

WHEN YOUR PRESBYOPE ONLY WANTS SURGERY

LINDSEY BULL, OD, FAOD
EYECARE ASSOCIATES OF SOUTH TULSA
OCULAR DISEASE RESIDENCY SUPERVISOR

DISCLOSURES:

- Lindsey Bull has received honorarium from:
 - Allergan/Abbvie
 - Viatris
- She is on the speaker bureau for Allergan/Abbvie
- She has been on advisory boards for Viatris
- All relevant relationships have been mitigated.

GOALS OF TODAY'S LECTURE

1. What is the current state of presbyopia and presbyopia treatments?
2. How to determine if surgery is a good option for your patient
3. Pro and cons of presbyopia surgeries?
4. Considerations for each type of surgery
5. How to manage/comanage surgical interventions for presbyopic patients

PRESBYOPIA STATISTICS

- Greater than 1.8 billion presbyopes in the world¹
 - Expected to rise to 2.1 billion by 2030¹
- Onset of age is approximately 40
 - Younger in areas with closer proximity to the equator²
- Presbyopia has a suspected earlier onset due to the pandemic³
- Estimated \$11 billion global productivity losses due to presbyopia⁴
- Every year approximately 1.4M new presbyopes⁵

1. Wu et al. "The prevalence of low vision and blindness due to presbyopia." *Clinical Ophthalmology*. 2012; 6: 237-239.
 2. Wu et al. "The prevalence of low vision and blindness due to presbyopia." *Clinical Ophthalmology*. 2012; 6: 237-239.
 3. Wang et al. "The prevalence of low vision and blindness due to presbyopia during the COVID-19 pandemic." *Presbyopia*. Available at: <https://doi.org/10.1080/16513758.2022.2122122>.
 4. Wang et al. "The prevalence of low vision and blindness due to presbyopia during the COVID-19 pandemic." *Presbyopia*. Available at: <https://doi.org/10.1080/16513758.2022.2122122>.
 5. Wang et al. "The prevalence of low vision and blindness due to presbyopia during the COVID-19 pandemic." *Presbyopia*. Available at: <https://doi.org/10.1080/16513758.2022.2122122>.

How many times today have you looked at your phone?



SETTING THE SCENE

- Existing patient comes into your office for an annual exam
 - Chief Complaint: Patient is noticing more difficulty seeing up close
 - Dx: Presbyopia
 - "Doctor- What are my options?"

What opportunities exist and what do we consider for our patients?

PRESBYOPIA TREATMENT COMES WITH INHERENT CHALLENGES

1. What are they?
2. How do we, as physicians, minimize these challenges?
3. How do we prepare/set patient expectations?

PATIENT CONSIDERATIONS FOR PRESBYOPIA TREATMENT- THE FIRST STEP

- Patient demographics
 - Age, occupation, hobbies
- Surgical History
- Ocular health
 - Level of presbyopia
 - Previous ocular surgical history
 - Anterior and posterior segment health
- Who does the procedure? Is there someone in your area?
- What presbyopia treatments has the patient previously tried?
 - Success/failure
- Patient expectations
- Healing time

EVALUATING FOR PRESBYOPIA TREATMENT

- What are the presbyopes everyday needs?
 - Intermediate vs near vs both
 - What option will best hit the target?
- Where is their vision lacking? Where is their vision doing well?
- What is current level of presbyopia?
 - Mild= +1.25 or less
 - Moderate= +1.5 — +2.00
 - Advanced= +2.25+
- What preoperative testing do I need?
 - OCL, pach, dilate of fundus exam, endothelial count, IOL master, A-scan, topography

THE THERAPEUTIC CONSIDERATIONS FOR PRESBYOPIA TREATMENT

- What options do we have to offer?

Glasses	Contact	Refractive lensectomy	Lasik	Conductive Keratoplasty	LASIK/PRK <small>PresbyLASIK*</small>	Conductive Keratoplasty	IntraCor*
--------------------	--------------------	-----------------------	------------------	-------------------------	--	-------------------------	-----------

- "But I don't want to wear glasses or contacts anymore"
- What surgical options do we have available?

