#### Iris Extirpation, Iris Prosthesis, and Endothelial Keratoplasty: A New Paradigm for "Doomed" Transplants

#### Michael E. Snyder, MD

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#### Disclosures

- Alcon: Research
- Beyeonics: Consultant
- Bausch and Lomb: Research
- DORC: Consultant
- Gore: Consultant
- Haag-Streit: Consultant
- Humanoptics: Consultant, Royalties
- Johnson and Johnson Vision: Research
- Plexitome: Research
- VEO Ophthalmics: Royalties

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#### The Problem:

- Iridocorneal adhesions or peripheral anterior synechiae (PAS) are most commonly formed during states of intraocular inflammation including uveitis, glaucoma, and/or surgical or laser surgery in the anterior segment.
- PAS are known contributors to corneal endothelial graft failure, possibly via stimulation of increased T-lymphocyte activity
- Prior studies have found that iridectomy or iris extirpation prior to corneal endothelial transplantation in patients with ICE Syndrome can reduce keratoplasty rejection rates

Yamagami S, Tsuru T. Increase in orthotopic murine corneal transplantation rejection rate with anterior synechiae. Invest Ophthalmol Vis Sci. 1999;40(10):2422-2426. Chaurasia S, Senthil S, Choudhari N. Outcomes of Descemet stripping endothelial keratoplasty combined with near total iridectomy in iridocorneal endothelial syndrome. BMJ Care Rep. 2021;14(2):e240988.



# The Problem:

- A bubble placed in an AC with high IK adhesions will likely push the iris forward and cause higher or near total IK adhesions...
- ...Also increases the risk of angle closure glaucoma and resultant sequelae, including graft failure.



# **Case Series**

#### • Single surgeon retrospective case series

- Corneal endothelial failure who underwent...
- Combined iris extirpation...
- Custom, flexible, artificial iris implantation...
- Simultaneous (Descemet stripping) automated endothelial keratoplasty

#### Iris Removal



Mechanical Extirpation with 23-g forceps

Vitrector Iris Removal

#### Iris Prosthesis Placement



4-point scleral suture fixation of custom, flexible, artificial iris prosthesis

#### Expanded polytetrafluoroethylene suture (ePTFE, Gore-Tex®, off-label use)

Recreates (at least) relative separation between anterior and posterior segments

#### Placement of Graft into Recreated, Deep AC



#### **Results:**

#### **Results:**

			Post-Operative Course					
Demographics and Baseline Characteristics			Baseline Vision	BCVA at POM1	BCVA at Peak	Re-bubbling	Graft Survival	Other Complications and Surgeries
Gender	4 male, 3 female	1	(Silellen)	(Snellen)	(Snellen)			
Age in years (mean, range)	53, 10-74	From 4		20/200 - 4	20/70	No	0	
Number of Prior Corneal Transplants (mean, range)	2, 0-4	Eye 1	ни	20/100+1	20/70	res	9 months -	
		Eye 2	20/70	20/40	20/30	No	10 months*	
Baseline Visual Acuity (logMAR)	1.45	Eve 3	20/100	20/125	20/40	Ves	18 months*	
		Lyc 5	20/ 200	20/123	20/40	103	10 11011115	
		Eye 4	нм	20/60	20/40	No	2 years	Delayed suprachoroidal hemorrhage requiring drainage with retina surgeon
Reason for Initial	Corneal Allograft							
Tube Shunt Related Bullous Keratopathy	2	Eye 5	20/100	LP	20/250	Yes	6 months*	Persistent vitreous hemorrhage requiring pars plana vitrectomy, retinal detachment
Perforated Infectious Keratitis	2	Evo 6	20/400	20/80	20/40	Voc	2 years	Lost to follow up, re-presented with biopsy confirmed fibrour
Fuchs' Endothelial Dystrophy	1	Lyeo	20/400	20/00	20/40	163	2 years	downgrowth requiring excision and IOL exchange
Pseudophakic Bullous Keratopathy	1	Eye 7	CF	20/400	20/125	Yes	18 months*	Retinal detachment requiring pars plana vitrectomy, steroid
Prior Surgical Trauma	1							response requiring cone anone

# Iris Extirpation, Iris Prosthesis, & AEK – 2 Videos





#### Conclusions

- Combined Iris extirpation, iris prosthesis implantation and endothelial keratoplasty is a viable surgical strategy in eyes with endothelial decompensation and irido-corneal adhesions
- This series represents patients with complex medical and surgical ocular histories, and a wide range of etiologies for initial corneal decompensation











