State of the Art Cataract Care

Justin Schweitzer, OD, FAAO
Vance Thompson Vision, Sioux Falls, South Dakota
Optometric Externship Director, Illinois College of Optometry
Residency Instructor, Illinois College of Optometry

PollEverywhere
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• Text to 22333 vision

Financial Disclosure – Justin Schweitzer, OD, FAAO
- Acute – C/L
- Alcon – C/L
- Allergan – C/L
- Bausch + Lomb – C/L
- Ocular Therapeutics – C
- EyePoint - C
- Densper - C
- Zeiss – C/L
- Sun – C/L
- Equinox - I
- Reichert - C
- J&J – C/L
- Glaukos – C/L
- Horizon – C
- Oculifl - C
- Sight Sciences – C/L
- LKC - C

* Co-Chief Medical Editor: Modern Optometry
Trends In Cataract Care

New technology pre, post, and during cataract surgery

IOL technologies

Higher patient expectations for visual outcome

“Standard” Cataract Surgery vs “Advanced” Cataract Surgery
Growing Population for Cataract Surgery

Cataract Surgery

is not just

Rehabilitative Surgery

Cataract Surgery

is

Refractive Surgery
When Does the Cataract Journey Start?

What Do We Look For in a Cataract Evaluation?

Age and Dominant Eye

Reassure if young

Important for monovision, doing a multifocal tandem and IOL calculation target

MRx, BCVA and Glare Acuity

Myope, Hyperope or Astigmat

BCVA

Glare Test – Most important indicator of how cataract is affecting vision and function
Angle Kappa

Avoid Multifocal Steep Axis and Pupil size

Uncorrected Vision after Cat Sx
Vision with astigmatism corrected (glasses, AK, Toric IOL)

Corneal Astigmatism
Corneal HOAs

Dry Eye Evaluation
Osmolarity
Meibography
Inflammation

Prevalence of ocular surface dysfunction in patients presenting for cataract surgery evaluation
Refractive Considerations

Refractive Endpoint
Monovision
Nearpoint target
Distant target

KEEP IT SIMPLE
Do you mind wearing glasses after surgery?

Current Options

- Monofocal IOLs
- Monofocal Toric IOLs
- Accommodating IOLs
- Accommodating Toric IOLs
- Multifocal IOLs
- Multifocal Toric IOLs
- Extended Depth of Focus IOLs
- Extended Depth of Focus Toric IOLs
- Trifocal IOLs
- Trifocal Toric IOLs
- Light Adjustable IOL
How Does Femto Help?

• Decreased Ultrasound Energy (30%)
• Reproducibility
  – Rhexis
  – Incisions
  – Astigmatic Keratotomies
  – Effective Lens Position?
  – Refractive Outcomes?

• 100% of LenSx® Laser procedures achieved an accuracy of ± 0.25 mm
• Only 10% of manual procedures achieved an accuracy of ±0.25 mm
• No radial tears

Centration Stability

Symmetric capsular forces
Asymmetric capsular forces


Zepto Capsulotomy
Intraoperative Aberrometry (ORA)
ORA System – Optiwave Refractive Analysis

Aphakic Refraction
Toric Implants
Surgically Induced Astigmatism
Posterior K Astigmatism

Intraoperative Aberrometry (ORA)
ORA System - Routine Cases

Aphakic Refraction

% of Patients within 0.50D

LMI of LMS

N=3380

84%

86%


Implant Options
Alcon Toric
FDA approved: 2005
Lowest power: 1.5D
(1.03 D @ corneal plane)
Range: 1.5, 2.25, 3.00, 3.75, 4.5, 5.25, 6.00

JNJ Toric
FDA approved: 2013
Lowest power: 1.5D
(1.03 D @ corneal plane)
Range: 1.50, 2.25, 3.00, 4.00, 4.50, 5.00, 5.75

B&L Toric
FDA approved: 2018
Lowest power: 1.25
(~1.63 D @ corneal plane)
Range: 1.25, 2.00, 2.75, 3.5, 4.25, 5.00, 5.75

Toric
• Residual astigmatism can be a problem
  • Rotate IOL
  • Laser Fine Tune
  • LRI’s
  • Glasses or Contacts

