“The use of the femtosecond laser for complex cataract surgery – Cases I could not have performed without the femtosecond laser”

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Agenda:

3:00 – 3:09 PM – Introduction, Richard Davidson, M.D.
3:10 – 3:17 PM – Alan Crandall, M.D., Cataract with complete zonular laxity
3:26 – 3:33 PM – Carlos Buznego, M.D., Using cataract density grading to customize fragmentation patterns
3:34 – 3:41 PM – Michael Taravella, M.D., Cataract with loose zonules
3:42 – 3:49 PM – Sonia Yoo, M.D., Dense cataract with small pupil and cataract with zonular dialysis.
3:50 – 3:57 PM – George O. Waring IV, M.D., Management of cataract and dysfunctional lenses in patients with narrow angles and fuchs dystrophy using the femtosecond laser
3:58 – 4:05 PM – Keith Walter, M.D., Using pneumo-dissection to your advantage with prolapsing lenses into the anterior chamber
4:22 – 4:29 PM – Beeran Meghpara, M.D., Traumatic cataract with zonular loss
4:29 – 4:30 PM – Conclusion and Q & A
The Use of a Femtosecond Laser for Complex Cataract Procedures

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Introduction

We are finally using a laser!!!
Introduction

- Femtosecond laser assisted cataract surgery is changing the way we approach the procedure
- More than 350 lasers
- 27 countries
- More than 500 MDs
- There have been more than 100,000 procedures performed
- The technology is not going away

Benefits

- More accurate effective lens position
- Lower phaco times
  - Less endothelial cell loss
- More precise astigmatism correction

Complex Cataracts

- Posterior Polar Cataracts
- Post-Penetrating Keratoplasty
- White Cataracts
- Fuchs Endothelial Dystrophy
- Small Pupils
- Traumatic Cataracts
- Pseudoexfoliation
- Morgagnian Cataracts
- Weill-Marchesani
Posterior Polar Cataract

Post-Penetrating Keratoplasty

- Make sure all sutures are removed
- Wound stable
- Refraction stable
- No evidence of inflammation or rejection
- I prefer arcuate incisions instead of toric intraocular lenses
White Cataracts

- Pose a number of challenges during surgery
  - Capsulorrhexis is difficult
  - The nucleus is dense
  - Risk of complications is higher
- There are techniques and devices that can be used to create a safer surgery and better outcome for our patients

Argentinian Flag Sign

White Cataract - Manual
Other Complex Conditions

- Fuchs Endothelial Dystrophy
- Less phaco time
- Studies underway evaluating endothelial cell loss
- Small Pupils / Pseudoexfoliation
- Zonular laxity
- Smaller pupils
  - Malyugin ring insertion may be possible on some lasers
  - Ability to adjust capsulorrhexis size on the fly
- Traumatic Cataracts

Conclusions

- Femtosecond laser-assisted cataract surgery is here to stay
- It is an excellent modality for routine cataracts
- It is equally impressive with “complex” cataracts
- The technology will continue to evolve in the years to come
Femtosecond LASER ASSIST: PXE and Loose Zonules

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The author has no financial interest in the material presented

Clinical History

- 70 year old male with history of pseudoexfoliation
- Obvious phacodenisis on slit lamp exam
- Plan: Femtosecond laser incisions, capsulotomy, and nucleus division followed by phacoemulsification

Factors predisposing to zonular weakness

- Systemic problems
  - Marfan's syndrome
  - Pseudoexfoliation syndrome
- Trauma

Strategies to Address Zonular dehiscence

- Low stress capsulotomy
  - Minimize tangential and centripetal forces if possible
- Low flow phacoemulsification
  - Try to decrease turbulence
- Minimize force used to crack/divide nucleus
- Judicious use of CTR/support rings

Surgical Pearls

- Femtosecond laser allows for capsulotomy and nuclear quadrant division to be performed with minimal zonular stress
- Iris hooks are used to support the capsule throughout the procedure
- Placement of CTR stabilizes bag and may prevent late dislocation
- Lens support relies on sulcus haptic position and optic capture
Conclusions

• The femtosecond laser may have utility in complex cataract cases

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ASCRS
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Relevant Financial Disclosures

• AMO
fem-to-second
/'femt̻,sekənd/
noun
1. one quadrillionth of a second.
Femtosecond Photodisruption

Thousands laser pulses are connected together in a raster pattern to create a cleavage plane
Refractive Laser Assisted Cataract Surgery
Refractive Laser Assisted Cataract Surgery
ReLACS
Background

• Over 300 laser cataract surgery units (LCS) units placed in US
• Efficacy has been demonstrated
• Multiple generations of corneal femtosecond lasers required prior to majority in keratome marketshare
  – Marketshare: 0% in 2001 → 55% in 2010
Proposed Benefits

• Image guidance
• Bladeless
• Less intraocular energy
• More precise and reproducible capsulotomy shape and size
  — ELP
• Integrated astigmatism correction
Technologies

- LensX (Alcon)
- Catalys (Optimedica/AMO)
- LensAR
- Victus (Technolas/ Bausch + Lomb)
First Optimedica Catalys in South Carolina
Therapeutic Laser Assisted Cataract Surgery
Therapeutic Laser Assisted Cataract Surgery
Angle OCT Pre-Post DLR
Hyperope DLS with Narrow Angle Glaucoma OS

Pre-operative

Post-operative

IOP=33

IOP=15

Post LPI, no IOP lowering medications

Waring IV, GO

UCNA = J1+
Scheimpflug Pre-Post DLR

Hyperope DLS with Narrow Angle Glaucoma OD

Pre-operative

Angle=24.8°
IOP=32

Post-operative

Angle=41.5°
IOP=16

UCDA = 20/10

Waring IV, GO
Hyperope DLS Narrow Angle Fuch’s Pre-Post DLR Comparison
Biomicroscopic Technique?
Fuch’s Dystrophy POD 1 TLACS (Specular Reflection)
POD 1 week TLACS
Moderate Fuch’s Dystrophy
TLACS Fuch’s Dystrophy
High Resolution Corneal OCT
Pre vs. Post Operative

Preoperative

CCT=589 microns

Postoperative

CCT=576 microns
ReLACS
Speed of Recovery
Postoperative ReLACS TMFIOL + LRI

Postoperative Day 1

Postoperative Week 1
Bilateral TLACS LOCS III-IV
Flomax & Fuch’s Dystrophy

OD

OS

Post Operative 20 minutes

Post Operative 10 minutes
LOCS III-IV Flomax & Fuch’s TLACS
Post Op 10 Minutes Subjective Response
Summary

• ReLACS is a significant advance in cataract surgery
• First generation lasers are superb
  – Incisions, capsulotomy, lens fragmentation, LRI
• Like femtosecond keratomes, we can anticipate improvement in performance
• Efficacy has been established
• Superior safety relative to manual remains to be seen
Thank you

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