

The Pursuit of Happiness in The Cataract Patient

Richard B. Mangan, OD, FAAO

Case #1

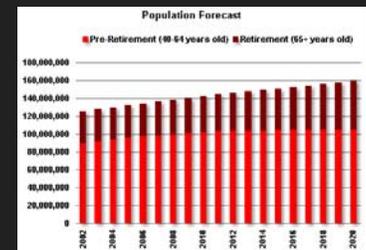
- A 66yo caucasian female presents with a chief complaint of intermittent blurred vision especially when reading. She used to wear contact lenses, but had to stop b/c of dry eyes. She uses Systane Balance prn. She has also been told that she is a suspect for glaucoma. She is concerned that her vision is related to the development of cataracts and was referred by her primary care optometrist for an opinion on the best way to manage her vision complaints.

Questions

- Should patients with glaucoma be treated differently than non-glaucomatous patients with respect to RLE? PC-IOL's?
- How does OSD impact our outcomes?
- How important is asphericity?
- Do Blue Blocking Lenses affect Visual Fields?
- What strategies can we employ pre, intra, and post-operatively to ensure the best possible outcome.

Baby Boomers

The average current life span today is 77. By 2030, nearly 71 million people will be age 65 and over, accounting for roughly 20% of the total US population and have an average life expectancy of 85.



Top 10 "Baby Boomer" Characteristics

- Staying Fit
- Staying in the Workforce past age 65
- Recreationally drawn to water.
- Enjoying Music
- Dating



Top 10 "Baby Boomer" Characteristics

- Staying Fit
- Staying in the Workforce past age 65
- Recreationally drawn to water.
- Enjoying Music
- Dating
- Volunteering
- Spiritual & Social Pursuits
- DIY Home Improvement
- Exploring Tech
- Extreme Sports

Keep 'Em Laughing



JeanneRobertson.com

How the Eye Care Industry Characterizes the Boomer generation

- Approximately 77 million Americans between the ages of 50 & 68.
- Control over 80% of personal financial assets.
- Are responsible for up to 50% of the discretionary spending power in the US.
- Approximately 30% of ALL refractive procedures involve baby boomers.
- Interested in "Cutting-Edge" Technology and willing to pay out-of-pocket for it.
- Impatient, Less Tolerant than previous generation.
- The previous LASIK factor - Expectations are HIGH...and often unrealistic!

Cataract surgery age is on the decline.

- Why? Nutritional issues? Medication side-effects? No...It's the Boomers!
 - ◆ Greater awareness & knowledge of cataract surgery (i.e. computer / Internet saavy, peer-to-peer interactions, etc)
 - ◆ Cataract surgery is perceived to be safer and more predictable.
 - ◆ Active lifestyle boomers are looking to reduce their dependency on glasses.
 - ◆ Aging LASIK patients are becoming less satisfied with their vision and often are impatient about waiting to "restore" their youthful, glasses free vision.

Case #1

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Case #1: Pertinent Exam Findings

- Ocular Surface
 - ❖ Rapid TBUT (3 Sec OD, OS)
 - ❖ Normal Blink Reflex (q7-8 sec) with complete closure
 - ❖ Mild Lid telangiectasia w/ Frothy Tear Film
 - ❖ Trace SPK OU
- Lens
 - ❖ Trace NS OU
 - ❖ +1.00 DS OU w/ +2.25 Add
 - ❖ BCVA: 20/20 each eye
 - ❖ BAT: 20/25 each eye
 - ❖ AC: Deep / Quiet

Case #1 Pertinent Exam Findings

- Optic Nerve
 - ❖ IOP: 26, 25; PACH's 524, 514
 - ❖ Vertical C/D Ratio: OD: 0.65 OS: 0.60
 - ❖ Gonio: D35rf0 OU; NO PAS, No Ruberosis
- ❖ NFL Analysis: Slight progression on TSNIIT analysis OU
- ❖ Visual Field Analysis: No pattern defect, either eye. MD: -2.5 OD, -2.2 OS
- ❖ DX: Uncontrolled Early Open Angle Glaucoma

