المؤتمر السنوي الدولي للجمعية المصرية
INTERNATIONAL CONGRESS OF THE
EGYPTIAN OPHTHALMOLOGICAL SOCIETY

REFRACTIVE LENS SURGERY: WHEN AND WHY?

Symposium of the Hellenic Society of Intraocular Implant and Refractive Surgery
Cairo, 14/3/2018

EOS 2018 14-16 March, 2018

Pandelis A. Papadopoulos, MD, PhD, FEBO, FEBOS-CR

Director, Ophthalmology Clinic, Athens Metropolitan Hospital
Director, Ophthalmo-Check Advanced Ophthalmic Microsurgery Eye Center
Fellow, European Board of Ophthalmology Subspecialist in Cataract and Refractive Surgery
Visiting Professor of Ophthalmology, Slovak Medical University
Vice President, Hellenic Society of Intraocular Implant and Refractive Surgery

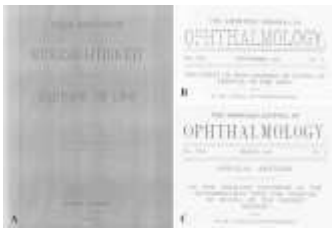
METROPOLITAN HOSPITAL
OPHTHALMO-CHECK ADVANCED OPHTHALMIC MICROSURGERY

- Financial Disclosure: No financial Interest

EOS 2018 14-16 March, 2018

Refractive Lens Surgery

- Abbé Des Monceaux: The first person to propose clear-lens surgery in high myopia in 1776
- Vincenz Fukala (1847–1911): pioneer in systematically extracting the clear crystalline lens in young patients with high myopia (1890)



Prof. Dr. Pandelis A. Papadopoulos

Refractive Lens Surgery

Clear lens extraction (CLE), also called refractive lens exchange (RLE), is the removal of a non-cataractous natural lens of the eye with or without intraocular lens placement as a refractive procedure.

Prof. Dr. Pandelis A. Papadopoulos

Refractive Lens Surgery

J CATARACT REFRACT SURG-VOL 20, MAY 1994

Clear lens extraction for the correction of high refractive error

W. Andrew Lyle, M.D., George J.C. Jin, M.D.

EDITORIAL ARTICLE: S. OBSTBAUM

Clear lens extraction for high myopia and high hyperopia

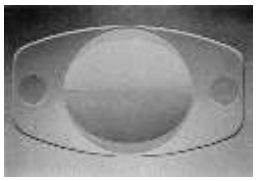
We are entering the era of refractive surgery. What began as a concept for reducing myopia has burgeoned into techniques and technology that address all aspects of refractive conditions. Despite await the results of ongoing studies to determine if they can predictably reduce high refractive errors. The data are not yet available and long-term consequences of treating these eyes are unknown.

Prof. Dr. Pandelis A. Papadopoulos

Refractive Lens Surgery

Why in the 90's ?

- Safer procedure compared to the past
- Foldable Intraocular lenses
- More precision in IOL power calculation in extreme long or short eyes
- Limitations of corneal laser surgery

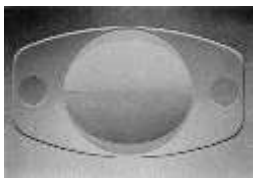


Prof. Dr. Pandelis A. Papadopoulos

Refractive Lens Surgery

Considerations…

- How "ethical" is to operate on a "healthy" eye
- Retinal Detachment and other complication rate
- Under- and Overcorrections
- Long-term outcome in these eyes



Prof. Dr. Pandelis A. Papadopoulos

Refractive Lens Surgery

Efficacy and safety of multifocal intraocular lenses following cataract and refractive lens exchange: Metaanalysis of peer-reviewed publications

Emanuel Rosen, MD, Jorge L. Alió, MD, PhD, H. Burkhard Dick, MD, PhD, Steven Dell, MD, Stephen Slade, MD

J Cataract Refract Surg 2016; 42:310–328 © 2016 ASCRS and ESCRS

	Rate %
CME	1,1
RD	0,04
RD in high myopia	0,0 – 7,3
Endophthalmitis	0,01

Prof. Dr. Pandelis A. Papadopoulos

Refractive Lens Surgery

Currently….

