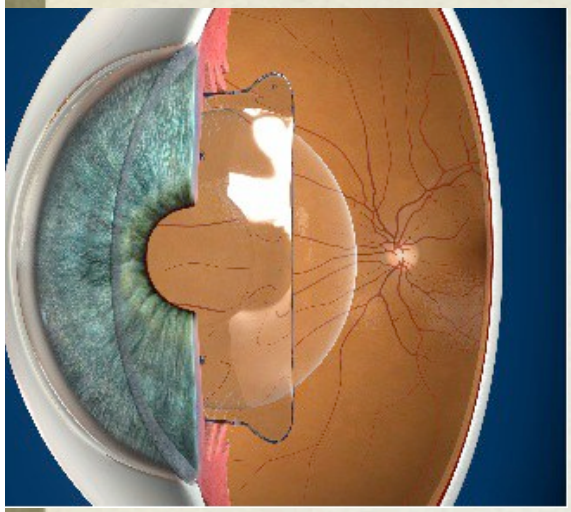
The Role of Phakic IOLs in Refractive Surgery



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Disclosures

Consultant: Bausch & Lomb, Novabay

Research/Speaker: Ocular Therapeutix, Sightlife, Staar, Imprimis

Trainer: VISX and Intralase Lasers

Patient Mary H. Myope

Current refraction: -8.50+0.75x90 OU

Age: 43

Corneal thickness: 498 microns

ACD: 3.1mm OU

K's: 41.00 x 41.50 @ 90

Pentacam maps: no posterior elevation

What would you do:

LASIK? PRK? Clear lensectomy? Phakic IOL?

High myopia: surgical options

LASIK, PRK

- Can result in ectasia or poor visual quality due to the extreme corneal flattening

Clear lensectomy

- Preserves cornea, but eliminates accommodation
- Long-term RD risk higher

Phakic IOL

- Preserves cornea and accommodation, no increased RD risk. Excellent quality of vision.

My phakic IOL journey

Became certified in both phakic IOLs soon after FDA approval

- Heard about some issues with chronic inflammation with Verisyse
- Heard about some issues with cataract with ICL

Convinced myself that being conservative was best…until 5 years ago. Spoke with my *trusted* international and US colleagues who had long-term experience. Reviewed the literature, and got started.

Glad that I did! Incredibly rewarding for patient and surgeon.

What's the problem with clear lensectomy in high myopes?

Increased RD risk after CE/IOL

CrossMark

AMERICAN ACADEMY OF OPHTHALMOLOGY
The Eye M.D. Association

Incidence, Risk Factors, and Impact of Age on Retinal Detachment after Cataract Surgery in France