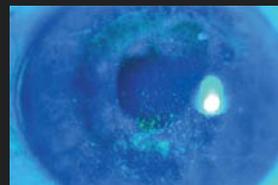
Case #1

- Prior to entering the room to review your findings with the patient, your technician tells you that the patient is requesting generic medication if you decide drops are warranted. Sound Familiar?
- Your goal is a 25%-30% reduction in IOP. Do you:
 - A. Give in to her request and prescribe a generic? –or–
 - B. Are you "disinclined to acquiesce to her request" and insist on a preservative free glaucoma drop or SLT?
 - C. Take the time to educate the patient and let her make an informed decision?

Patient Education Pearls

1. Cost vs. Value: Don't Make Assumptions or Pre-Judge
2. Frame Best Options for Patient
3. The Psychology of MIGS / Hope
4. Set Realistic Expectations
1. Avid Reader – Quality of Vision More Important
2. Travatan Z (Zioptan) SLT
3. Average Age of Cataract Surgery
4. *It is ALWAYS my goal...*

What if our patient had clinically significant cataracts?



Cortical and Nuclear Sclerotic Cataract

Surface Optimization – Really?

What is the number one cause of refractive surprise after cataract surgery?

- Error in measuring:
 - ❖ Axial Length
 - ❖ Corneal Power
 - ❖ A-Constant
 - ❖ Refraction
- Answer: Corneal Power

A patient with a poor tear film has an inaccurate corneal topography resembling forme fruste keratoconus (A). After 1 week of Restasis and AzaSite therapy, the tear film improved (B).

William Trattler, MD – MAY 2009 | CATARACT & REFRACTIVE SURGERY TODAY

Cataract and Dry Eye: Prospective Health Assessment of Cataract Patients Ocular Surface Study

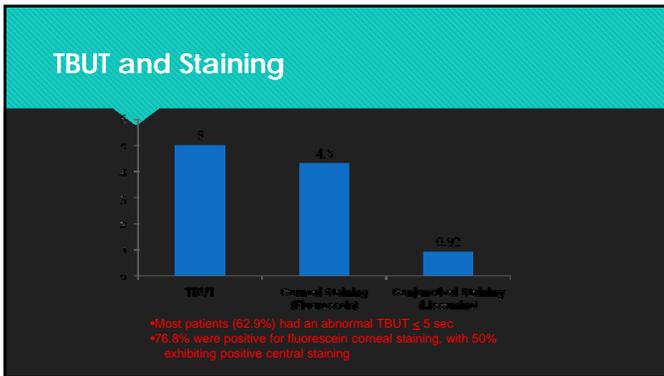
W. B. Trattler, C. D. Reilly, D. F. Goldberg, P. A. Majumdar, J. A. Vukich, M. Packer, E. D. Donnemfeld

Patient Enrollment

- 143 consecutive patients (286 eyes) scheduled to undergo cataract surgery and meeting all other inclusion/exclusion criteria were enrolled at 9 sites across the United States
 - 7 of these patients (7/143, 4.9%) were presently using Restasis and investigators completed a questionnaire about their use of Restasis
 - Additional data from these patients was not collected/not used for the analysis of the remaining 136 patients (272 eyes)
- Of the 136 patients, 30 (22.1%) indicated a prior diagnosis of dry eye disease
 - If including the Restasis patients, this incidence increased to 25.9% (37/143)

ITF Scores

Level	Number of Patients
Level 0	11
Level 1	5
Level 2	25
Level 3	54
Level 4	3



Conclusions

- The findings of the present study suggest that the prevalence of dry eye signs and symptoms in patients undergoing cataract surgery is more common than frequently reported:
 - Most patients (62.9%) had an abnormal TBUT \leq 5 sec
 - 21.3% had an abnormal Schirmer's score (\leq 5 mm)
 - 76.8% were positive for fluorescein corneal staining, with 50% exhibiting positive central staining

Same patient with CSC's!