- A safe refractive procedure
- Low Complication rate
- Stability of Long-term outcomes in these eyes
- A huge choice of IOLs to correct almost all refractive errors
- Few Under- and Over-corrections
- Presbyopic Correction!

Prof. Dr. Pandelis A. Papadopoulos

Refractive Lens Surgery

Refractive Lens Surgery is the procedure with the best ***permanent*** outcomes in presbyopia correction.

Prof. Dr. Pandelis A. Papadopoulos

Refractive Lens Surgery

Requirements:

- Careful Patient selection
- Significant chair time preoperatively
- Accurate preoperative measurements
- Careful Planning of Surgery
- State-of-the-Art Surgery
- Ability to manage the potential complications
- Close preoperative monitoring of the eye

Prof. Dr. Pandelis A. Papadopoulos

Patient Selection for Lens Surgery

- Motivation
- Lifestyle
- Patient Expectations
- Personality
- Tolerance
- Informed Consent

Prof. Dr. Pandelis A. Papadopoulos

Preoperative Chair Time

- Patient information and education
- Understanding his needs, motivation and expectations

Prof. Dr. Pandelis A. Papadopoulos

Candidates for Lens Surgery

Myopes (with or without astigmatism):

- Presbyopic or Near-presbyopic age
- Always include correction of ***presbyopia*** with monovision or multifocal IOLs
- Always correct ***moderate and high astigmatism*** with IOLs and ***Low astigmatism*** with Arcuate Incisions (LRIs or Femto AKs)
- Caution with low myopes !
- Accurate biometry !
- Check Macula and Peripheral Retina

Prof. Dr. Pandelis A. Papadopoulos

Candidates for Lens Surgery

Hyperopes (with or without astigmatism):

- Presbyopic , Pre- or Near-presbyopic age
- Always include correction of ***presbyopia*** with monovision or multifocal IOLs
- Always correct ***moderate and high astigmatism*** with IOLs and ***Low astigmatism*** with Arcuate Incisions (LRIs or Femto AKs)
- Caution with very short eyes !
- Accurate biometry !
- Check Macula and Anterior Chamber Angle
- Most Satisfied Group!

Prof. Dr. Pandelis A. Papadopoulos

Candidates for Lens Surgery

High Astigmatism

- Seldom, usually presbyopic age
- Always include correction of ***presbyopia*** with monovision or multifocal IOLs
- Many are amblyopic !
- Many have irregular astigmatism
- Accurate keratometry from different sources !
- Check Fundus and cornea !

Prof. Dr. Pandelis A. Papadopoulos

Candidates for Lens Surgery

Presbyopes

- Monofocal, EDOF or Multifocal IOL, CL, Laser or No surgery?
- Always correct ***moderate and high astigmatism*** with IOLs and ***Low astigmatism*** with Arcuate Incisions (LRIs or Femto AKs)
- Accurate preoperative measurements
- Prepare for dysphotopic phenomena of EDOF and MF IOLs
- Check Macula!
- Check Pupil Size
- Treat Dry Eyes

Prof. Dr. Pandelis A. Papadopoulos

Preoperative Measurements

- Refraction
- Tonometry
- Dilated Fundus examination
- Scheimpflug Tomography
- Corneal Topography
- Optical Biometry
- Endothelial Cell Count
- O.C.T. of macula (+ O.N.)
- U/S B-Scan
- Image Guided System