*Not FDA approved as of 8/15/2024 at this time

REFRACTIVE LENSECTOMY/CATARACT SURGERY FOR PRESBYOPIA MANAGEMENT

- Surgical options:
 - Monofocal
 - Allows for one distance optically
 - Accommodative
 - Haptic allow for lens to change positioning/ placement within capsule
 - Multifocal
 - Offers multiple focal points typically with designated "rings" in lens design
 - Extended depth of focus (EDOF)
 - Creates a single extended focal point to enhance depth of focus
 - Small aperture
 - Type of laser
 - Light adjustable
 - Adjusted through a series of UV light treatments postoperatively giving an EDOF monofocal outcome

MONOFOCAL IOL WITH MONOVISION

- Pros:
 - Quality of vision near and far with monofocal optics
 - Cost
 - Chair time post-operatively
- Cons:
 - Monovision trial necessary
 - Loss of depth perception
 - Choice between 2 of 3 distances
- Patient considerations:
 - Has the patient tried/failed with monovision?
 - Job/hobbies with lack of depth perception
 - What is target for non-dominant eye?

ACCOMMODATIVE IOL

- Pros:**
 - Monofocal optics
 - No need for trials
- Cons:**
 - Amplitude of accommodation/reading capability
 - Axial length
 - Did the lensh ed mo m for ward or backward than expected?
 - Cost to patient
 - Adaptation period
 - Chair time post-operatively
 - Potential need for LASIK/PRK adjustment
 - Corneal measurements prior to lens ed only

*See IOL approval list here

- Patient considerations:**
 - Conversation with patient about need for glasses
 - Non-dominant eye to riget
 - -0.25 to -0.50 sph
 - Exercises post-operatively
- Types of accommodative IOLs:**
 - Crystalens/TriVign
 - FluidVision*
 - OmniVu
 - Lumina*
 - Juvene*
 - Jellise*
 - Opira*

MULTIFOCAL IOL

- Pros:**
 - Vision at all distances - Distance, intermediate, near
 - Improved technology
- Cons:**
 - Glare/halos
 - Generation of lens aberrations as a difference of
 - Decreased contrast sensitivity*
 - Increased IOLs
 - Cost
 - Adaptation period
 - Potential need for LASIK/PRK adjustment
 - Corneal measurements prior to lens ed only

*See IOL approval list here

- Patient considerations:**
 - Higher order aberrations
 - Retinal/macular health
 - Previous corneal procedures?
 - Dry eye?
 - Pupil size
 - Lens centration
- Types of multifocal IOLs**
 - PanOptix
 - TriFocal PanOptix showing superior clinical outcomes post-refractive surgery patients
 - ReStor
 - Technis
 - ClearView
 - RayOne TriFocal*

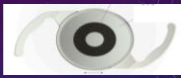
EXTENDED DEPTH OF FOCUS

- Pros**
 - Reduce glare/halos compared to MF IOLs
 - Good distance and intermediate vision
 - Better option for higher order aberration patients
- Cons**
 - Reduce near VA compared to other lens options
 - Cost
 - Potential need for LASIK/PRK adjustment
 - Corneal measurements prior to lens ed only?

*See IOL approval list here

- Patient considerations:**
 - Has the patient had previous corneal procedures?
 - RK, LASIK, PRK
 - High amount of HOA?
 - Retinal health?
 - Possibly a better choice for patients with macular/retinal health concerns due to lack of decreased contrast sensitivity
- Types of EDOF IOLs:**
 - Symfony
 - Vivity
 - RayOne EMV
 - FineVision Triumf*

SMALL APERTURE IOL (EDOF)



- Pros:
 - Reduce glare and halo
 - Better option for patients with ocular surface irregularities
- Cons:
 - Contraindicated in patients with macular/retinal disease
 - Monocular use
 - Mono focal used in dominant eye
- Considerations:
 - Amount of cylinder
 - Has been effective upto 150D
- Types of Small Aperture IOLs
 - IC-8 Athera IOL

7. Athera™ IC-8 Athera IOL. Inquire © Acuteo as.com

LIGHT ADJUSTABLE IOL WITH LIGHT DELIVERY SYSTEM



- Pros:
 - Can manipulate power based on patient healing
 - No need for LASIK/PRK adjustment
- Cons:
 - UV blocking glasses postoperatively
 - Chair time postoperatively
 - Cost
 - Depth of focus - patients may still need glasses
 - no novision
- Patient considerations:
 - Pupil size for light adjustment
 - Needs to be 6mm
 - Patient compliance with UV glasses
 - Medications
 - History of herpetic infection
 - Nystagmus/uncontrolled eye movements
- Types of Light Adjustable Lenses
 - RxSight LAL