Would you recommend a Multifocal IOL in this patient?

Monofocal Asphericating (Crystalline IOL)
 Single focus
 Monofocal (crystalline 4.5)
 Single focus
 Diffractive
 Two focus
 Multifocal
 Two focus

Do MFIOL's affect routine glaucoma tests?

- What should we expect with respect to it's affect on Visual Field analysis?
- What should we expect with respect to it's affect on OCT?

The Effect of the Restor Multifocal IOL on Frequency Doubling Perimetry

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 Chicago Glaucoma Consultants, Chicago, IL and Evanston, IL

* NO FINANCIAL INTERESTS

ABSTRACT

- PURPOSE:** To determine the effect of ReSTOR Multifocal IOL lenses on FDT Visual Field Perimetry in patients with glaucoma.
- SETTINGS:** Private Practice - Chicago Glaucoma Consultants; Chicago, IL
- METHODS:** This prospective study included 13 patients (25 eyes); Patients had varied ocular history (3 with glaucoma, 3 glaucoma suspects, and 7 without "high risk" for glaucoma). All with phacoemulsification with AcrySof ReSTOR Natural IOL (Alcon) implantation. Participants underwent Frequency-doubling perimetry (FDT) Humphrey Matrix 24-2 (Carl Zeiss Medtec Inc.) testing before and after cataract extraction. The MD and the PSD were recorded along with considerations for accurate test taking. Changes in visual acuity using LogMAR, IOP, and visual complaints post ReSTOR intraocular lens implantation were also noted.
- RESULTS:** No significance with data.
- CONCLUSIONS:** Patients with well controlled glaucoma can enjoy the benefits of the ReSTOR lens without compromising their treatment. FDT Visual field testing remains consistent and accurate after placement of the ReSTOR IOL.

Influence of multifocal intraocular lenses on standard automated perimetry test results. *JAMA Ophthalmol.* 2013;131(4):481-485.

○ PARTICIPANTS:

- Sixteen eyes of 16 patients with a diffractive MFIOL (median age, 64 years), 18 phakic eyes of 18 healthy individuals serving as controls (median age, 62 years), and 12 eyes of 12 patients with a monofocal IOL (median age, 64 years) were included.

❖ **Conclusion:** Reports a reduction in visual sensitivity of up to a 2 dB, as measured by **standard automated perimetry**, in patients with a multifocal IOL compared with phakic controls.

The impact of multifocal intraocular lens in retinal imaging with optical coherence tomography

- Cross-Sectional Study: 23 eyes MFIOL; 27 eyes Aspheric Monofocal; OCT with Heidelberg Spectrals.

○ This study demonstrates that OCT measurements in the macular area are not affected by the optical design of diffractive MF IOLs. These measurements were comparable to those performed in patients implanted with monofocal aspheric IOL. However, MF IOL reduces OCT Image quality by more than 3 dB. This reduction was statistically significant.

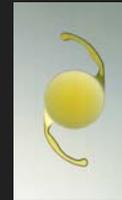
Dias Santo et al: Int Ophthalmol (2015) 35:43-47

Severity of Visual Field Loss and Health Related Quality of Life

Roberta McKean-Cowdin, PhD¹, Rohit Varma, MD(MPH)^{1,2}, Joanne Wu, MS³, Ron D. Hays, PhD^{4,5,6}, and Stanley P. Azen, PhD^{1,2} for the Los Angeles Latino Eye Study Group⁷

- A loss of 1dB per year is considered a moderate rate of disease progression.
- Several studies have investigated the association between VFL and questions concerning completion of daily activities such as the ability to read or watch television, issues of mobility including walking or driving, and frequency of falls.
- 5,213 Participants
- A lower QOL score was observed with only a -2db or worse if in both eyes.
- A 4-5 db worsening corresponds to a 2 line drop in visual acuity when it comes to QOL scores.

Let's table the MFIOL discussion for a minute...