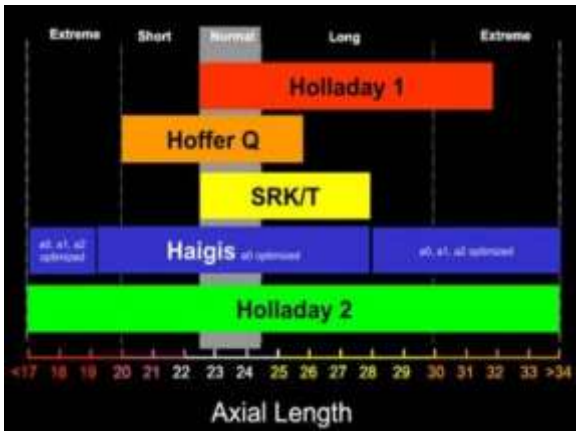
Prof. Dr. Pandelis A. Papadopoulos

Planning of the Operation

- Calculation of IOL Power
- Selection of IOL Type (Monofocal, EDOF or Multifocal)
- Selection of Method for Correction of Astigmatism (LRI, FemtoAK)
- Final Planning of the operation with Imaging System
- Transfer of Data to the O.R.

Prof. Dr. Pandelis A. Papadopoulos

IOL Power Calculation Formulas



Prof. Dr. Pandelis A. Papadopoulos

IOL Power Calculation Formulas

Estimation of Effective Lens Position

- Axial Length
- Keratometric readings
- Anterior Chamber Depth
- White-to-White
- Lens Thickness
- Manifest Refraction
- Age

a0,a1,a2 for Haigis, C constant for Olsen

Prof. Dr. Pandelis A. Papadopoulos

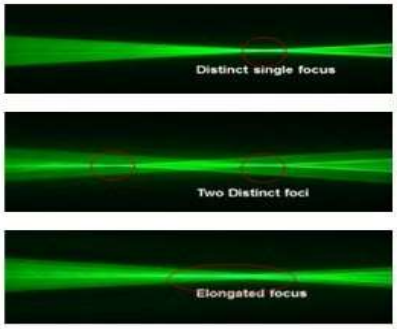
IOL Power Calculation Formulas

Prof. Dr. Pandelis A. Papadopoulos

IOL Type Selection

- Monofocal
- Trifocal
- Enhanced Depth of Focus (EDOF or EDF)

  + Toric versions



Prof. Dr. Pandelis A. Papadopoulos

IOL Type Selection

- Monofocal
- Trifocal
- Enhanced Depth of Focus (EDOF or EDF)

  + Toric versions

B&L Envista
Alcon Clareon

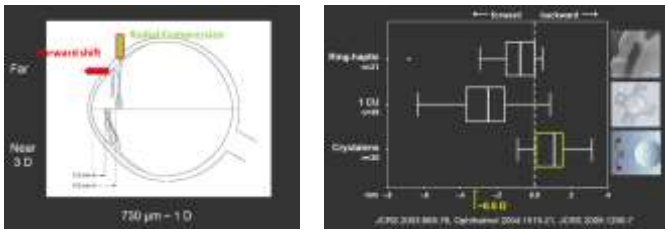
Alcon Panoptix
Physiol Finevision

J&J Symfony
Sifi Mini Well

Prof. Dr. Pandelis A. Papadopoulos

IOL Type Selection

- Accommodative IOLs



Prof. Dr. Pandelis A. Papadopoulos

Multifocal IOL Contraindications

- Severe diabetic maculopathy
- Corneal Pathology
- Irregular Astigmatism
- Severe Dry Eyes
- Retinal Disease
- ARMD
- Uveitis
- Zonular Inefficiency
- Advanced Glaucoma
- Amblyopia
- Eccentric Pupil
- Aniridia
- Professional Drivers / pilots
- Very old Age ?
- Intraoperative Surgical Complications

Prof. Dr. Pandelis A. Papadopoulos

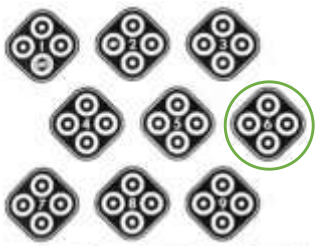
Monovision

- Determination of Dominant eye
- Assessment of Individual Needs of the Candidate
- Trial with Contact Lenses and different near correction (+0.50 to +2.00)
- Superiority of EDOF IOLs?
  (Mini-monovision (+0.50 to +0.75 without previous CL trial)

