

eye left 51,4% or 18 eyes
right 48,6% or 17 eyes

pre SR equiv: mean -1,60 D ± 3,65 D (from -9,38 to 10,00)
pre SR sph: mean -0,87 D ± 3,76 D (from -6,00 to 13,00)
pre SR cyl: mean -1,45 D ± 1,70 D (from -6,75 to 1,00)

number of eyes 1 m: 29 (follow up rate 82,9%)

post SR equiv: mean -1,16 D ± 3,51 D (from -12,63 to 3,75)
post SR sph: mean -0,66 D ± 3,16 D (from -9,50 to 5,00)
post SR cyl: mean -1,02 D ± 1,55 D (from -8,25 to 0,00)
number of eyes pre OP: 35

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number of eyes 3 m: 22 (follow up rate 62,9%)

post SR equiv: mean -0,17 D ± 3,25 D (from -7,25 to 5,13)
post SR sph:  mean 0,19 D ± 3,26 D (from -6,00 to 5,50)
post SR cyl:  mean -0,73 D ± 0,95 D (from -3,50 to 0,00)
number of eyes pre OP: 35

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number of eyes 6 m: 16 (follow up rate 45,7%)

post SR equiv: mean -0,71 D ± 4,01 D (from -11,25 to 5,25)
post SR sph: mean -0,28 D ± 3,71 D (from -8,50 to 6,00)
post SR cyl: mean -0,86 D ± 1,36 D (from -5,50 to 0,00)
number of eyes pre OP: 35

age average 44 years (from 25 to 104)

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pre SR equiv: mean -1.60 D ± 3.65 D (from -9.38 to 10.00)
pre SR sph: mean -0.87 D ± 3.76 D (from -6.00 to 13.00)
pre SR cyl: mean -1.45 D ± 1.70 D (from -6.75 to 1.00)

number of eyes 1 y: 5 (follow up rate 14.3%)

post SR equiv: mean -1.35 D ± 2.60 D (from -6.00 to 0.00)
post SR sph: mean -1.30 D ± 2.63 D (from -6.00 to 0.00)
post SR cyl: mean -0.10 D ± 0.22 D (from -0.50 to 0.00)
Aberrations

- Total Aberration
- Coma
- High Order

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Pre vs Post month (eyes)
2. SAFETY: Change in BSCVA - Percentage

- lost > 2: 4%
- lost 2: 11%
- lost 1: 4% 5% 6%
- unchanged: 32% 27% 19%
- gained 1: 18% 19% 25%
- gained 2: 14% 25% 25%
- gained > 2: 36% 20% 31%
No hyperopic shift

Subjective Refraction Equivalent over Time

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1. STABILITY: Achieved Change in Refr. over Time

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Suggestion

- Multistep approach
- Ablate cautiously, over treatment is easy !!
- Over treatment is difficult to correct
- Don’t be afraid to make several topography checks
- Extremely powerful technique
Conclusions

• Expanded use of PTK
• Evolution of techniques allows tissue sparing
• Often 20-30 μm are sufficient for successful treatment
• Safer control by intraoperative topography
Arrivederci
September 23 – 25, 2004
Refractive online