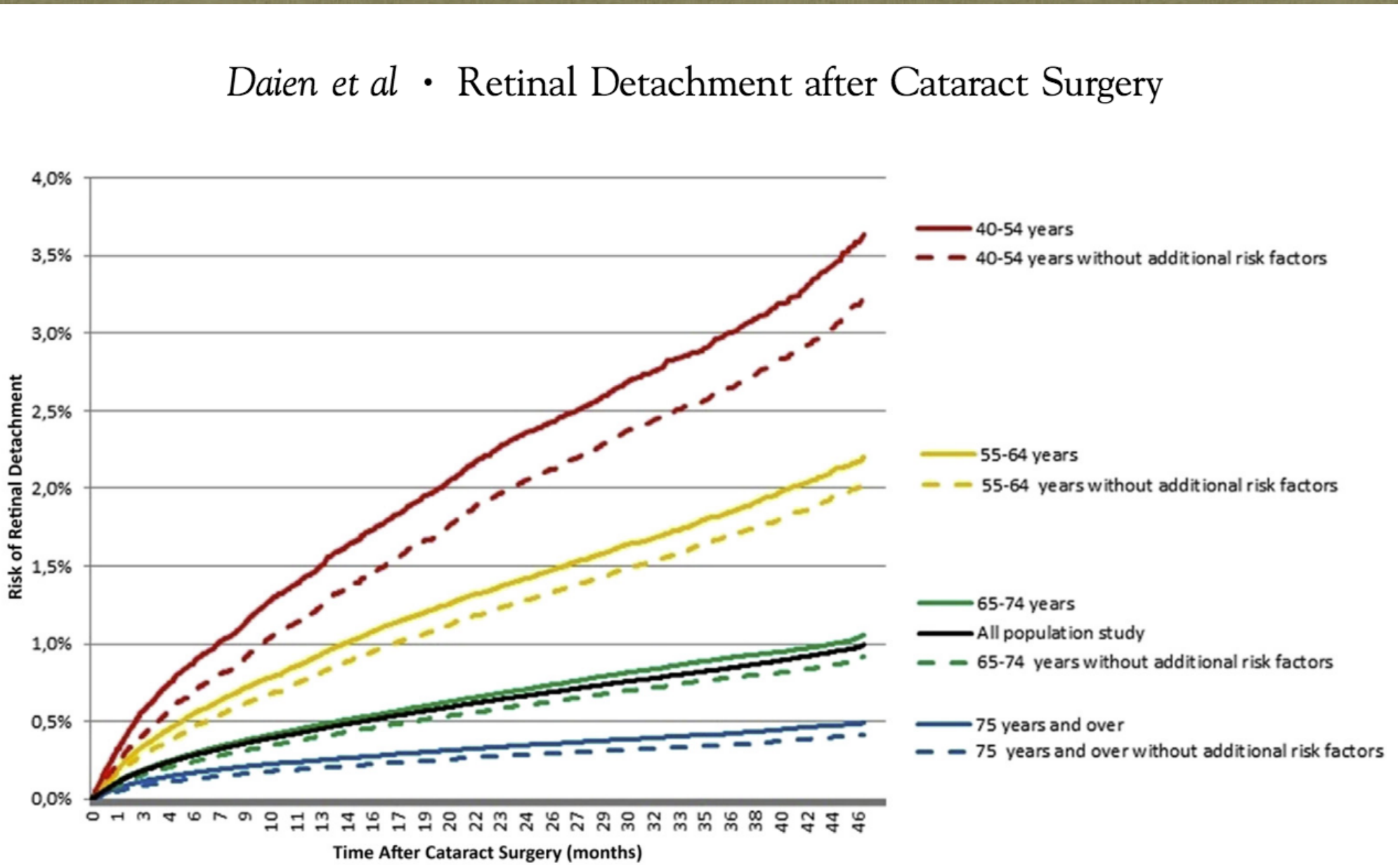
A National Population Study

Vincent Daien, MD, PhD,[1,2,3] *Annick Le Pape, MS,*[4] *Didier Heve, MD,*[4] *Isabelle Carriere, PhD,*[1] *Max Villain, MD, PhD*[2,3]

Conclusions: We provide a hierarchy of risk factors for RD onset: high myopia, young age, capsular rupture, history of eye trauma, extracapsular extraction technique, male gender, and diabetes. Young age was an additional risk factor in myopic patients. *Ophthalmology 2015;122:2179-2185*

- 2.68 million eyes undergoing cataract surgery
- 11,424 patients had RD after 4 years

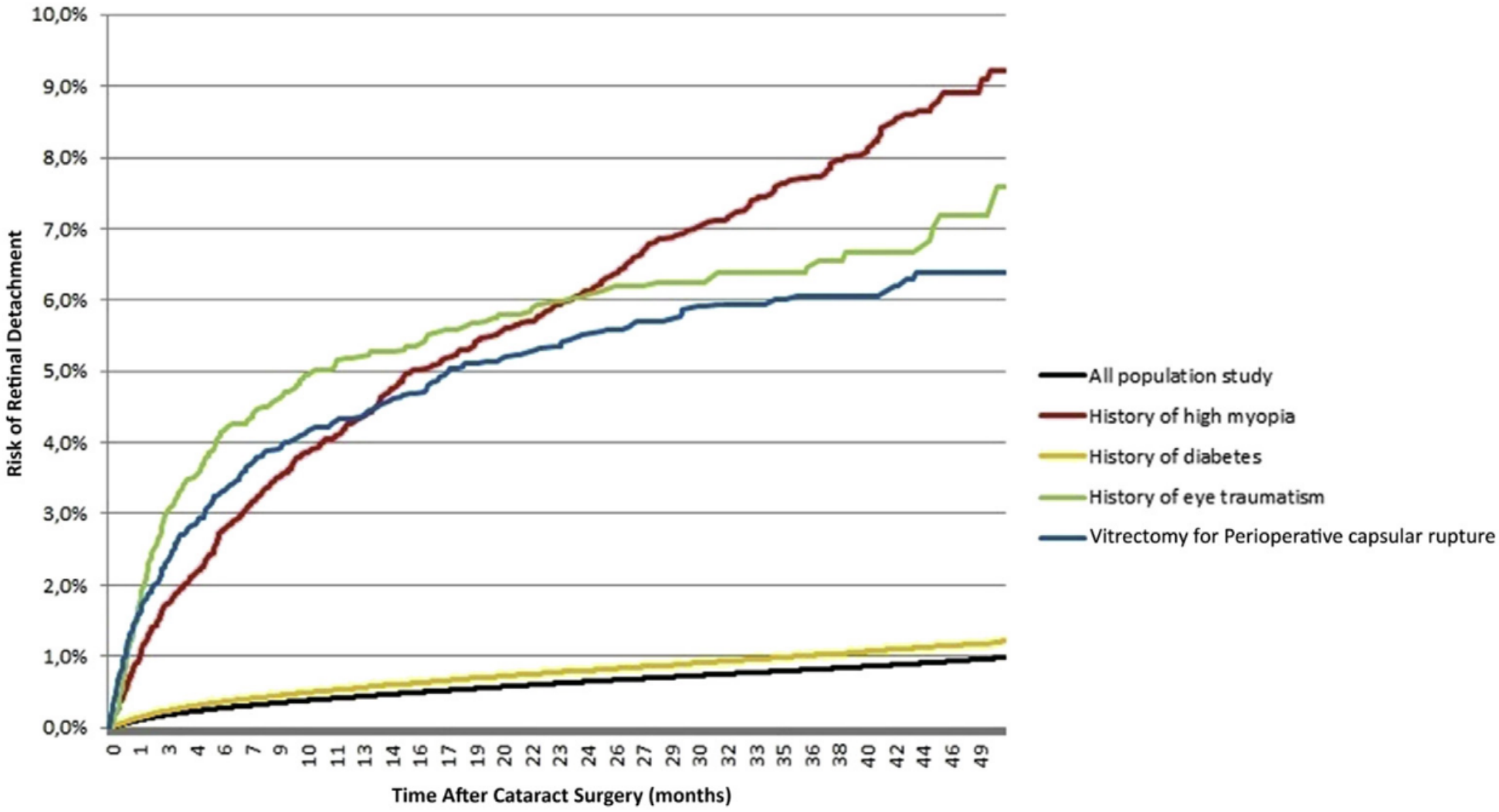
RD risk 3.6% at 4 years in younger age group