8. RxSight™ "Customize your vision" <http://www.rxightsight.com/uv-blocking-uv-protecting>

LASIK/PRK

- Pros:
 - Healing time
 - Difference between LASIK vs PRK
 - Surface procedure
- Cons:
 - Lack of depth perception
 - Choice between 2 of 3 distances
- Patient considerations:
 - Age and lens status
 - Monovision trial
 - Absolute vs relative contraindications:
 - Systemic health
 - Autoimmune/collagen vascular diseases
 - Ocular health
 - Dry eye, HSV, keratoconus, corneal thickness
 - Medications?
 - topical?
 - Non-dominant eye to ignore?
 - Continuously changing need as presbyopia develops to develop

* Not FDA approved in US as of this time

PRESBYLASIK*


- How does it differ from LASIK?
 - Aims to reshape the cornea for both near AND far in both eyes
 - Center = near vision
 - Peripheral = distant vision
 - Peripheral PresbyLASIK
 - Center = distant
 - Peripheral = near
- Pros:
 - Both distance and near in each eye
- Cons:
 - Decreases contrast sensitivity
 - Glare/halos
 - Decreased surgical effect over time
 - Due to presbyopia worsening
- Patient considerations:
 - Same as LASIK/PRK
 - Patient age
 - Most suited for 40-55 years old

* Not FDA approved in US as of this time


CORNEAL INLAYS*

- Pros:
 - No tissue removed from eye with implantation
 - Removable
- Cons:
 - No availability in the US with FDA approval at this time
 - KAMRA inlay icon studied in 2022⁹
 - Raindrop FDA class recall
 - Mild to moderate presbyopes
 - Corneal haze
 - Compromised distance/night vision
- Considerations:
 - Types: refractive, corneal shaping, small aperture
 - Allotx all-logic corneal inlay¹⁰
 - Trials underway at centers in Europe
 - Presbyia Flexvue Microlens¹¹
 - Hydrogel implant
 - Approved in Europe
 - Not FDA approved at this time
 - CorVision⁷
 - Collagen implant
 - Emmetropic status
 - Allotx currently being studied at -0.75 to +1.00 with 0.75D of cyl or less


CORNEAL INLAYS



Kamra inlay⁹



Presbyia Flexvue inlay¹¹



Raindrop inlay¹³


SLERAL IMPLANT/EXCISION*

- Pros:
 - No changes to any structures in the visual axis
 - Extended depth of focus- "pseudaccommodation"
- Cons:
 - Not FDA approved in the US at this time
 - Controversial
- Considerations:
 - Implant vs excision

*Not FDA approved or available in the US at this time

CONDUCTIVE KERATOPLASTY (CK)

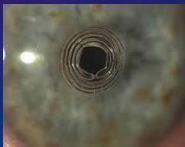
- Pros:
 - No scalpel or laser necessary
 - Use of radio frequency energy to adjust the cornea by shrinking collagen
 - Lower cost option
- Cons:
 - Mild myopia
 - Over-correction vs under-correction
 - High rate of regression
- Considerations:
 - Refractive status of dominant eye
 - Not as readily available



14. Hersh PS. "Optical conductive keratoplasty for presbyopia treatment." In: Medicine of the American Ophthalmological Society, Dec 2015. 672-678.

INTRACOR*

- What is it?
 - Intraocular treatment for presbyopia
 - Concentric rings made in the stroma
 - Steepens the central cornea and increases depth of focus
- Pros:
 - Minimally invasive
- Cons:
 - Myopes are not candidates
 - Loss of distance vision
 - Myopic shift of approx. 0.5D
 - Patients with history of intraocular or corneal surgical history are not candidates
 - Pseudo myopia
- Considerations:
 - Pach must be at least 500
 - Non-dominant eye only



15. Hersh PS. "Intraocular treatment for presbyopia with the Intracor." In: Ophthalmology, July 2010. 1066-1070. 16. Hersh PS. "Intraocular treatment for presbyopia with the Intracor." In: Ophthalmology, July 2010. 1066-1070.

HYPOTHETICAL CASE #1

- A 46YOF patient comes into the office with near visual concerns.
 - UCVA 20/40
 - Needs hyperopic correction to achieve 20/20 distance
 - Measured add power of +1.25 gets her to 20/20 NVA
 - Anterior and posterior seg findings WNL OU
 - Has tried monovision and multifocal contacts with little success
 - Reports inability to wear glasses due to hobbies
 - Low amount of HOA
- What options are most appropriate for this patient?