#### **Prevalence of Myopia**

Myopia is projected to affect almost half of the world's population by  ${\bf 2050}-{\rm a}$  sevenfold increase

- 5 billion with myopia
- 1 billion with high myopia (>-6D)
- US and Canada increase to 260 million, or dose to half of the population, up from 89 million in 2000
- High myopia cases will increase by five times to 66 million





#### 

#### • Age : 21 to 45

- Correction or reduction of myo pia -3.0 D to -20.0 D with astigmatism correction up to 4.0 D
- Stable Refraction
- Anterior Chamber Depth (ACD) of 3.0 mm or greater
- From En doth eliu m to Natural Len s
- Other considerations for those with
- Thin corne as / corneas at risk for ectasia
- Dry Eye Risk Factors



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- RECOM MENDED PATIENT POSTOPERATIVE A SSESS MENT 1
   Intraocular pressure should be initially checked 1 6 hours postoperatively
- Postoperative 1 d ay, 7 day and b eyo nd
- Visu al acui ty
  Intraocular pres sure
- Assess the ICL to crystall ine lens vault

#### Chuck RS, Jacobs DS, Ize JK, Afshari NA, Witale S, Shan TT, e Emos & Refactive Surear VPreferred Practice Pattern<sup>®</sup>, Opl

📁 US EYE



4























#### ≶ US EYE

#### EVO/EVO+ ICL FDA Study: Endothelial Cell Density

			Endothelial Cell Loss
Published Literature <sup>1</sup>	n = 1,476	14.7 months	2.6%
FDA Clinical Trial	n = 629	6 months	2.3%

EVO/I	EVO+ ICL FDA	A Study: Ad	verse Events	US EYE BETTER TOGETHER
		Eyes (n = 629)	Outcome	
	Angle Narrowing	2 (0.3%)	<ul> <li>No increased IOP</li> <li>Both lenses exchanged</li> <li>Both UDVA 20/16</li> </ul>	
	Residual Astigmatism	1 (0.2%)	<ul> <li>Lens repositioned</li> <li>UDVA 20/16</li> </ul>	
	Halo/Glare	1 (0.2%)	<ul> <li>Lens explanted</li> <li>CDVA 20/16</li> </ul>	
		Bertenig C melliden Bal - Ondras Daterti	Packer M. United Rates Multicenter Clinic d'Initi d'a l Inglastable loss with Central Bott for Myspinor My officie and and Rafnather Surgery Annual Meding Wi	- Yoster for Chamber Phalec opic Astigna tim, American Socie ty shington DC, 24 April 2022.









# Taming the Ornery Cataract...

Michael E. Snyder, MD Cinteal Governance Board, Cincinnuti Bye Institute/CVP Physicians Co-cheir, BysCare Partners Medical Executive Board, Research Committee Professor of Ophthalmology, University of Cincinnati

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- VEO Ophthalmics: Board member, Royalties (TKP)

# There are lots of way to skin a cat(aract)...

# Zonulopathy with Sector Iris Defect



#### Tips:

- Vitrectomy first, and please use the pars plana!
- Capsule Hooks for Larger Zonular Dialysis
- MCTR with Needless Suture Retrieval
- PC tears require simultaneous engagement of the capsule and movement of the I/A handpiece. If you only aspirate when stationary, a tear will not occur.

### Traumatic "CataROCK" with Corectopia

![](_page_12_Picture_1.jpeg)

#### Traumatic "CataROCK" with Corectopia Tips:

- Dispersive OVD for very dense lenses with repeated replenishment
- Horizontal chop minimizes energy, zone friendly, and permits working in center safe zone
- Pull pieces central rather than going the periphery

#### Traumatic "CataROCK" with Corectopia Tips (2):

- Subincision US contact can damage iris, even through sleeve.
- For latter dense fragments, place IOL before removal as "shield."
- Can stuff nuclear fragments into (metal tip) I/A.
- The vitrector is an excellent tool to sculpt a pupil.
- A new pupil does not have to include the old pupil.

![](_page_12_Picture_12.jpeg)

#### Tips:

- Microscissors can be very helpful for fibrotic capsules for both CCC and PCCC.
- Dry aspiration is an excellent technique in soft material/young patients.
  - 27G cannula, 3cc syringe half-filled with BSS.
- Even with an axial scar, one can preserve the native cornea with decent results.