RD rate in high myopes 9.2% at 4 years

"Thus, cataract surgery or refractive lens exchange in patients with high myopia seems to be associated with high risk of RD"

Ophthalmology *Volume 122, Number 11, November 2015*



Increased RD risk after CE/IOL

Risk for Retinal Detachment After Phacoemulsification: A Whole-Population Study of Cataract Surgery Outcomes *Arch Ophthalmol.* 2012;130(7):882-888.

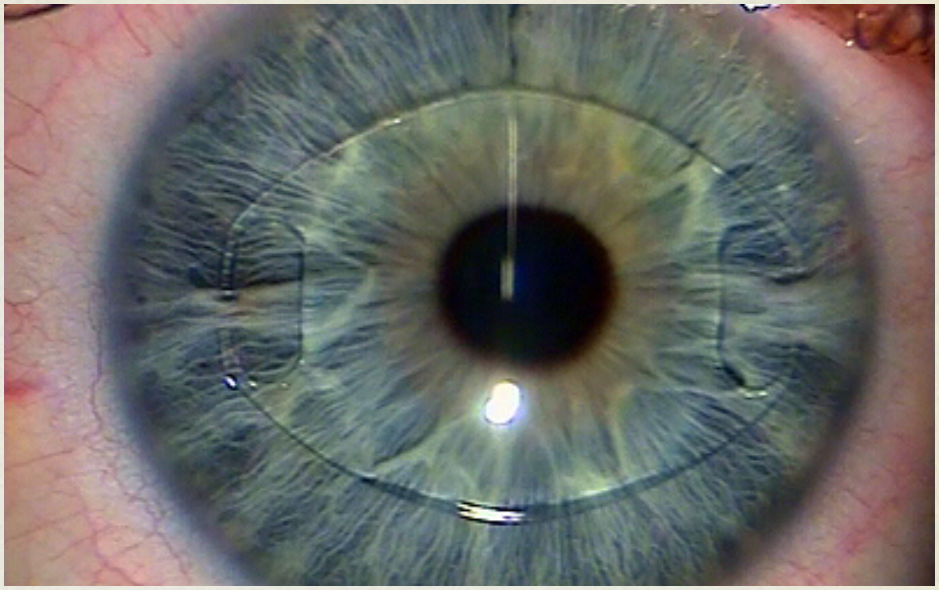
- "Younger patient age and male sex at surgery significantly increased risk for RD. Phacoemulsification requiring anterior vitrectomy vastly increased risk for RD".

In our study, patients younger than 60 years undergoing phacoemulsification were almost 4 times more likely to have an RD compared with those who were 60 years or older. Several theories have been postulated for why

Phakic IOL options:

