QUEST FOR PERFECTION IN REFRACTIVE LENS SURGERY

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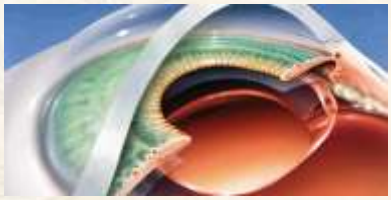
REFRACTIVE LENS SURGERY

Refractive lens surgery or Refractive Lens exchange (RLE) is frequently used as a refractive surgical procedure for the correction of high ametropias and presbyopia when LASIK, PRK, SMILE or phakic intraocular lens refractive surgery is unsuitable.



REQUIREMENTS FOR PERFECTION IN OUTCOMES

- Motivation
- Adequate Patient information and Selection
- No eye pathology
- Accurate biometry and IOL Calculation
- State-of-the-Art Surgery
- Close post-operative monitoring
- Fine tuning – Re-enhancement

MOTIVATION

Demand for surgery by the candidate

Professional requirements

Lifestyle

Contact Lens Intolerance

Realistic Expectations !

PATIENT SELECTION AND INFORMATION

- Customized Approach
- Enough chair time to explain the options
- Age: Hyperopes: >50 yrs
  High Hyperopes: > 40-45 yrs
  Myopes: > 50-55 yrs
  Presbyopes: > 55 yrs

PATIENT SELECTION AND INFORMATION

- Which IOL?
- Monovision?
- IOL Simulator
- Objective Evaluation

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SIMVIS SIMULATOR (2EYESVISION)

- Estimation of patient satisfaction before implantation
- Screening out patients not suitable for multifocality or monovision

SIMVIS SIMULATOR (2EYESVISION)

- Comparison of
  - Monofocal IOLs
  - Multifocal IOLs
  - Monovision
  - Mix-and-match

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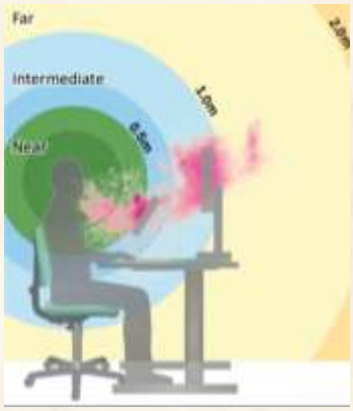
VIVIOR (VISUAL BEHAVIOR MONITOR)

- Objective evaluation of visual needs
- Activity Recognition
- Exact Working Distances
- Ambient Light Color & Intensity
- Head Motion and positioning

VIVIOR (VISUAL BEHAVIOR MONITOR)

- Measurements can be mapped two-dimensionally in terms of viewing distance distribution
- Measurements allow identification and characterizing of individual activities to derive a personal vision profile



VIVIOR (VISUAL BEHAVIOR MONITOR)

- Provides a detailed and accurate account of the patient's visual needs based on his/her personal lifestyle
- Education of patients about their best refractive options
- Helps the surgeon to select the best IOL choice

EYE CONDITION

- Exclude eyes with pathology that affects visual acuity, contrast sensitivity, visual fields or pupillary reaction
- No systemic disease that may affect vision in the future
- Avoid large mesopic – scotopic pupils
- Always check periphery of retina
- *Indication in Narrow Iridocorneal Angle

ACCURATE BIOMETRY AND IOL CALCULATION

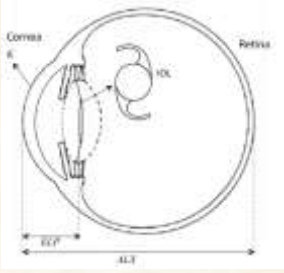
Zeiss Iolmaster 700

Haag Streit Lenstar 900

Online IOL Calculation

ACCURATE BIOMETRY AND IOL CALCULATION

- Estimation of Effective Lens Position
- Posterior Corneal Astigmatism
- Previous Corneal Refractive Surgery



MODERN FORMULAS

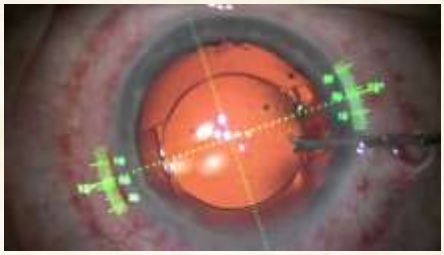
ACCURATE BIOMETRY AND IOL CALCULATION

Alcon Verion

Zeiss Callisto

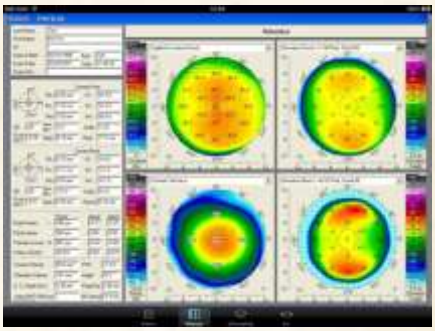
STATE-OF-THE-ART SURGERY

- No induction of astigmatism
- Correction of pre-existing astigmatism
- Capsulorhexis Centration
- Posterior Capsular Cleaning
- IOL Centration
- Avoid complications !