Astigmatic Keratotomy vs. Limbal Relaxing Incision

AK
• central = bigger effect
• 1:1

LRI
• Peripheral = less effect
• Hyperopic Shift
Residual Astigmatism

Causes of Residual Astigmatism

- Wrong Location
  - Poor Measurements
  - Poor Calculations
  - Surprising SIA
  - Posterior Ks
  - IOL Rotated
  - Poor IOL Placement

- Wrong Lens
  - Poor Measurements
  - Poor Calculations
  - Surprising SIA
  - Posterior Ks

- Wrong Eye
  - Ocular Surface Disease
  - ABMD
  - Irregular Astigmatism

- Toric IOL Misalignment
  - Misalignment
  - % Loss
  - Absolute % Loss
  - Absolute mm

<table>
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<tr>
<th>Misalignment</th>
<th>% Loss</th>
<th>Absolute % Loss</th>
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<td>50%</td>
<td>0.51%</td>
</tr>
<tr>
<td>30deg</td>
<td>100%</td>
<td>1.03%</td>
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Residual Astigmatism

Other Piece of the Puzzle

- Tecnis Eyhance
  - First lens in the monofocal IOL category in Europe to deliver improved intermediate vision and 20/20* distance vision
  - Offers low incidence of halo, glare, or starburst as 1-piece IOLs
  - FDA approved 2/2/21
  - Refractive technology (no rings)
  - Reduces spherical aberration to near zero

Refractive Aspheric IOLs - Tecnis Eyhance
**Refractive Aspheric IOLs**

- Simulated Visual Acuity

**EDOF Tecnis Symfony**

- Extended depth-of-focus lens (EDOF)
- Better near distances than monofocal, but not as well multifocal
- Glare and halo still possible
- Diffractive optics to...
  - Correct chromatic aberration
  - Extend the range of quality vision
Combining an EDOF IOL with a Low-Add Multifocal IOL

Single center, prospective, non-comparison trial
50 patients, bilateral surgery
Data on 24 bilateral cataract patients
Mean age: 64
58% female / 42% male
Target:
Emmetropia
Astigmatism corrected (only included patients with ≤1.5 D of astigmatism)
3 month follow up

Excellent Visual Acuities Across the Range

Uncorrected Visual Acuity
96% of patients achieved 20/20
91% of patients achieved 20/25
93% of patients achieved 20/25

Distance
Intermediate
Near
Extended Vision IOL (AcrySof IQ Vivity)

No splitting of light rays
Designed for better near and intermediate than monofocal

Extended Vision IOL (AcrySof IQ Vivity)

Flexible and forgiving around distance (attention to the related near VA change)
Provides a continuous extended range of vision

Extended Vision IOL (AcrySof IQ Vivity)

Patient Reported Visual Disturbances Profile

Safety analysis set, 6 months
Patients reporting Not Experiencing VD at all
**Light Adjustable Lens—What’s Special?**

Regular silicone polymers + mobile, silicone subunits, called macromers

Photosensitive

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**Prediction to Prescription**

1. **Standard cataract implant procedure**

2. **Residual refractive error determined using standard phoropter**

3. **Refractive error entered into Light Delivery Device**

4. **Desired light profile delivered by machine**

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**Key Study Findings**

- RxLAL eyes achieved UCVA of 20/20 or better at 6 months postoperatively at approximately 2x the rate of patients receiving a monofocal lens.
- 90% of RxLAL eyes achieved 20/25 compared to 90% of control eyes reached 20/40 (two line improvement).
- 91.8% of LAL eyes achieved result within 0.50 D of target MRSE (which is similar to the refractive accuracy seen in recent LASIK studies).
- The primary safety endpoint (% eyes w/ BCVA of 20/40 or better at 6-months postop), was met in 100% of LAL eyes.