Sulcus-supported

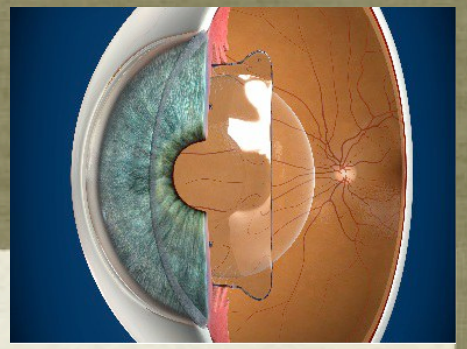
Staar Visian ICL



Iris-fixated

AMO Verisyse

Visian ICL—quick facts

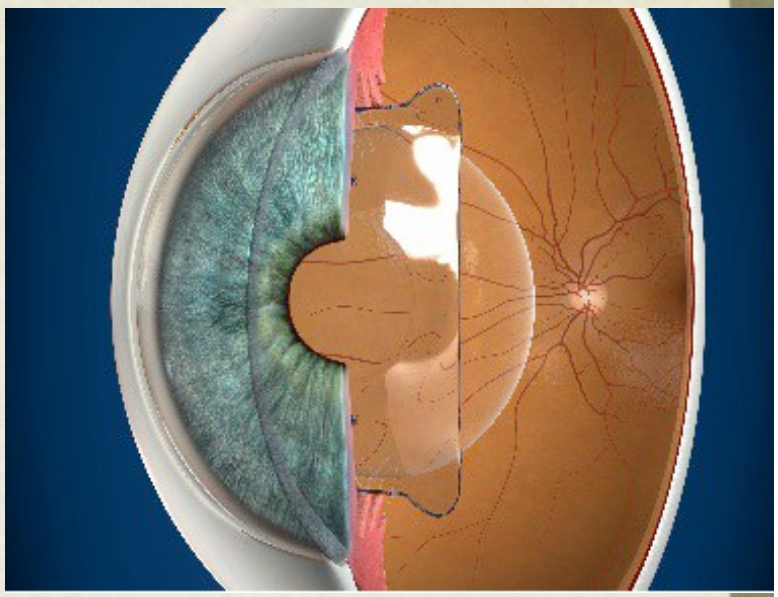


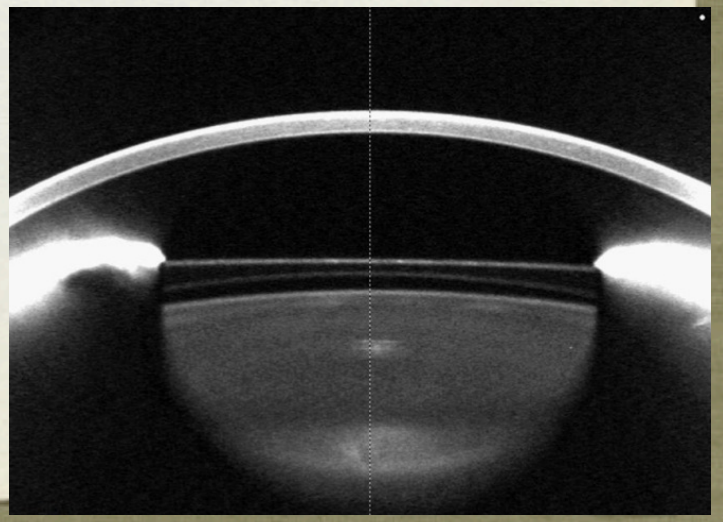
- Implantable collamer lens placed in sulcus
- Commonly used by the U.S. Military
- Visian ICL has been available for over 10 years in the U.S.
- 20+ years experience in eyes outside the U.S.
- Over 500,000 lenses implanted worldwide
- Indications:
  - Correction of myopia -3.0 D to -15.0 D
  - Reduction of myopia > -15.0 D to -20.0 D
  - 21 to 45 years of age

Visian ICL: who are good candidates?

- Age less than 45 years
- ACD greater than 3.0mm
- Myopic patients who are not candidates for LASIK or PRK
- Normal endothelium, no glaucoma, no cataract