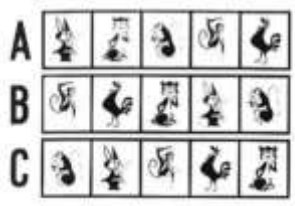
Prof. Dr. Pandelis A. Papadopoulos

Monovision

- Succ
- Succ
  1- A
  2- St
  3- D



Age
44 -
49 -
>52



Prof. Dr. Pandelis A. Papadopoulos

State-of-the-Art Refractive Lens Surgery

- Optimum Surgical Planning
- Advanced Surgical Equipment
- Excellent Surgical Performance

Prof. Dr. Pandelis A. Papadopoulos

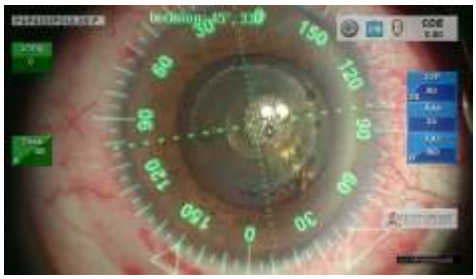
State-of-the-Art Refractive Lens Surgery

Femtolaser and Image Guided Systems have improved Refractive Lens Surgery with Premium IOL insertion adding precision and standardization to the surgical skills of the surgeon.

Prof. Dr. Pandelis A. Papadopoulos

State-of-the-Art Refractive Lens Surgery

Femtolaser and Image Guided Systems have improved Refractive Lens Surgery with Premium IOL insertion adding precision and standardization to the surgical skills of the surgeon.

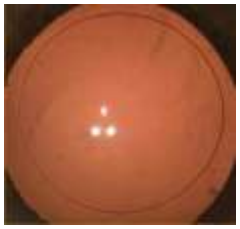


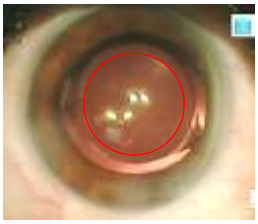
Prof. Dr. Pandelis A. Papadopoulos

State-of-the-Art Refractive Lens Surgery

Contribution of Femtosecond Laser in Refractive Lens Surgery:

- Capsulotomy (Centration, size, circularity with 0.1mm precision)
- Management of low astigmatism
  Intrastromal or Penetrating Corneal Incisions
- Lens Fragmentation
- Incisions (Main and Side Port)





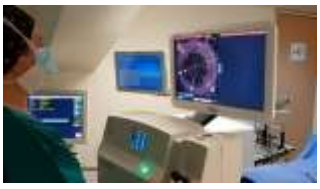
Prof. Dr. Pandelis A. Papadopoulos

State-of-the-Art Refractive Lens Surgery

Prof. Dr. Pandelis A. Papadopoulos

Intrastromal Astigmatic Keratotomies

- Less discomfort
  Less dry eye
  Less inflammation
- Uncut : 50µ anteriorly and 20% posteriorly
- 8mm optical zone
- Verion Nomogram + 30% of arc length
- Aks Centered to the limbus



Prof. Dr. Pandelis A. Papadopoulos

Intrastromal Astigmatic Keratotomies

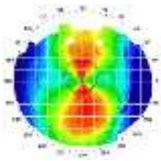
- 196 eyes of 133 patients
- >0,70 D of astigmatism
- 8,0 mm zone
- TIA: 1.21 D ± 0.42 D
- SIA: 0,74 D ± 0.40 D
- DV: 0,74 D ± 0.38 D
- Mean Astigmatism Correction: 63%

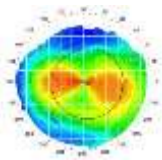

Nonpenetrating femtosecond laser intrastromal astigmatic keratotomy in eyes having cataract surgery

