An Update on Cataract and Refractive Surgery in the Ocular Surface Disease Patient

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Have done research, consulting, or speaking for:
Avedro, ESI, Humanoptics, Johnson & Johnson, Minnesota Eye Consultants, OSD, Shire, Sightpath, TearFilm, UVP

Some of the information may represent off-label uses of approved drugs or devices

Pre-Operative Care

LASIK & Cataract Surgery

- Good Postoperative Care Begins with Careful Pre-Operative Management
- Careful History
  - Corneal
  - Other Ocular
  - Systemic
- Assessment of Patient Expectations
- Careful Examination

History Based Criteria

LASIK & Cataract Surgery

- Relative indications or contraindications
- Understand why they may be an issue
- Historical information supplemented by examination in most situations

Ocular History

Contact lens history
- Refractive stability
- Tolerance
  - Allergies
  - Dry Eye
  - Blepharitis
  - Ask why they stopped contact lenses in past
- Listen to pattern of blur in the cataract patient
  - After 10 minutes things get blurry
  - My eyes get tired

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Medications

LASIK Screening
- Allergies to medications
- Many medications cause ocular dryness
  - Antihistamines
  - Antidepressants
  - Bladder medications
  - Pain Medications
  - Muscle relaxants
- Some affect accommodation
- Some affect wound healing
- Rosacea treatment in past?
- Accutane or retinoids?

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Full Ocular Exam

Refractive Surgery Patient and Cataract Patient Similar when it comes to OSD
- UDVA & BDVA & UNVA
- MR
- CR or Cylco-Wavescan in LASIK/PRK Patients
- Comparison to past glasses and exams
- Motility
  - Prism in current glasses, unable to wear contacts due to diplopia in past
- Slit Lamp exam
  - ABMD, Old scars, Cataract, Blepharitis, Dry Eye, Orbital Access, Pannus, Pterygia
- Retinal Exam
  - Visual Potential issues/General Screening issues

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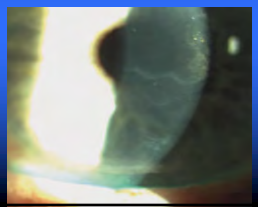
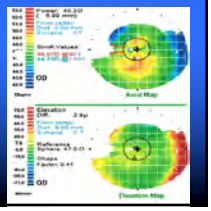
ABMD

Common-Identify

- PRK better option if refractive surgery contemplated
- May mimic/exacerbate dry eye IA on topography in Cataract/Refractive Patient





Ocular Surface Disease

Common – needs identification

- Dry Eye often mainly historical
- Look for conjunctival staining with Lissamine Green
- Schirmer's and Tear Osmolarity may be helpful – yet often falsely negative when Blepharitis or Allergic disease is a major component of disease
- Evaluate Meibomian glands
  - Consider Meibomian gland imaging
- Education is key to help patients understand ocular surface disease will still need management after refractive surgery

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Educate Preop

Cataract and Refractive Surgery

- Preop education puts focus where it belongs
  - On the ocular surgery disease (chronic)
  - Takes emphasis off of the surgery as the "cause" of a problem that was pre-existing
- Chronic disease management
  - Patients want a surgical cure
  - Frightened about diagnosis with a chronic disease
  - Can start to understand how it will impact their lives
  - Family support
  - Pre-op deal with feelings of frustration and learn the management techniques
  - Distractors for support: Exercise, emotions, relationships

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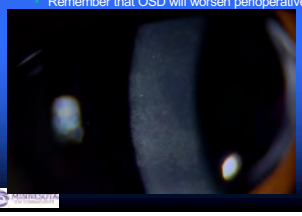
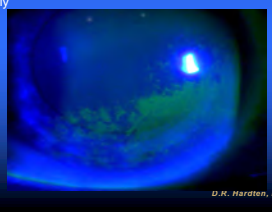
Ocular Surface Stress Test

Preoperative Evaluation

Hardten, Cornea 2008

- We used to brush this off as "artifact"
- Epitheliopathy after stress test deserves further attention
- Remember that OSD will worsen perioperatively