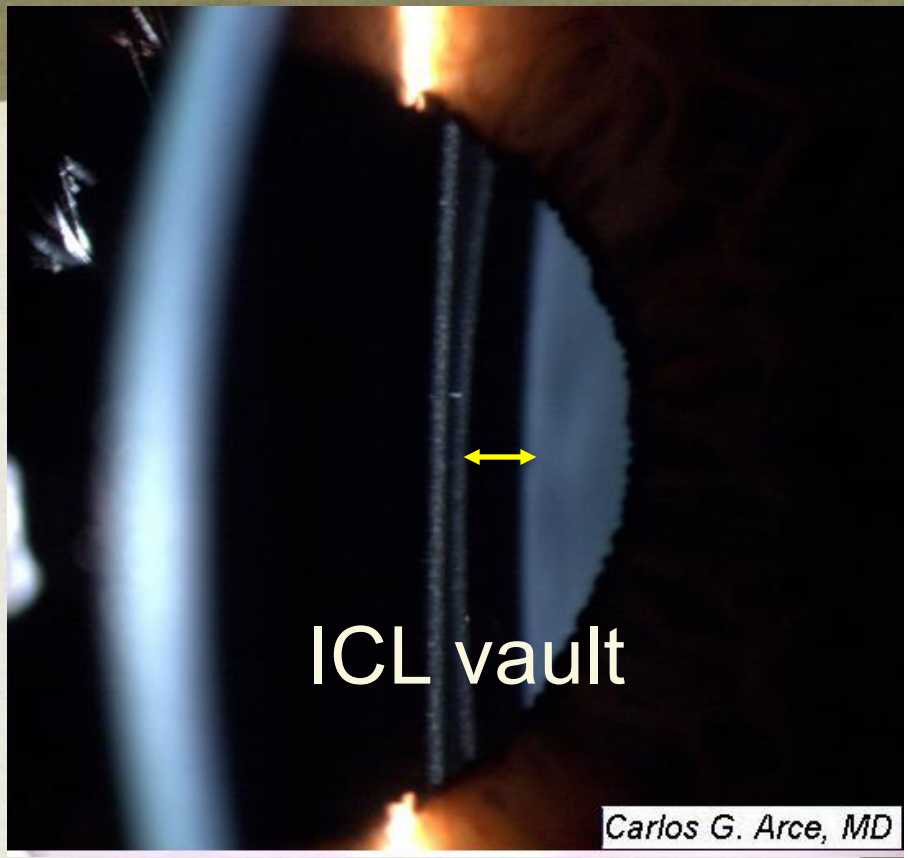
Toric ICL is not yet FDA-approved



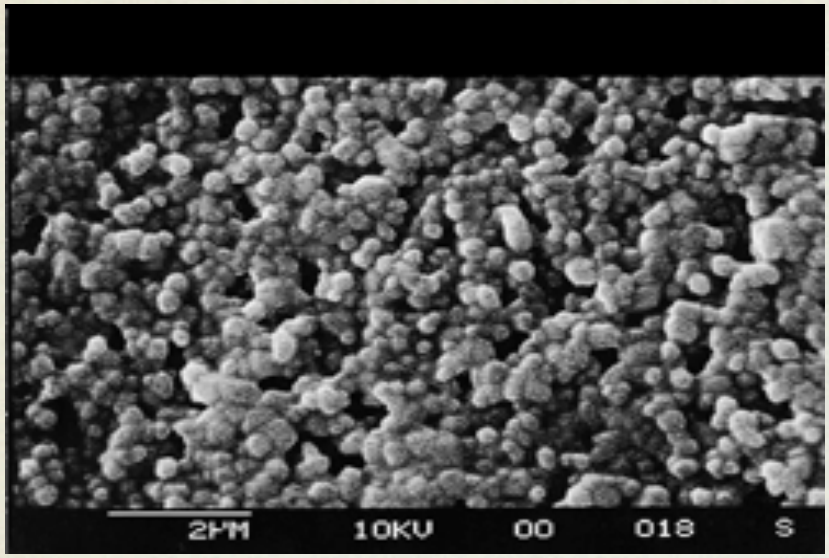


Staar ICL: Benefits

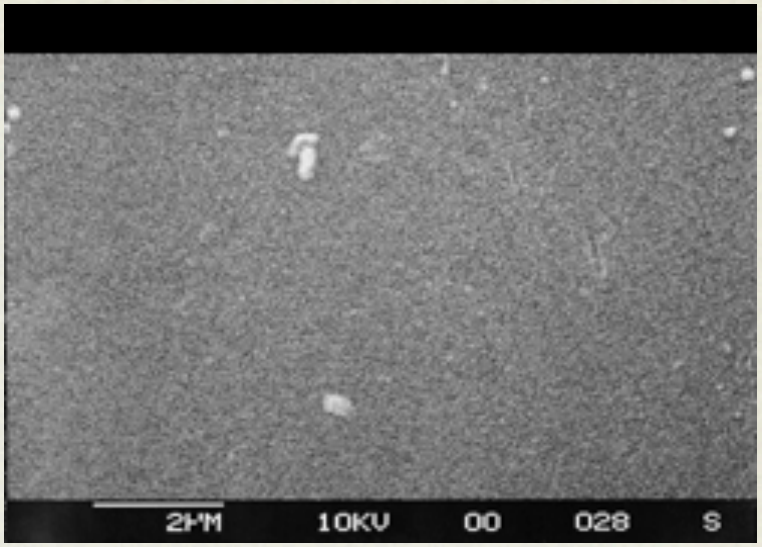
- Exceptional Vision Quality
- High Patient Satisfaction
- Blocks UV rays
- Removable if necessary
- Quick results and recovery
- No cornea tissue removal- Preserves the cornea
- Leaves options for future procedures



Staar ICL: Very Quiet in Eye



Acrylic



Collamer

Same exposure time to concentrated protein solution

Quality of vision:
ICL vs WG LASIK

- Retrospective, observational case study comparing postoperative visual function (contrast sensitivity, higher-order aberrations) after Visian ICL™ implantation and wavefront-guided LASIK in eyes with high myopia
  - 46 eyes of 33 patients ICL implantation
  - MRSE: -10.55 +/- 2.66 D (range: -6.13 to -20.88 D)
  - 47 eyes of 29 patients WFG LASIK
  - MRSE: -7.96 +/- 1.41 D (range: -6.00 to -11.25 D) ($p < 0.001$)

1. Igarashi A, Kamiya K, Shimizu K, Komatsu M. Visual Performance after Implantable Collamer Lens Implantation and Wavefront-Guided Laser In Situ Keratomileusis for High Myopia. **Am J Ophthalmol 2009;148:164-170.**