ZERO INDUCED ASTIGMATISM

- Minimal incision 1.8 – 2.2 mm
- On steepest axis
- Appropriate instrument gauge
- Care to not stretch or burn the wound



CORRECTION OF PREEXISTING ASTIGMATISM

- TORIC IOLS

Higher precision in astigmatic correction
Wider range of Astigmatism Correction
No further surgical procedures
No corneal trauma
Can be applied in corneas with pathology
Ability of further correction (IOL rotation) if needed

CORRECTION OF PREEXISTING ASTIGMATISM

- ASTIGMATIC KERATOTOMIES (FEMTOLASER- ASSISTED)
  - Penetrating
  - Intrastromal
    - Less dry eye
    - Less inflammation
    - Less discomfort
    - Uncut : 20% anteriorly and posteriorly
    - 8mm optical zone
    - Centered to the limbus

CORRECTION OF PREEXISTING ASTIGMATISM

196 eyes of 133 patients

>0,70 D of astigmatism

8,0 mm zone

TIA: 1.21 D ± 0.42 D

SIA: 0,74 D ± 0.40 D

DV: 0,74 D ± 0.38 D

Mean Astigmatism Correction: 63%


ARTICLE

Nonpenetrating femtosecond laser intrastromal astigmatic keratotomy in eyes having cataract surgery

Alexander C. Day, PhD, FRCOphth, Nicola M. Lau, FRCOphth, Julian D. Stevens, FRCOphth, FRCS

J Cataract Refract Surg 2016; 42:102–109 © 2016 ASCRS and ESCRS

ASTIGMATIC CORRECTION

WTR	
0,25 - 0,5 D	FSAK or None
0,5 - 1,0 D	FSAK
> 1,0 D	TIOL

ATR	
0,25-0,5 D	On-Axis CCI
0,5- 1,0 D	OACCI or FSAK
1,0-1,5 D	FSAK
>1,5 D	TIOL

Temporal Surgeon Position

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ORA (ALCON)

- Real time measurements of the refractive status of the eye during cataract surgery
- Selection of the IOL sphere and Cylinder
- Assistance in Toric IOL Positioning

SOURCES OF ERROR IN ASTIGMATIC CORRECTION

- Wrong Axis Calculation
- Incorrect marking
- Inaccurate IOL Placement
- Misalignment of IOL
- Capsular fibrosis

ACCURACY OF TORIC IOLS

- 4.3º difference from intended position
- Evaluation at the Slit Lamp
- Best Achieved accuracy in IOL placement:

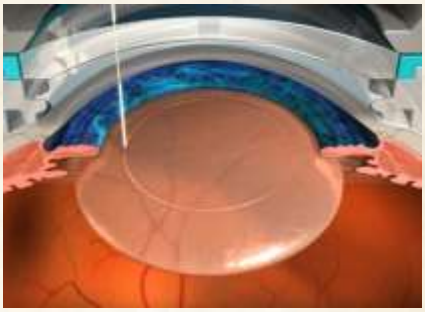
± 5º = 15% loss of astigmatic correction


CAPSULORHEXIS OR CAPSULOTOMY

- A critical and challenging step in the cataract procedure that provides foundation for lens extraction and stable in-the-bag IOL fixation.
- Complete enveloping of IOL
  Reduction of PCO
  More predictable ELP (Effective Lens Position)

ADVANTAGES OF FEMTOLASER CAPSULOTOMY

- More precise placement
- Better centration
- Complete Circularity
- Precision in diameter in relation to the IOL



CONTRAINDICATIONS OF FEMTOCAPSULOTOMY

- Corneal opacities
- Previous Bleb surgery
- Small myotic pupil
- Relative: Poor mobility, tremor, nystagmus, attention deficit disorders, inability to lie flat, deep-set eyes and narrow palpebral apertures

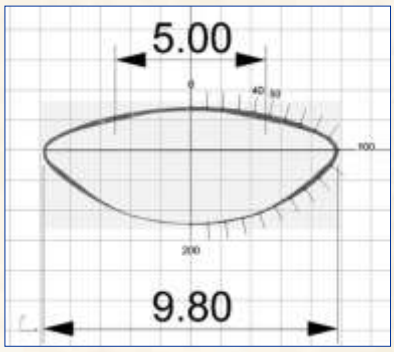
CAPSULAR INTEGRITY

- Laser anterior capsulotomy integrity seems to be compromised by postage-stamp perforations and additional aberrant pulses, possibly because of fixational eye movements.

CAPSULAR INTEGRITY

- A capsulotomy of 5.25 mm, centered on the anterior pole of the lens capsule, would be most likely to intersect the anterior capsule at its thickest (and therefore strongest) point.