# Take Homes:

- PPV for Anterior Vitrectomy
- Dry Aspiration
- Capsule Shield
- MCTR/Bag Preservation
- Repair or Replace the Iris

# Thanks!

![](_page_14_Picture_1.jpeg)

![](_page_15_Picture_1.jpeg)

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#### Cataract Surgery in Nanophthalmos: What's the Big Deal about Small Eyes

Michael E. Snyder, MD

Board of Governors, CVP Co-Chair, EyeCare Partners Medical Executive Board Research Committee Professor of Ophthalmology, University of Cincinnati

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# Nanophthalmos: What's the Big Deal About Small Eyes?

- Difficult IOL calculations
- · Limited IOL power availabilities
- "Tight quarters" for AC surgical maneuvers
- "Posterior pressure" during surgery
- Zonulopathies
- · High risks for ciliary effusions or malignant glaucoma

# In the Clinic...

# Nanophthalmos and IOL Power Calculations

- Cooke 6/8
- Hill-RBF?
- Barrett Universal II?
- Olsen II?
- Holladay?
- HofferQ

# Nanophthalmos and IOL Power Calculations

- Cooke 6/8
- Hill-RBF?
- Barrett Universal II?
- Olsen II?
- Holladay?
- HofferQ

# In the OR...

![](_page_19_Picture_1.jpeg)

#### Pre-emptive Maneuvers

- Reverse Trendelenburg
- Reduces orbital congestion
- Reduces periorbital venous pressure

# Pre-emptive Maneuvers General Anesthesia

- Smooth muscle relaxation reduces orbital congestion and periorbital venous pressure
- Paralytics reduce rectus muscle action/posterior pressure

![](_page_19_Picture_9.jpeg)

#### In the Eye...

![](_page_19_Picture_11.jpeg)

![](_page_20_Picture_0.jpeg)

# Nanophthalmos Tips

- General anesthesia with paralysis
- Reverse Trendelenburg
- Intravenous mannitol
- CTR
- Irido-hyaloidio-zonulotomy
- Healon5

## Nanophthalmos Tips

- General anesthesia with paralysis
- Reverse Trendelenburg
- Intravenous mannitol
- CTR
- Irido-hyaloidio-zonulotomy

#### Nanophthalmos Tips

- General anesthesia with paralysis
- Reverse Trendelenburg
- Intravenous mannitol
- CTR
- Irido-hyaloidio-zonulotomy:What about case 2?

"Malignant Glaucoma" vs. Aqueous Misdirection vs. Choroidal expansion...

Effectiveness of IHZ?

![](_page_20_Picture_22.jpeg)

# Nanophthalmos Tips

- General anesthesia with paralysis
- Reverse Trendelenburg
- Intravenous mannitol
- CTR
- Irido-hyaloidio-zonulotomy
- Scleral windows?

# Nanophthalmos Controversy

- Scleral windows?
- Rajendrababu SI, Babu NI, Sinha SI, Balakrishnan VI, Vardhan AI, Puthuran GVI, Ramulu PY. Randomized Controlled Trial Comparing Outcomes of Cataract Surgery in Nanophthalmos With and Without Prophylactic Sclerostomy. Am J Ophthalmol. 2017 Nov;183:125-133.
- 60 eyes. 38.7% vs. 17.2% uveal effusions.

#### Nanophthalmos Controversy

#### • Scleral windows?

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- 60 eyes. 38.7% vs. 17.2% uveal effusions.
- Nothing is a "free pass..."

![](_page_21_Picture_9.jpeg)

#### Late Ciliary Effusions

- Even with a scleral window, the ostium may close over over time (think bleb failure).
- If patient develops more than trivial *myopic shift* months or years out, it is likely a ciliary effusion.
- Diagnosis is presumed, but UBM is confirmatory.
- Retreatment with intermediate-term or long-term atropine cycloplegia may be needed. Some folks only take a drop a week ...