Quality of vision: ICL vs WG LASIK

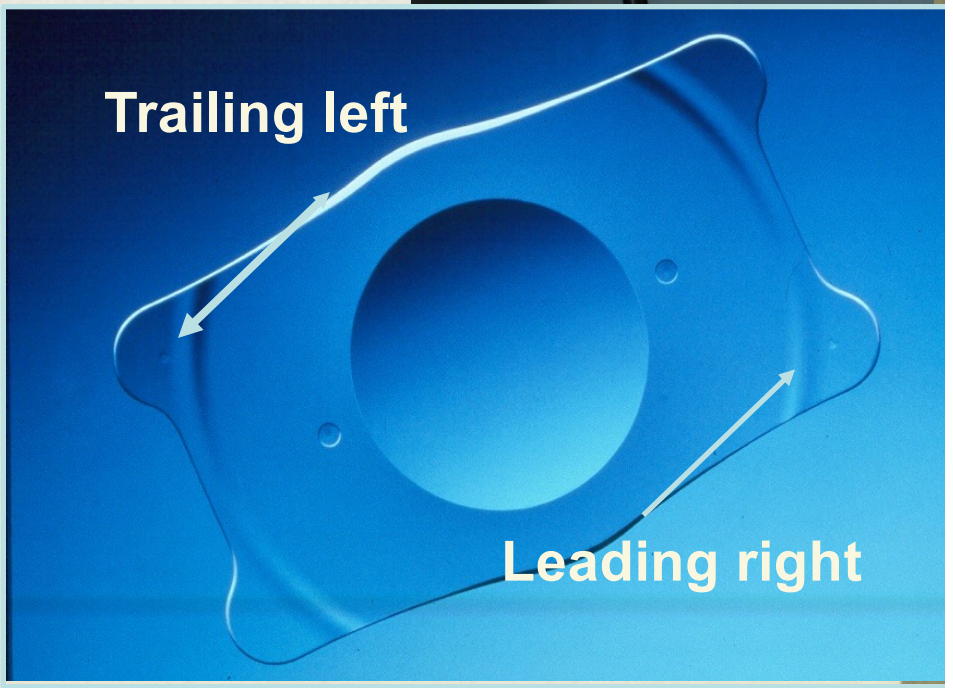
	ICL	WFG-LASIK
LogMAR BSCVA	Significant Improvement ($p = 0.02$)	No significant change ($p = 0.74$)
Total HOAs	ICL significantly less than WFG-LASIK ($p < 0.001$)	
Contrast Sensitivity	Significant increase ($p < 0.001$)	Significant decrease ($p < 0.001$)

- Conclusion: "…in the correction of high myopia, ICL implantation seems to be superior in visual performance to WFG-LASIK, suggesting it may be a better surgical option…"

1. Igarashi A, Kamiya K, Shimizu K, Komatsu M. Visual Performance after Implantable Collamer Lens Implantation and Wavefront-Guided Laser In Situ Keratomileusis for High Myopia. **Am J Ophthalmol 2009;148:164-170.**

Visian ICL: surgical procedure

- Preop→need good dilation!
- Loading is critically important and should be done by surgeon prior to making first incision