"Effect of aspherical and yellow tinted intraocular lenses on blue-on-yellow (SWAP) perimetry"

- 25 patients (50 eyes) received aspherical intraocular lens (Akreos AO) in one eye and spherical intraocular lens (Akreos FIT) in the fellow eye.
- Primary Outcome Measure: Contrast Sensitivity
- 27 patients (54 eyes) received ultraviolet and blue light filter (yellow tinted) IOL implantation in one eye and acrylic ultraviolet (non-tinted) filter IOL in the fellow eye.
- Primary Outcome Measure: MD & PSD from Blue on Yellow Perimetry

Effect of aspherical and yellow tinted intraocular lenses on blue-on-yellow perimetry

○ Conclusions:

1. Contrast sensitivity was better under mesopic conditions with aspherical intraocular lenses.
2. Blue-on-yellow perimetry did not appear to be affected by aspherical or yellow tinted intraocular lenses.

What is 20/20?

Defining Clarity

- The Snellen test is not sensitive enough to detect declines in the *quality* of our vision
 - Well-lit, high-contrast images are inconsistent with many real-world visual tasks
 - A person with reduced functional vision can read the letters on the chart, but may not see clearly in low light conditions

Climburg AP. Forensic aspects of visual perception. In: Forensic aspects of vision and highway safety (1996) Lawyers & Judges Publishing Company, Inc. 201:240.

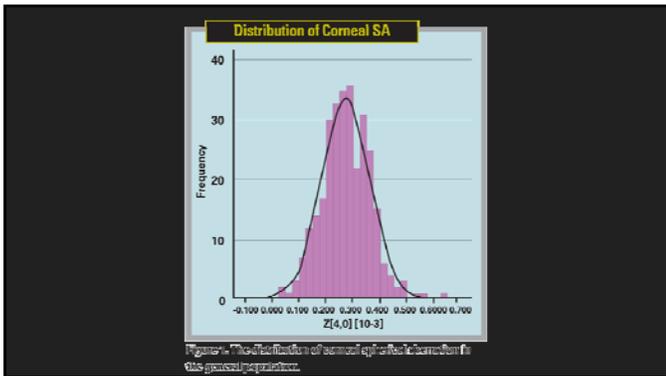
Young Adult Eye

- Crystalline lens has negative SA
 - Power decreases from center to edge
- Cornea has positive SA
 - Power increases from center to edge
- Aberrations from lens and cornea tend to partially offset
 - Young healthy eyes tend to have positive SA

SA, spherical aberration.

Aging Adult Eye

- Crystalline lens develops positive SA with age, which increases depth of field
 - Over time, the crystalline lens no longer offsets the SA of the cornea and eventually adds to it
- Excessive positive SA reduces functional vision
 - Reducing contrast sensitivity
 - Increasing halos



Optic Design Strategies

Positive SA	Negative SA	"Zero" SA
Power increases from center to edge	Power decreases from center to edge	Power constant from center to edge
Conventional	Tecnis AcrySof IQ	SofPort® AOV

Residual Spherical Aberration Decreases Image Quality*

Residual spherical aberration of monofocal lenses (4 mm pupil)

Lens	TECHNIP IOL	AcrySof® IOL	MAO LRI60 IOL	Spherical IOL
Point Spread Function				
20/20				
Average Corneal SA	+0.27	+0.27	+0.27	+0.27
Lens SA	-0.27	-0.17	0.0	+0.16
Total Residual SA	0.0	+0.10	+0.27	+0.42

The point spread function (PSF) is the shape of a single, concentrated ray of light as it is projected through a lens. PSF is used to describe the distortion caused by aberrations present in an optical system.

Comparison of Depth of Field

Conventional IOL

Best

Zero SA IOL

Very good

Negative SA IOL

Worst

D, diopters. -0.50 D -0.25 D 0 D +0.25 D +0.50 D

Simulated visual images

48

What would you recommend for our patient?