Prof. Dr. Pandelis A. Papadopoulos

Intrastromal Astigmatic Keratotomies

Surgeon Position: Temporally





WTR	
0,25 - 0,5 D	FSAK
0,5 - 1,0 D	FSAK
> 1,0 D	TIOL

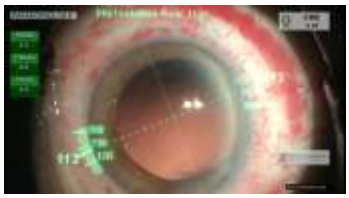
ATR	
0,25-0,5 D	On-Axis CCI
0,5- 1,0	OCCI or FSAK
0,5-1,5 D	FSAK
>1,5 D	TIOL

Prof. Dr. Pandelis A. Papadopoulos

State-of-the-Art Refractive Lens Surgery

Contribution of Image Guided Systems in RLE:

- Avoidance of wrong eye mistakes through registration
- Centration of Capsulorhexis according to limbus or pupil
- Reduction of Surgically Induced Astigmatism
- Calculation of Cyclotorsion
- Markerless Toric IOL placement



Prof. Dr. Pandelis A. Papadopoulos

Intraoperative Complications

- Posterior capsule tear – vitreous prolapse

  IOL in the sulcus with posterior optic capture after ant.vitr.

"Finger of God" sign

  Implantation of a 3-piece IOL with less power in sulcus

- Any complication seen in cataract surgery

Prof. Dr. Pandelis A. Papadopoulos

Postoperative Complications

- Posterior Capsule Opacification > YAG-laser required earlier
- Cystoid Macular Edema > Medical Therapy
- Retinal Detachment > VR Surgery
- Endophthalmitis > Medical Treatment or VR Surgery
- IOL Decentration > IOL repositioning or exchange
  The near images (newspaper characters) became difficult to distinguish at a decentration of 0,75 -1.0mm
- Under- or Overcorrections > Refractive Corneal Surgery, IOL exchange or Add-on IOLs
- Dysphotopic Phenomena > Brimonidine Drops to reduce pupil size, Wait at least 3-6 months before removing MF IOL