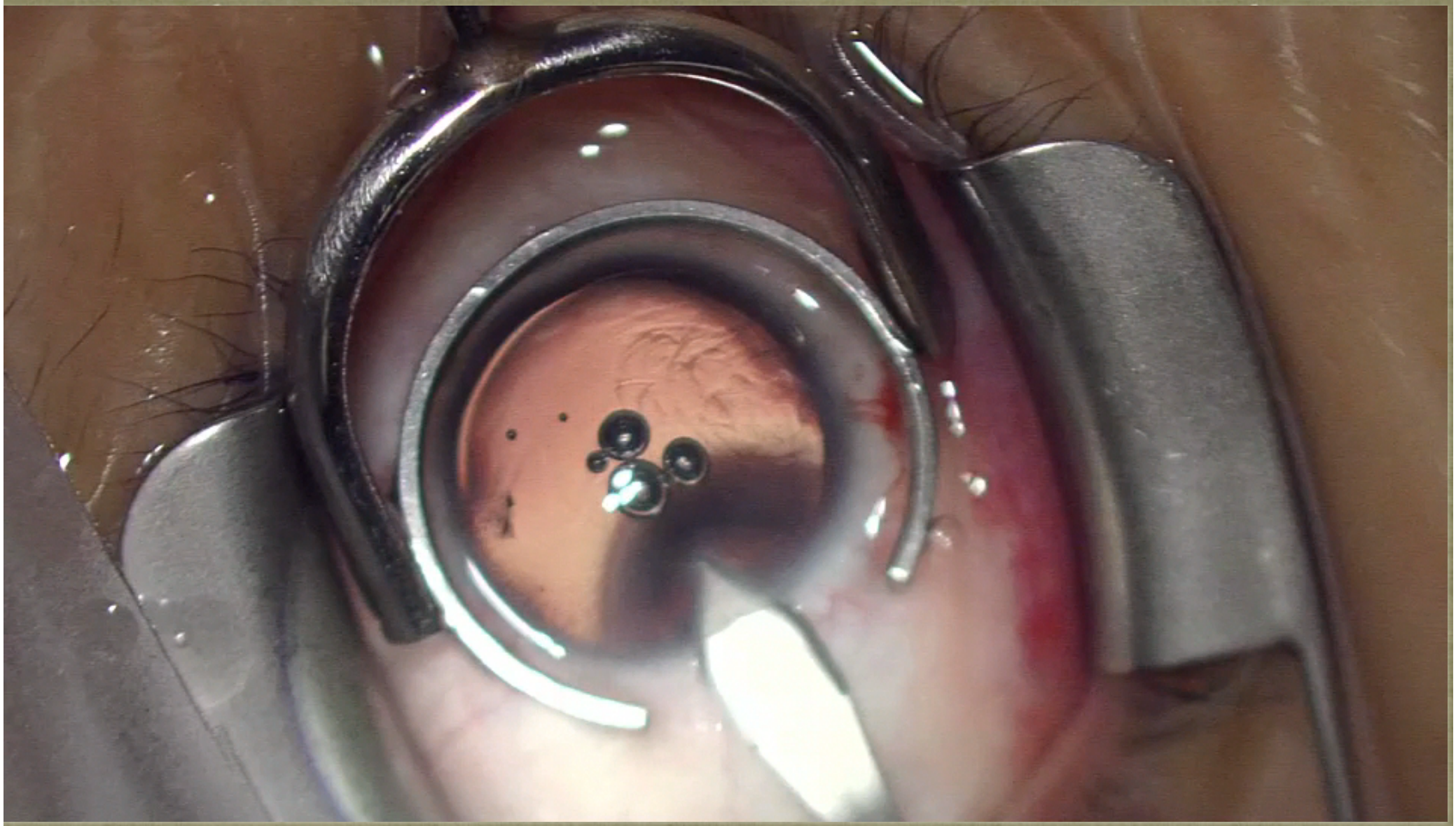


Surgical Technique

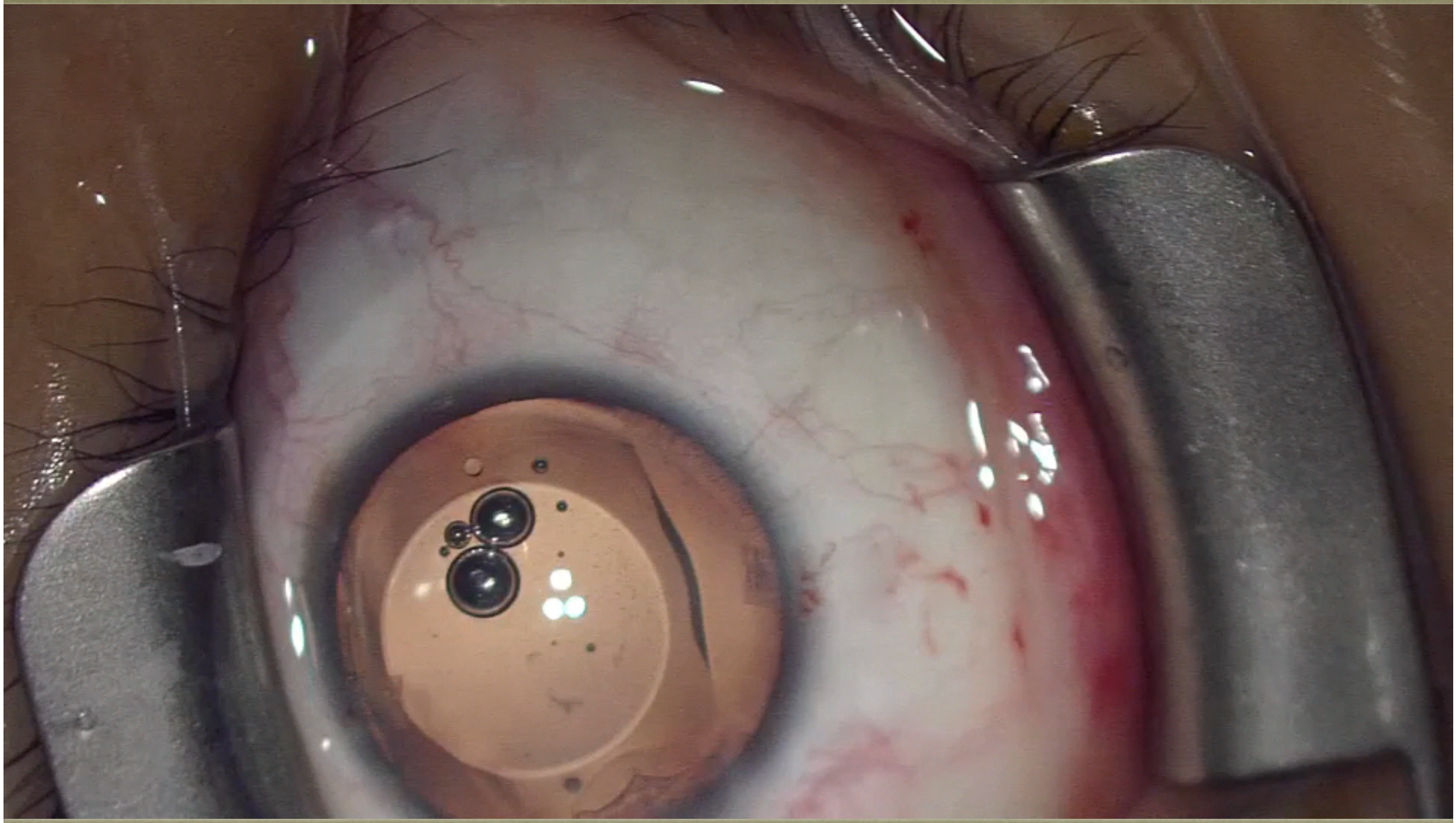
- Paracentesis
- Viscoelastic injection
- Temporal, clear corneal incision (3.2 mm)
- Injection of ICL
- Injection of viscoelastic (Ocucoat) on top of Visian ICL
- Positioning of Visian ICL behind iris
- Removal of viscoelastic
- 2-4 hours postop check