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Trifocal

- Goal of Trifocality:
  - Continuous visual acuity over near, intermediate and distance
  - Minimal photic phenomena with the greatest amount of light reaching the retina for optimal contrast sensitivity
TRIFOCAL IOL (PanOptix)

- **Superposition of Focal Points**
- **Light Redirection** - 120 cm intermediate focal point redirected to distance
- **3 Foci** - Trifocal with 40 cm, 60 cm and distance
- **88% Light Utilization** - at 3.0 mm pupil
- **Light Allocation** - 50% of available light to distance, 25% to intermediate and 25% to near

MF and EDOF Combination – Tecnis Synergy

- Gives broad range of continuous vision covering from distance to 33 cm
- Eliminates the visual gaps present in trifocal and other multifocal technology
- Continues to deliver superior performance in low-light conditions
- Violet-filtering technology demonstrates reduction in halo intensity for tasks like night driving

92% of these subjects reported not wearing glasses across all distances**

**Based on interim data collected at 3-months post-operative

1. DOF2020CT4014 - Forte 1: A Comparative Clinical Evaluation of a New TECNIS® Presbyopia Correcting Intraocular Lens Against a Pan Optix® Intraocular Lens - Defocus Curves and Visual Acuity Results
2. DOF2020CT4015 - ("Forte 1"): A Comparative Clinical Evaluation of a New TECNIS® Presbyopia Correcting Intraocular Lens Against a PanOptix® Intraocular Lens - Spectacle Wear and Satisfaction Results
Base implanted in capsular bag
OCT is done to establish exact position of the base
In the same setting, optic power is optimized based on concrete data from OCT imaging.

Small Aperture Lens

Accommodating IOL - Juvene
• Modular, curvature-changing, fluid-optic IOL
• Two-part IOL - Base and Modular
• Advantages
  • Doesn’t split light
  • Up to 3D of continuous range vision
  • No change in ELP
  • No PCO up to 4 years
  • Astigmatism?? Drug Delivery?? Exchangeable 2nd implant??
Accommodating IOL - FluidVision Lens

- Entire lens is hollow and filled with liquid silicone
- Fluid changes changes in optic
- Avg. accommodation range 2D
- Dr. Nichamin ESCRS 2018
  - 29 eyes
  - Distance 20/20
  - Intermediate 20/20-20/25
  - Near 20/22-20/27

Accommodative IOL - Lumina

- Two piece sulcus IOL
  - Fixed and variable
  - Hydrophilic acrylate
- Shifting optics
  - Can provide 3-4 D focal range when shifted
- Dr. Alio -59 eyes of 43 pts
  - Accommodative range of 3.1D

Trifocal IOL - PhysIOL

- Aspheric diffractive trifocal
- 2 diffractive structures that give +3.5D add for N and +1.75D for intermediate
- Less glare and halos
- Designed to reduce the loss of light energy resulting from any diffractive system
- Diffractive anterior surface entirely cornealized
- Height of the diffractive step varied
- Distributes light to near, intermediate and distant foci adjusted according to the pupil aperture

**Not FDA Approved**
The Psychology of Premium IOL's

1st Thing - Understand why they are unhappy

20/Unhappy Causes of unhappiness

- Refractive Error
- Dryness
- PCD
- Positive Dysphotopsias
- Problematic Near Point
- Visually Demanding
May Take Time

Requires Patient Motivation

Requires a Belief
Patient Satisfaction = Results - Patients Expectations

A major "pain point" for both doctors and patients in the postoperative period after cataract surgery is:

- Uneventful recovery
- High level of satisfaction
- Urinary or vaginal organ replacement
- Postoperative pain
Dropless or Drop a Day Cataract Surgery

→ Dropless or Drop-a-Day- is an injection of an antibiotic & steroid combination in the eye at the time of surgery.

Preparation:
1. dexamethasone
2. moxifloxacin

One intracameral injection

Take Home Point
1). This study showed a 5-fold decrease in endophthalmitis with intracameral cefuroxime
### Kaiser Study

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<tr>
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<td>1.0</td>
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<tr>
<td>2011</td>
<td>1.1</td>
<td>1.0</td>
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1. No injectable drug reactions at any point.
2. 22 (2100%) fold decrease in endophthalmitis from 2007-2011.