Prof. Dr. Pandelis A. Papadopoulos

Causes of Patient Dissatisfaction with Bi/Trifocal IOLs

- 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

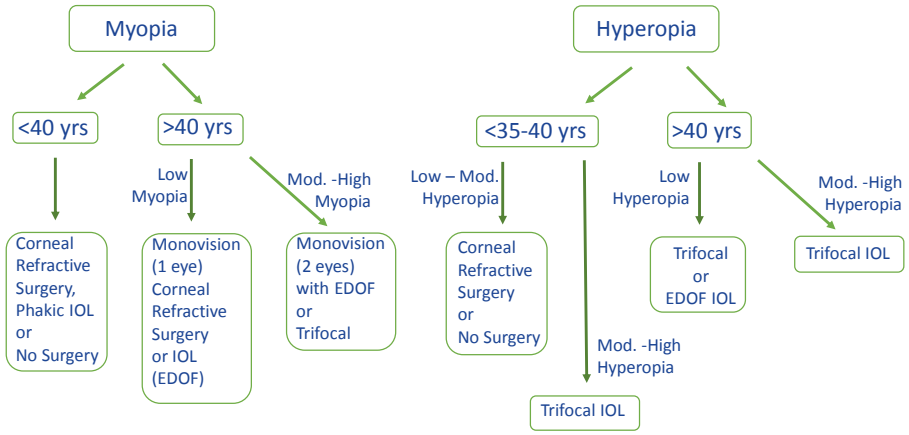
Prof. Dr. Pandelis A. Papadopoulos

Causes of Patient Dissatisfaction with Bi/Trifocal IOLs

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

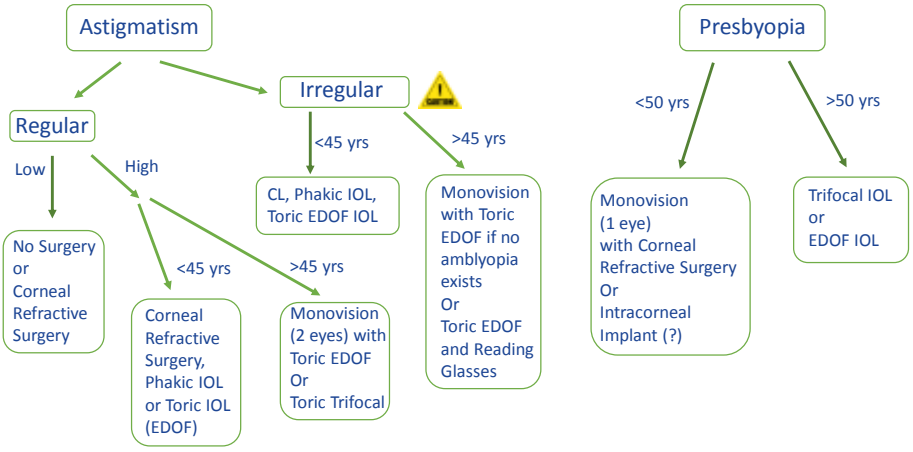
Prof. Dr. Pandelis A. Papadopoulos

Decision Making in Refractive Lens Surgery



Prof. Dr. Pandelis A. Papadopoulos

Decision Making in Refractive Lens Surgery



Prof. Dr. Pandelis A. Papadopoulos

Clinical Examples #1

- Female, 53 yrs, housewife
  OD: +2.75 -1.50 x 175 add:+2.25 VA: 1.0
  OS: +2.25 -0.50 x 180 VA: 1.0 (Dominant)
  No corneal or retinal Pathology
  Wants to be able to see far and read her tablet without glasses

1. OD: Trifocal Toric IOL
   OS: Trifocal IOL + FEMTO-assisted Aks
2. OD: EDOF Toric IOL – target refraction -0.50 or -0.75 sph
   OS: EDOF IOL + FEMTO-assisted Aks
3. Monovision with EDOF IOLs after CL trial – OD target -1.50 sph

Prof. Dr. Pandelis A. Papadopoulos

Clinical Example #2

- Male, Taxi Driver, 45 yrs
  OD: +0.25 sph VA: 1.0 (Dominant eye)
  OS: -0.50 cyl x 180 VA: 1.0 Near add: +1.25
  Mild Diabetes, controlled with diet, normal fundus OU
  He doesn't want to wear glasses at all

1. No Refractive lens surgery (yet)
2. Contact lens in OS (+1,50)
3. OS Corneal Refractive Surgery – target: -1.50 D after CL trial

Prof. Dr. Pandelis A. Papadopoulos

Clinical Example #3

- Male, 59yrs, Accountant
  OD: -2.25 VA: 1.0 (Dominant Eye)
  OS: -2.75 VA: 1.0
  No Ocular or Retinal Pathology except mild nuclear sclerosis OU
  Wants to get rid of glasses but has very high expectations of his postop near, intermediate and far vision

1. Extended chair time to explain the expectations
2. Mini-monovision with EDOF (OD plano- OS: targ -0.5 to -1.00) if he agrees to wear near glasses for very small print
3. Trifocal IOLs OU if he has understood that he may see dysphotopic phenomena

Prof. Dr. Pandelis A. Papadopoulos

Summary

Refractive Lens Surgery:

- A relatively safe intraocular procedure
- Low complication rate
- Requires careful patient selection and education
- Requires state-of-the-art surgery
- High patient motivation enhances the outcome
- Stability of refractive status of the eye over the years

Prof. Dr. Pandelis A. Papadopoulos

شكرا على الاهتمام

EGYPTIAN OPHTHALMOLOGICAL SOCIETY
EOS 2018 14-16 March, 2018