HYPOTHETICAL CASE #1

- Best surgical options:
 - Refractive lensectomy
 - Discussion would include conversation about still having some accommodative ability and how that will possibly change
 - Was not successful in monovision contacts = NOT a candidate for monovision refractive lensectomy
 - Possibly accommodative, EDOF, or multifocal IOL
 - LASIK/PRK
 - Discussion would include conversation that near add power will continue to change and need for enhance ment or other surgical intervention may be necessary in the future
 - Unsuccessful in monovision CTLs

HYPOTHETICAL CASE #2

- 67YOM patient with moderate cataracts presents for a cataract evaluation and is interested in regaining his near visual acuity as well as preserving distance visual acuity
 - UCVA 20/100
 - Measured add power of +2.50
 - Anterior seg findings WNL
 - Posterior seg findings show mild pigment mottling in macula OU
- What options are most appropriate for this patient?

HYPOTHETICAL CASE #2

- Cataract surgery with lens exchange
 - Which lens type?
 - Multifocal IOL
 - Decrease contrast sensitivity and increase in higher order aberrations, less common already showing macular changes
 - EDOF
 - Possible
 - Consider age of patient, severity of macular changes
 - Monovision with monofocal IOL
 - Possible
 - Consider macular changes in one eye, more advanced than the other?
 - Light adjustable lens
 - Dependent on severity of macular changes

HYPOTHETICAL CASE #3

- 56YOF patient presents to the office with near visual concerns and mild lens changes
 - UNVA 20/60
 - Measured add power of +1.75
 - Anterior seg findings show 8 RK findings OU
 - Posterior seg findings: WNL
 - Has worn monovision contact lenses in the past with success
- What options are most appropriate for this patient?

HYPOTHETICAL CASE #3

- 1. Refractive lensectomy
 - Discussion would include conversation about still having some accommodative ability and how that will possibly change
 - Possibly accommodative, EDOF, monofocal with monovision, light adjustable, small aperture
 - Would not recommend multifocal lens at this time
- 2. PRK
 - Discussion would include conversation that near add power will continue to change and need for enhancement or other surgical intervention may be necessary in the future- possible cataract surgery at that time?
 - What do K's look like? How flat is cornea from the RK findings?

MANAGING PRESBYOPIC SURGERY PATIENTS

- Clear discussion over what outcome each surgery can provide
 - Paperwork sent to patient prior to surgical evaluation with explanation of options
 - Simulators on devices
 - Time to decide
- Setting expectations after decision has been made
- Depending on procedure, may be a multistep process- Pre AND post operatively
 - Ocular health is vital
 - Need for dust masks post operatively
 - VACULOCK®/RBC, UV light treatment
 - Patient is key!
- Consent forms
 - "I have chosen _____ option for surgery and understand the need for glasses for certain tasks may be necessary"
- Under promise and over deliver

WHEN SURGERY IS NOT THE RIGHT OPTION

Drops

- Vuity- Allergan/Abbvie¹⁷
 - FDA approved October 2021
 - 2.25% pilocarpine
- Qloxi- Otsuka¹⁸
 - FDA approved October 2023
 - 0.4% pilocarpine
 - Preservative free
- LNZ100 and LNZ101- Lenx Therapeutics¹⁹
 - Acetidine-based eye drop
 - In phase 3 trials
 - Cilary body sparing
- Brimochol-Visu²⁰
 - Carbachol and bromidine
 - In trials
- Mirotriline- Eyegonia²¹
 - 2-Methylcarpine microdose array print formulation
 - In trials

17) Vuity, www.vuity.com
18) Qloxi, www.qloxi.com
19) Lenz Therapeutics, www.lenztherapeutics.com
20) Brimochol-Visu, www.vision.com
21) Eyegonia, www.eyegonia.com
22) "Efficacy and safety of the novel, acetidine-based eye drop, LNZ100, in a preservative-free and contact lens compatible formulation: Study of Mirotriline as a potential on-demand treatment for presbyopia." Ocular Research, October 2022.

OVERVIEW

- One surgical procedure does not fit all
- One choice may not correct patient's vision at all distances at all times
- Multiple procedures may be necessary to achieve desired outcome
- Setting expectations is key
- Optimizing ocular surface health prior to surgical intervention yields best outcomes
- Evaluation of entire eye is absolutely necessary