Conventional IOL

Best

Zero SA IOL

Very good

Negative SA IOL

Worst

D, diopters. -0.50 D -0.25 D 0 D +0.25 D +0.50 D

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Case 3: Same patient except:

Decentration of an IOL

- An IOL centered perfectly in the capsular bag and/or behind the pupil is likely to be decentered to the visual axis
- Mean decentration values
 - Between pupil and visual axis = 0.37 mm (± 0.24)¹
 - Between IOL and pupil = 0.36 mm (± 0.25)²
- Decentration induces aberrations in IOLs with positive or negative SA
- Tilt can also create coma aberrations in these types of IOLs

1. Altmann GE, et al. 2005; 2. Data on file.

51

CTR's

1

4

Area of Zonular Loss

CTR: Capsular Tension Ring

Bausch & Lomb Neutral Aspheric Implants

- Softport AO (Silicone)
- Akreos AO
- enVista IOL
 - ◆ FDA Labeled "No Glistenings"
 - ◆ Neutral Aspheric Design
 - ◆ Minimal PCO
- Crystalens
- Trulign Toric



Capsular tension ring implantation enhances outcomes of accommodating IOL

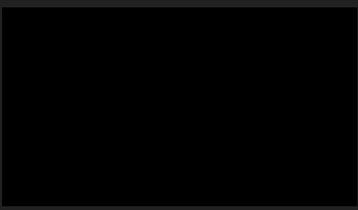
A surgeon reports significantly improved intermediate and near visual acuity when capsular tension ring is implanted along with premium IOL:

- ◆ Mean monocular uncorrected distant vision with the CTR was 20/25 or better in 52% of eyes and 20/20 or better in 31% of eyes. Without the ring, results were similar: 56% of eyes achieved 20/25 or better and 28% achieved 20/20 or better.
- ◆ Intermediate vision with the ring was 20/25 or better in 94% of eyes and 20/20 or better in 81% of eyes. Without the ring, only 70% of eyes achieved 20/25 or better and 41% achieved 20/20 or better.
- ◆ For near vision, J2 and J1 were achieved in 74% of cases that underwent ring implantation, whereas in the group without the ring, 56% were able to read J2 and 28% achieved J1.

Reducing Astigmatism

- On-axis clear corneal incision (0.75D to 1.00D)
- Limbal Relaxing Incisions
- Laser Vision Correction
 - mLASIK
 - iLASIK
 - Surface Ablation
- Toric IOL
 - Staar Toric
 - Acrysof Toric
 - Trulign Toric
- Combination of Procedures

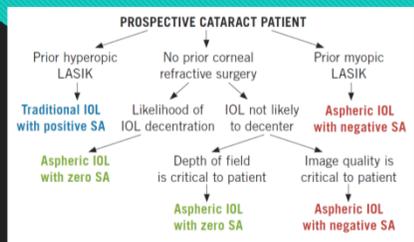
Trulign Toric



Deciding Factors

- Level of glaucomatous nerve damage
- Age
- Type of glaucoma i.e., POAG, NTG, Narrow Angle, PXF
- Patients goals / expectations
- Refractive Error
- Corneal Astigmatism
- Quality of the Ocular Surface

How to choose an aspheric IOL



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    graph TD
        A[PROSPECTIVE CATARACT PATIENT] --> B[Prior hyperopic LASIK]
        A --> C[No prior corneal refractive surgery]
        A --> D[Prior myopic LASIK]
        
        B --> E[Traditional IOL with positive SA]
        C --> F[Likelihood of IOL decentration]
        D --> G[Aspheric IOL with negative SA]
        
        F --> H[IOL not likely to decenter]
        F --> I[Depth of field is critical to patient]
        
        H --> J[Aspheric IOL with zero SA]
        I --> K[Aspheric IOL with zero SA]
        
        G --> L[Image quality is critical to patient]
        L --> M[Aspheric IOL with negative SA]
    
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Study: Monovision vs. Multifocal

- 212 Patients who had bilateral cataract surgery were randomly assigned preoperatively to receive either:
 - Monovision with the Akreos monofocal aspheric IOL (B&L) with the near eye targeted to -1.25 –or–
 - Tecnis ZM900 3-piece multifocal