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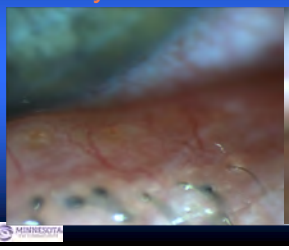
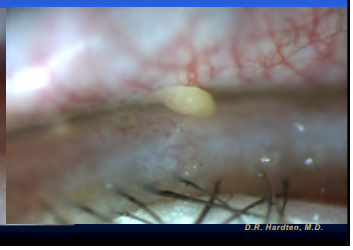
Lid Evaluation

Identify Meibomian Gland Disease





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Blepharitis/MGD Component

Cataract and Refractive Surgery

- Lid hyperemia
- Meibomian gland quality
  - Push on the glands
  - Good oil?
  - Turbid, Thick, non-expressive
- Take in consideration of symptoms/contact lens history
- Take in consideration of blur-pattern history

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Meibomian Gland Disease

Change in composition of meibomian gland secretions -leads to inflammation, irritation and an altered tear film

Signs and symptoms:

- Dilated & plugged meibomian gland orifices with "toothpaste" like material
- Dry eye signs and symptoms (burning, foreign body sensation, contact lens intolerance)
- Thickened lid margin
- Vision fluctuation
- Filmy vision with foam in tear film (soaps/fatty acids)

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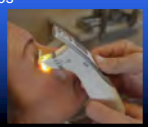
Meibomian Gland Disease

Change in composition of meibomian gland secretions -leads to inflammation, irritation and an altered tear film

Current treatment

- Lid Hyperthermia / Massage / IPL / LipiFlow/ I-Lux
- Antibiotic and corticosteroid ointments & drops
- Oral antibiotics (doxycycline)
- Nutritional supplements
- Topical cyclosporine or lifetegrast



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Considerations in Cataract & Refractive Surgery Population

Preoperative Screening for Dry Eye

- Contact Lens intolerance is one of best clues
- Ocular surface examination
- Don't be afraid to use stains (Lissamine Green Strips are best)
- Look carefully at the topography
- Much of abnormal topography is ocular surface disease

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Dry Eye Worsens after Cataract & Refractive Surgery

Think back

- You are enjoying a moment away from patients right now
  Wonderful meeting, learning a lot, networking
- In the last month – did you have a cataract or refractive postop patient tell you their eyes were dryer or more irritated than preop?
- If so – and they weren't identified as an ocular surface disease patient preoperatively, then there needs to be more aggressive identification of dry eye/blepharitis preoperatively
- Patient didn't understand they had a chronic disease

Li, et. al. Cornea 2007;26:S16 – OSDI precop ocular discomfort 2.60 increased to 12.66 at 3 months
Battat, et. al. Ophthalmology 2001;108:1230

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DTS Diagnosis & Treatment Chart

Severity Level	1	2	3	4
Symptoms	Mild to moderate	Moderate to severe	Severe	Extremely severe
Conjunctival Signs	Mild to moderate	Staining	Staining	Scarring
Corneal Staining	none	Mild punctate staining	Marked punctate staining; central staining; filamentary keratitis	Severe staining; corneal erosions
Other Signs		Tear film; vision (blurring)		
Treatment Options				
	• Patient education • Environmental modification • Preserved tears • Control allergy	• Unpreserved tears • Gels, ointments • Cyclosporine A • Topical steroids • Secretagogues • Nutritional support	• Oral tetracyclines • Punctal plugs (once inflammation is controlled)	• Systemic anti-inflammatory • Acetylcysteine • Moisture goggles • Surgery (punctal cautery)
	If no improvement, add level 2 treatments	*If no improvement, add level 3 treatments*	*If no improvement, add level 4 treatments*	

Meibomian Gland Disease – Treatment Options
Lid hygiene; thermomassage; oral tetracyclines
McDonnell et al. ARVO 2004