Fincham EF . The mechanism of accommodation. *Br J Ophthalmol* 1937 (Suppl 8):1–80



PREVENTION OF PCO

Complete overlap of the IOL enhances the barrier effect to epithelial cell growth

POSTERIOR CAPSULE OPACIFICATION

- Vertical tilt, horizontal and total decentration of intraocular lenses and PCO proved to be significantly higher in the manual CCC group.
- Due to better intraocular lens position, femtosecond laser-assisted anterior capsulotomy resulted in slightly decreased PCO scores

WHICH IOL ? – MONOVISION?

- Selection of IOL depends on individual needs and lifestyle
  - Monofocal IOLs
  - EDOF (Enhanced Depth of Focus) IOLs
  - Multifocal (Trifocal) IOLs
  - Monovision
  - Mix-and-Match

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IOL SELECTION - TIPS

- Hyperopic presbyopes: The happiest group with multifocal IOLs
- Best mid-distance correction mostly appreciated by younger individuals that spend a lot of time in front of a computer screen (EDOF IOLs)
- Monovision with monofocal IOLs is a good choice for those that can not tolerate halos
- Spend more chair time with myopes of 2-3 D

POSTOP PATIENT MONITORING

- Neuroadaptation
- Explain Photopic phenomena
- "Brainwashing"
- Treat dry eyes
- Do not rush for IOL exchange

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MAIN CAUSES OF DISSATISFACTION

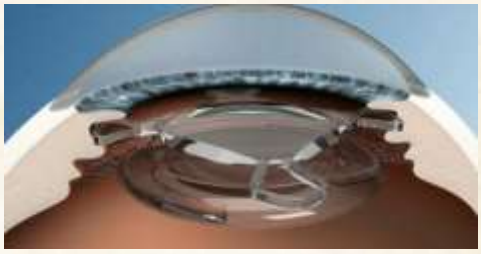
- Unsatisfactory Visual Acuity
  - Residual Refractive Error
    - Spherical
    - Cylindrical (>0,75 D)
  - IOL decentration
  - Posterior Capsule Opacification
  - Large Pupil
  - Limited reading depth
  - Dry Eyes
  - IOL opacification/glistenings

MAIN CAUSES OF DISSATISFACTION

- Photopic Phenomena
- Wrong Personality Selection
  - High Expectations
  - Low motivation
- Unilateral implantation

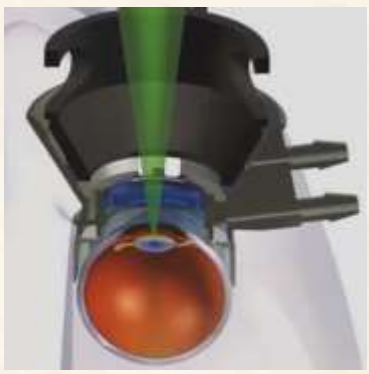
RE-ADJUSTMENTS

- PRK, LASIK, SMILE
- Add-on IOLs
- Lens Exchange
- In Situ Refractive Power Index change



REFRACTIVE INDEX SHAPING OF IOLS

- Alteration of Hydrophilicity of targeted areas in the optic of an IOL with FEMTOlaser
- Spherical, Toric and Spherocylindrical changes
- Induction of Multifocality
- Cancellation of Multifocality

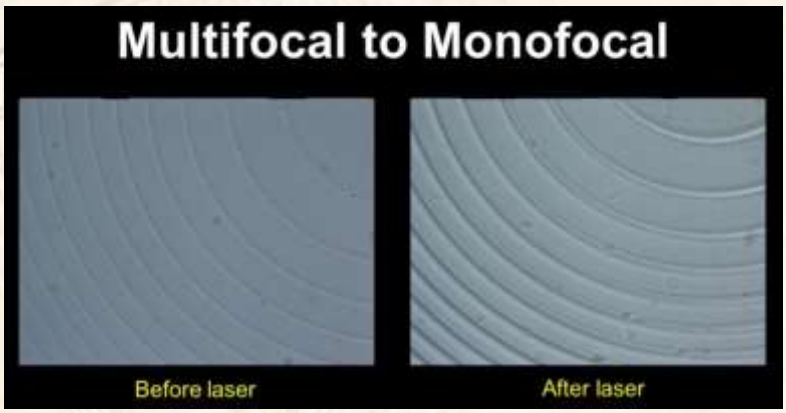


IOL REFRACTIVE INDEX SHAPING

Biocompatibility of intraocular lens power adjustment using a femtosecond laser in a rabbit model

IOL power adjustment by a femtosecond laser: *In vitro* evaluation of power change, MTF, light transmission, and light scattering in a blue-light filtering lens

IOL REFRACTIVE INDEX SHAPING



L. Werner, Nick Mamalis

CLOSING REMARKS

- Although the accuracy in the IOL calculations, the IOL technology and the surgical performance has extremely progressed in the last decades, we still haven't reached the desired point of excellence in refractive lens surgery.
- The in situ IOL power index shaping could further improve our results.

THANK YOU FOR YOUR KIND ATTENTION !

شكرا على حسن انتباهكم !

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