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### Concerns with Transzonal Injections

1. Cystoid Macular Edema
2. Steroid response/ IOP spikes
3. HORV

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### Dexycu

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**Phase 2**  Phase 3a  Phase 3b

<table>
<thead>
<tr>
<th>Absence of Pain at Day 8</th>
<th>DEXTENZA</th>
<th>Placebo</th>
<th>DEXTENZA</th>
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<th>DEXTENZA</th>
<th>Placebo</th>
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<td>78.3%</td>
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<td>76.3%</td>
<td>76.3%</td>
<td>77.1%</td>
<td>75.6%</td>
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**Post-Surgical Ocular Pain**

**Absence of Anterior Chamber Flare**

**Post-Operative Cataract Care**
Early Emergent Post-Operative Complications

IOP

↑ IOP
Endophthalmitis
Early Emergent Post-Operative Complications

- High IOP
  - Ocular hypotony/wound leak with flat anterior chamber

- Endophthalmitis
  - Vitreous to wound, iris prolapse

- Retinal break / detachment

- IOL dislocations

Early Urgent Post-Operative Complications
IOP
(Possible steroid induced)

Case JS

SPO: OCS/PCDDL OS x 1 day
CC: Very cloudy and fluctuating vision upon awakening
VA(sc): HM ph NI
GAT: 10 mm Hg (Goldmann)
SLE: see photo
Fundus: No view
Surgical Hyphema

Risk factors
- Posterior synechiae
- Surgical manipulation of iris tissue
- Iridectomies
- Iris neovascularization
- Anticoagulants (ASA, Coumadin, Plavix)
- Clotting disorders
- Maintaining anticoagulants prior to surgery is supported from a risk-benefit standpoint.
Hyphema

Management
- Continue antibiotic (1 drop qid), increase topical steroid (1 drop q 2h)
- Antiglaucoma drop prn
- Avoid vigorous activity, bending below waist
- Sleep with head slightly elevated
- Avoid unprescribed anticoagulants
- Follow up in 3 – 5 days

Patient Education
Case BF

SPO: CE×PCIOL OD x 1 day
CC: Vision slightly blurred, mild discomfort
DVA (sc): 20/40 ph 20/25
TAps: 0 mm Hg (Goldmann)
SLE: See photos
Management of Wound Leak

If AC flat, refer for AC reformation and wound suture
If AC well-formed or slightly shallow
  Discontinue corticosteroid drop
  Continue antibiotic drop
  Eyeshield qhs
  Consider BCL
  Consider wound suture at 1 week

Ocular Hypotony

Wound leak vs ciliary body shutdown
  Seidel testing to differentiate

Choroidal detachment 2m to choroidal effusion
  Typically monitored unless visually threatening or “kissing” choroidals
  Resolution as IOP increases
  r/o RD
Early Urgent Post-Operative Complications

- Elevated IOP (possibly steroid-induced)
- Hyphema
- Wound leak with well-formed AC
- Retained lens material - cortical, nuclear
- IOL malpositions – toric rotation, decentration

Later Post-Operative Complications
Patient ER

SPO: CEx/PCIOL OD x 10 weeks
CC: Blurred central vision past week in right eye
BCVA: 20/50 OD PH: NI
SLE: 1+ PCO
Fundus: vitreous/ONH/vessels nl; macular thickening with faint yellow spots at fovea
Clinical Detection of Macular Edema

- Fundus biomicroscopy
- Thin slit beam
- Bright illumination
- Narrow angle (10 to 20 degrees) between slit beam and microscope
- OCT - macula

Pseudophakic CME

Management:
- Monitor
- High rate of spontaneous resolution

Pharmacologic therapy
- Topical, periocular, intravitreal, oral corticosteroids
- NSAIDs

Surgical therapy
- Anterior vitrectomy
- YAG laser procedure
Management of ER

Topical corticosteroid 1 drop q 4h OD, NSAID 1 drop bid OD
Tapering of drops after 4 weeks, over next 4 weeks; at 10 weeks BCVA = 20/30 and SPH = 20/25
YAG posterior capsulotomy

Later Post-Operative Complications

Cystoid macular edema (pseudophakic CME)

Persistent iritis or Rebound iritis

Corneal decompensation (pseudophakic bullous keratopathy)

Glaucoma

Conclusion

• ATIOls can give excellent results and patient satisfaction
• An ounce of prevention is worth more than a pound of cure!
• Post-op surprises are inevitable!
• Methodical approach to treat residual refractive error
• Refractive cataract surgery is a commitment that can yield great satisfaction, even if patient is initially unhappy
Thank You!

justin.schweitzer@vancethompsonvision.com