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Conjunctival Signs	Mild to moderate	Staining	Staining	Scarring
Corneal Staining	none	**Cataract Surgery adds 1 severity step**	Marked punctate staining; central staining; filamentary keratitis	Severe staining; corneal erosions
Other Signs		Tear… vision (blurring)		
Treatment Options				
	• Patient education • Environmental modification • Preserved… • Control al…	• Unpreserved tears • Gels, ointments • Cyclosporine A • Topical steroids • Secretagogues • Nutritional support	• Oral tetracyclines • Punctal plugs (once inflammation is controlled)	• Systemic anti-inflammatory • Acetylcysteine • Moisture goggles • …ry (punctal cautery)
	If no improvement, add level 2 treatments	*If no improvement, add level 3 treatments*	*If no improvement, add level 4 treatments*	

LASIK adds 2 severity steps

Plan pre-op and post-op care accordingly

Meibomian Gland Disease – Treatment Options
Lid hygiene; thermomassage; oral tetracyclines
McDonnell et al. ARVO 2004

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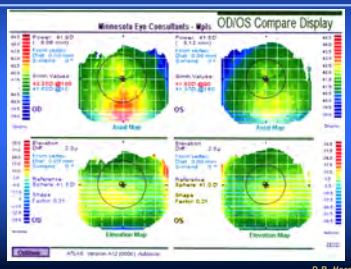
Interested in Cataract Surgery

Contact Lens Intolerant
58 years old
Female
Decreased TBUT
Schirmer's 15 mm
Pach 590



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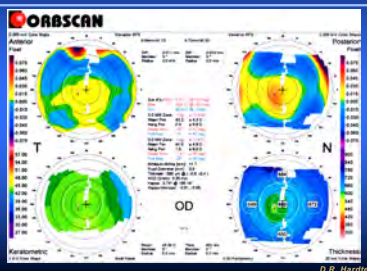

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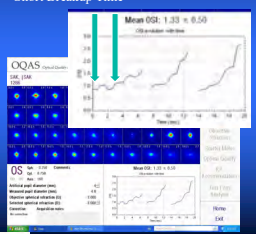
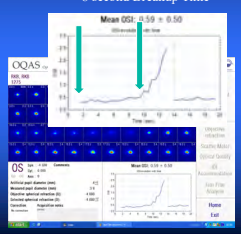
Importance of Tear Film on Vision
Stability of Ocular Surface Index
Measured by Optical Quality Analysis

Short Breakup Time



8 second Breakup Time



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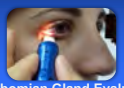
New Solutions – Intense Heating and Expression Treatments of the Meibomian Glands: LipiFlow and Intense Pulsed Light

Tear Film Lipid Measurements with Interferometer

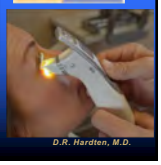


Meibomian Gland Evaluator

iLux Treatment

\Thermal Pulsation System

Intense Pulsed Light Treatments



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New Refractive Technology IOLs

Importance of Ocular Surface Disease Management

- Presbyopic IOLs are now real part of practice
- More concerned with early recovery and preventing infection and CME and PCO and ocular surface
- Usually move patients up one level in consensus guidelines for management perioperatively – more aggressive treatment of dry eye and blepharitis with artificial tears, cyclosporine and lid hygiene

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Modern Laser Vision Correction

Importance of Ocular Surface Disease Management

- Patients expect rapid recovery from modern LASIK – especially with IntraLase
- Most common problem pointed out at FDA LASIK panel complaints in prior years was dry eye
- Usually move patients up two levels in consensus guidelines for management perioperatively – more aggressive treatment of dry eye and blepharitis with artificial tears, cyclosporine and lid hygiene

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Ocular Surgery Disease

Management depends on goals and expectations

- 20/80 cataract, 75yo, long history of glasses, just wants to pass driver test
  - Moderate Dry eye
    - Consideration to putting on dry eye management, but just getting the surgery done and then continuing treatment postop
  - Very severe Dry eye
    - May want to delay the surgery until under control to reduce other complications