Study: Monovision vs. Multifocal

- Patients were assessed at 4 months post-op for the following parameters:
 - Spectacle independence
 - Subjective dysphotopias
 - Unaided binocular visual acuity at:
 - Distance
 - Intermediate
 - Near
 - Contrast sensitivity
 - Stereoacuity
 - Light scatter
 - Higher Order Aberrations

	Monovision	Multifocal
Spectacle Independence	26%	71%
Binocular Unaided Distance VA	Same	Same
Intermediate	:-)	
Near		:-)
Contrast Sensitivity	:-)	
Stereoacuity		:-)
Forward Light Scatter and HOA's	Same	Same
Dysphotopsia	:-)	
Overall Patient Satisfaction	85%	81%

Study: Monovision vs. Multifocal

- Subjective dysphotopsia questioning revealed that multifocal patients reported far more "annoying" or "debilitating" glare or dazzle than monovision patients (43% vs 18%).
- IOL exchange (ie, multifocal out, monofocal in) was performed in 6 multifocal patients but no monofocal patients.
- The reason for IOL exchange was dissatisfaction with image quality in 5 of the 6 exchanged multifocal patients.

Intra-operative Ways to Reduce BAK Exposure

- Intra-camerally instill a preservative-free dilation mixture in place of topical dilating agents (PF Lidocaine 2% and 1:1000 epinephrine).
- Off-label Intra-cameral alpha-agonist.
- Use PF Lidocaine Jelly
- No Drop Cataract Surgery
- MIGS (i.e., iStent)

No Drop Cataract Surgery



MIGS (i-Stent)



Additional Pearls as it relates to the Pursuit of Happiness

Pre-op	Post-Op
<ul style="list-style-type: none"> ○ PG's and CME? ○ Trial Frame Distance, Document Near VA ○ Punctal Occlusion Debate ○ Axial length changes from decreased IOP after surgery. ○ Establish Realistic Expectations 	<ul style="list-style-type: none"> ○ Post-op IOP Spikes ○ Re-establish Baseline IOP ○ Special Testing <ul style="list-style-type: none"> ○ Visual Fields ○ NFL Analysis ○ The 7 C's

The 7 C's – typical causes why patients are dissatisfied with the MFIOL.

1. Consecutive Treatments
2. Cylinder & Residual Refractive Error
3. Capsular Opacification
4. Cystoid Macular Edema
5. Corneal & OSD
6. Centration of the IOL
7. Circumference of the Pupil relative to the IOL.



In Conclusion

- Diffractive Multifocal IOL's are OK with proper informed consent in OCHTN & MILD Glaucoma.
- Don't take the ocular surface for granted.
- Aspheric designed lenses improve contrast sensitivity and are ideal when quality of vision is most important.
- Neutral aspheric monovision provides a slightly improved depth of focus.
- Utilize surgeons that are experienced with Malugan & Capsular Tension Rings.
- No Drop Cataract Surgery + i-Stent are novel approaches to dealing with the comorbidity of OSD, Glaucoma & Cataracts.
- Dr. Mangan can be reached at eyeam4uk@gmail.com
- Customize OR Music for the Boomers

15 Most Influential Songs During The BBE

<ul style="list-style-type: none"> ○ Elvis Presley (Jailhouse Rock) ○ Buddy Holly (That'll Be The Day) ○ Danny and the Juniors (At the Hop) ○ Chuck Berry (Johnny B. Goode) ○ Ray Charles (What'd I Say) ○ Chubby Checker (The Twist) ○ The Beatles (I Want to Hold Your Hand) ○ Martha and the Vandellas (Dancing in the Street) 	<ul style="list-style-type: none"> ○ Rolling Stones (Satisfaction) ○ Bob Dylan (Like a Rolling Stone) ○ The Beach Boys (Good Vibrations) ○ Aretha Franklin (RESPECT) ○ The Doors (Light My Fire) ○ The Beatles (A Day in the Life) ○ Marvin Gaye (What's Going On)
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Tim Hawkins – “Old Rock Star Songs”