#### Nanophthalmos Tip

- General anesthesia with paralysis
- Reverse Trendelenburg
- Intravenous mannitol
- CTR
- Irido-hyaloidio-zonulotomy
- Scleral windows!
- Atropine

#### Special IOLs

Highest available in the US is 40D

![](_page_22_Picture_0.jpeg)

#### What Documents Are Needed for CUDE?

- A Letter from the treating physician:
  - Why is a CUDE needed?
  - Why are alternative therapies unsatisfactory?
  - What is the risk?
- A detailed description of the device (Brochure, IFU, publications, etc.)
- An independent assessment from an uninvolved physician
- A draft informed consent for the use of the non-FDA approved device
- Clearance from the Institution/ASC
- Letter of Authorization (LOA) from the device manufacturer

#### Need IRB Approval...

- The IRB will also require:
- A Single Site Submission
- Curriculum Vitae
- Good Clinical Practice Certificates of Research Staff
- The FDA will require Concurrence of the IRB chair

#### The Physician's Responsibilities

- Ensure that pt understands that the suggested device is not FDA approved
- Evaluate the potential risks and benefits with the patient
- Oversee the device use and pt care
- Provide a letter to both the FDA and IRB within 45 days
  - Success or failure of procedure
  - Any issues with the use of the device
  - A summery of the patient's outcome
- Documentation for return of any unused devices (must be sent back to manufacturer)
- Closeout with IRB

#### Thanks/Qs?

#### The Latest in LASIK & PRK (and beyond)

## **Joaquin De Rojas, MD** Director of Refractive Surgery

Cataract, LASIK & Corneal Surgeon Center For Sight / US Eye

![](_page_23_Picture_4.jpeg)

![](_page_23_Figure_9.jpeg)

![](_page_23_Figure_10.jpeg)

![](_page_24_Picture_1.jpeg)

Advan ced eye tracking and iris registrati • 1050 Hz, 2.5 ms latency – Account sfor effects of cyclotorsion

![](_page_24_Picture_3.jpeg)

- 20/15 vision is common, especially in younger patients
- Lower higher order aberrations such as coma compared to older devices
- Less incidence of halos and dysphotopsias
- FDA approved for up to -12.00 of myopia, +6.00 of hyperopia, 6.00 of mixed astigmatism
- We limit LASIK treatment sto comeas thickert han 500 microns that have no signs of early ectasia

![](_page_24_Picture_9.jpeg)

![](_page_24_Figure_10.jpeg)

2

#### Topography-guided ablations: RESULTS

With Phorcides software:

100% of patients ending up with 20/15 or better OU, and 100%achieving 20/20 or better in each eye.<sup>1,2</sup>

• Topo-guided is useful if there is irregular astigmatism

Rush SW, Ridett CJ, Wilson B, Rush RB. Topggraphy-Gui ded LASIK A Rospective StudyEvaluating Ratiert -Reported Outcomes. Clin Opithalmol. 2023 Sep 25; J7:2815-2824.
 Sulting RD, Lobandf M, Mann PM2nd, Weider S, Stonecipher K, Potvin R. Clinical and refractive outcomes after topggraphy-guided refractive surgery planned using. Phoncides surgery plannings dtware. J Cataract Refract Surg. 2022 Sep 1;48(9):1010-1015.

#### A LASER VISION CORRECTION CASE?

40 yo F presents for LASIK eval. "I want to be glasses free!"

PMH/POH: soft contact lens wearer

Social Hx: Very active lifestyle: snowboarding, snowmobiling, hiking, and constant vacations!

	OD	OS	
VAsc	CF at 6 feet	CF at 6 feet	0 0 0
MR	-6.25-1.00 x017 → 20/20-2	-6.75-0.50x152 → 20/20	Barris
L/I/L	1-2+ MGD	1-2+ MGD	
C/S	LG:0 temporal / 1+ nasal	LG:1+temporal/2+nasal	
Cornea	3-4+ PEE	3-4+ PEE	and the second
Lens	clear	clear	
Everything else	wnl	wnl	9
			-

ANA+ (1:320) → PRK CANCELLED THE DAY BEFORE!  $\rightarrow$ RHEU MATOLOGY CONSULT → DX OF INFLAMMATORY ARTHRITIS MADE  $\rightarrow$ MOBIC PO STARTED

![](_page_25_Picture_13.jpeg)

2

![](_page_26_Picture_1.jpeg)

#### EVO/EVO+ ICL FDA Study:

- 2022 US FDA Appro val
- Maintains physiologic a queous flow

   Zero pupillary block
   Zero anterior subcapsular cataract
- Eliminates preoperative peripheral iridotomy
- The results of this clinical trial have definitively demonstrated the safety and effectiveness of EVO/EVO+ Sphere and Toric ICLIenses for the correction of myopia and myopia with astigmatism.<sup>1,2,3</sup>

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