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Ocular Surgery Disease

Especially Critical in the patient with high goals and expectations

- 20/30 cataract with BAT, 54 year old, multifocal contact lens wearer, doesn't want to wear glasses postop
  - Mild dry eye without stain or topography issues
    - Counsel so understands long term issues and what issue causes what problems and Consideration to putting on dry eye management, getting the surgery done and then continuing treatment postop
  - Moderate Dry eye
    - Delay surgery until dry eye management established and symptoms and signs much improved
    - Unlikely to be happy or understand separation of issues if go ahead with the surgery
    - Long term management will be needed
  - Very severe Dry eye
    - Delay surgery until dry eye management established and symptoms and signs much improved
    - Unlikely to be happy or understand separation of issues if go ahead with the surgery right away
    - Likely to need in office treatments like IPL, Thermal pulsation, Lipiflow, I-Lux
    - Long term management will be needed
    - May not get to point where you feel multifocal is OK

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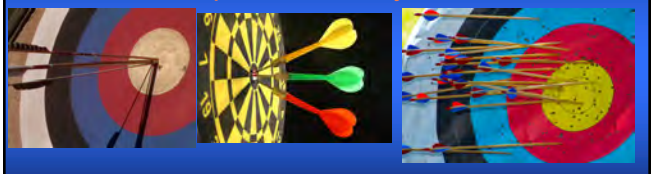
Cataract Surgery

Patient Perception v. Reality



- Ocular Surface Disease Impacts the Accuracy

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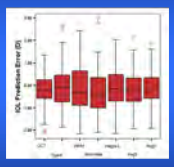
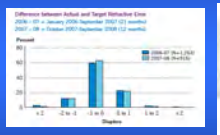
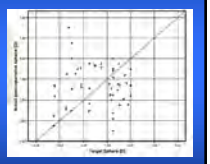
Accuracy of IOL Calculations

- Post-Refractive
- Standard Cataract
- High Myopia







- Ophthalmology 2015;122:2443
- Cole 2008 Eye Outcomes
- Oman J Ophth 2010;3:126

- Overall - ± 0.5D for 55% and ± 1.0D for 85% - maybe even 70% ± 0.5D and 90% ± 1.0D

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How To Understand Their Expectations

Preop Discussion with Cataract Patients

- Need to pick goal refraction postop
- Often a tough thought process for the patient

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Ask Questions

- Questionnaire
- Simple Choices Identify the Goal
  1. I don't care
  2. Really want your best effort at Distance
  3. Distance w/Astig
  4. Distance and Near

Date _____ Name _____ Date of Birth _____

Options for Lens Implants

When a cataract is removed, an artificial lens is placed inside the eye to take the place of the human lens that is removed. Clear lenses that have not yet developed cataracts are also sometimes replaced with an artificial lens to reduce the need for glasses or contacts. This questionnaire will assist us in providing the treatment best suited for your visual needs if it is determined that surgery is appropriate for you. It is important that you understand that many patients still need to wear glasses for some activities after surgery and that vision can not be perfect for all situations.

1. How interested are you in seeing at a **distance** without glasses after surgery?
   ____Prefer no distance glasses
   ____Not important to me. I don't mind wearing distance glasses.
2. How important is it to you to see **up close** (reading) without glasses after surgery?
   ____Prefer no reading glasses
   ____Not important to me. I don't mind wearing reading glasses.
3. If you could have good vision for driving during the day without glasses, and good near vision without glasses in most situations, would you be able to tolerate some halos and glare around lights at night as well as use glasses for some situations?
   ____Yes
   ____No

Think One Step Ahead

Chess game especially with presbyopic IOLs!

- Always try to think/anticipate several moves ahead of the patient
- Perform surgery on dominant or worst eye first
- Allow recovery in less than 1 week
  - Maximize speed of recovery
  - (cool phaco, viscoelastic, posterior chamber phaco, NSAID)
- Have a plan for unhappy patients
- Time Enhancements with LVC
- Time PCO management
- Address dry eye

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Cataract Patient

Understand that even patients you don't think should have a presbyopic IOL may have similar desires and also deserve a discussion about options.

- Diabetic with past PRP and focal laser treatment
- Wet ARMD in one eye, smoker, soft drusen and RPE changes in other eye
- Otherwise normal healthy eye
- One eyed patient with severe macular scar

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Custom Cataract Surgery

>70% of patients have ≥ 0.5 D of pre-op astigmatism

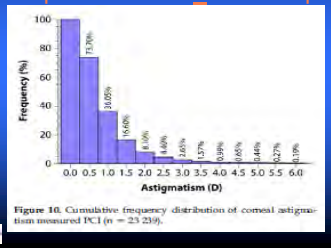

Figure 10. Cumulative frequency distribution of corneal astigmatism measured PCI (n = 23 259).

Critical to Address For Good Uncorrected Vision

Hoffmann & Hutz JCRS 2010;36:1479

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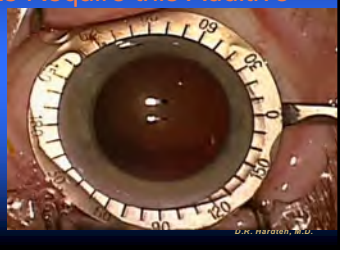
Astigmatic Keratotomy

Some Presbyopic IOLs Require this Additive

- Same Nomogram
  - Femto-AK
  - Blade-AK

On axis incision: 1-8-2.2mm	0.25 D
On axis incision: 2.8 mm-3.2 mm	0.50 D
On axis incision Plus: 1 X 30 CPI	0.75 D
On axis incision Plus: 1 X 45 CPI	1.00-1.50 D
On axis incision Plus: 1 X 60 CPI	1.50-2.00 D
On Axis incision Plus: 2 X 45 CPI	2.00-2.50 D
On Axis incision Plus: 2 X 60 CPI	2.50-3.00 D



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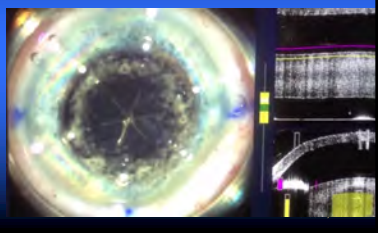
On axis incision Plus: 1 X 30 CPI	0.75 D
On axis incision Plus: 1 X 45 CPI	1.00-1.50 D
On axis incision Plus: 1 X 60 CPI	1.50-2.00 D
On Axis incision Plus: 2 X 45 CPI	2.00-2.50 D
On Axis incision Plus: 2 X 60 CPI	2.50-3.00 D



Toric IOLs

Astigmatism

- Up to 4 D of corneal astigmatism
- Regular Astigmatism
- Typical teaching had been to use the K's
- Often K's, topo astigmatism, tomo astigmatism don't match
- Advanced formulas
- Depends on a good ocular surface
  - Important to control dry eye and blepharitis before final measurements
- Be prepared for enhancement
  - Also important to have good ocular surface to calculate rotation or to perform laser vision correction

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Timing of Secondary Intervention

Astigmatism Correction after IOLs

- Enhance large corrections earlier
- Small corrections – wait longer
- Typically I wait 1-2 months to do IOL Rotation or IOL exchange for large corrections
- Typically I wait 3-6 months to do laser vision correction

Capsule considerations – contraction or PCO

Yag first in many patients

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Residual Astigmatism after Toric IOL

Questions to Ask

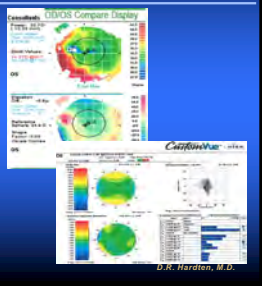
- 1. Is it Regular or Irregular?
- 2. Is the Spherical Equivalent where you want?
- 3. Is it correctable by rotation of the IOL?
- 4. Has the dryness/surface toxicity stabilized?
- Example: SN6AT5 at 150 degrees

WSR: -2.69 + 4.05 x 90

MR: -2.00 + 3.00 x 95 = 20/40-2

HOA: 0.46 μ @ 4.75mm pupil

Humphrey Astig 4.12 D at 80 degrees



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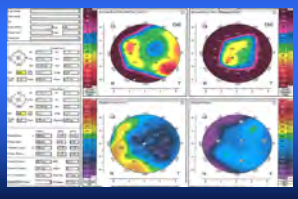
Irregular Astigmatism

SN6AT5 at 150 degrees

Pentacam Astig 2.3 D at 54 degrees



MR: -2.00 + 3.00 x 95 = 20/40-2

WSR: -2.69 + 4.05 x 90

Humphrey Astig 4.12 D at 80 degrees

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Options – Irregular Astigmatism

Toric after RK - - Options?

- Rotate Toric based on Refraction
  - (to 115° = 0.94 D x 115)
  - www.astigmatismfix.com
- Rotate Toric based on Wavescan
  - (to 105° = 1.45 D x 106)
- Easier to rotate based on change of position
  - Change from 150 to 115 is 35 degrees clockwise
  - Perform totally based on intraoperative analysis for best accuracy
- Remove toric IOL? (baseline astig of eye likely 3.5 to 4 D)
- PRK? (only 4.75 mm capture) – Might be useful for irregular component
- Exchange IOL for higher powered toric?

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Post-Operative Management

Laser Vision Correction

- PRK
  - No issues with prior LRI incision
- LASIK
  - May be issues with prior LRI
  - More rapid recovery
- IOL rotation in toric IOLs – usually minimal effect if close to correct axis
- Depends on excellent tear film for measurement and recovery

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Work Doesn't Stop after the Surgical Operation

Management

- Decreased BCVA
  - YAG
  - Treat Cystoid Macular Edema (OCT helpful)
  - Treat Dry Eye
  - Epiretinal Membrane
- Normal BCVA
  - Glare/Halos – Trial in spectacles
  - Residual Refractive Error – Trial in spectacles
  - Tincture of Time
  - Neuro-adaptation
  - IOL Exchange

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Don't be Afraid to Offer Return to Presbyopia

Offer Removal of Presbyopic IOL if Needed

- Your brain may not be adaptable enough to make this work for you

Pearls for Success

Refractive IOL Practice

- Keep in touch with the patient until you know they are happy
- Ocular Surface Management is more work for these patients postop
- Prepare them for this work
- Counseling
- Start treatment before
- Fix other issues for satisfaction
  - Yag for mild PCO, PRK /LASIK for mild refractive errors
- Schedule follow-up
- Happiness breeds happy referrals
- Make each patient an ambassador for your practice
- Exceed their expectations

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Conclusions – Refractive Surgery

LASIK Preoperative Management in OSD

- Good Postoperative Care Begins with Careful Pre-Operative Management
- Careful History
  - Especially dryness in stress related situations
  - Contacts, Computer, fluctuation of vision
- Assessment of Patient Expectations
- Careful Examination
  - Tear Film, Lids, Testing if history or exam suggests
- Counseling to help patient understand what is pre and what will postop course be like and long term work involved

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Summary-Refractive Cataract

Ocular Surface Disease Patients

- Still can offer great options if patient motivated for the work, chronic disease management
- Still will have changing needs over time
- Figure out what patients' needs/wants are real and important
- "Mostly goal" – will wear glasses postop
- "Specific target" – work hard to provide some spectacle independence
  - Not covered by insurance, extra cost, effort, possible enhancement with PRK, IOL exchange, forever OSD management

It is worth the work!

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Summary

Ocular Surface Disease Management

- Very common 2nd, 3rd, 4th diagnosis – evaluate and discuss more than just the chief complaint with patients for maximum patient satisfaction
- Dry eye much more common that previously recognized and still under appreciated and under managed
- Aggressive management perioperatively
- Ocular Surface Stress Test

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Summary

Ocular Surface Disease Management

- Most common management for Dry Eye
  - Artificial Tears & Lid Hygiene
  - Cyclosporine – well tolerated and reduces progression to more advanced levels
  - Lifetegrast – works well in this group of patients
- Identify and manage blepharitis for maximum patient satisfaction
  - Warm Compresses
  - Topical antibiotics
  - Oral Antibiotics
  - Shampoos/cleansers to lids
  - In office treatments: IPL, Lipiflow, iLux, BlephEx

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