ICL loading

ICL Insertion



ICL tucking



ICL Surgical Pearls

- Loading is important, ½ low molecular weight 2% HPMC and ½ BSS
- Paracentesis, then viscoelastic (DO NOT OVERFILL), then incision
- Before injecting ICL, make sure AC is only 80% full with viscoelastic (not packed)
- Inner width of incision sl larger than 3.2mm and not too long (easy to insert injector)
- Careful and complete viscoelastic removal

Post op Care

- Similar to cataract patients, but taper steroid faster and do not use NSAID
- Typically rapid visual recovery!

Complications

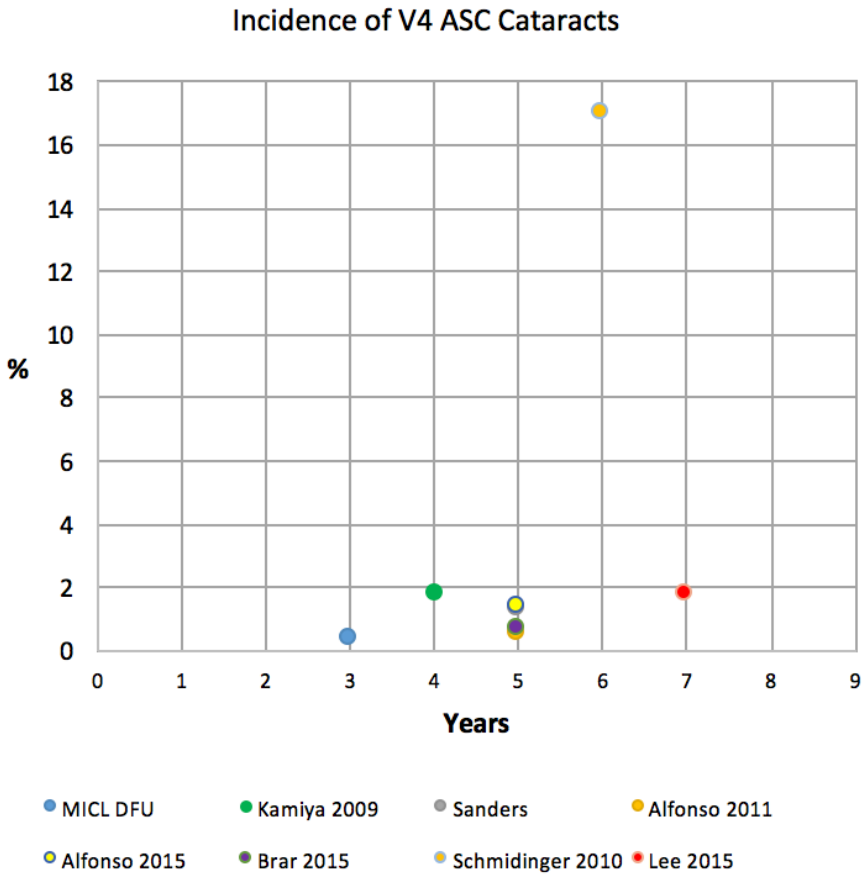
- IOP spike (0.7%)
  - ✓ Blocked PI's
  - ✓ Incomplete viscoelastic removal
  - ✓ I do NOT constrict pupil intra-op
- Cataract
  - ✓ Ensure proper vault (we use UBM for sizing)
- Infection

Cataract formation

Patient Related Factors[1]	Surgeon Related Factors[1]	Visian ICL™ Related Factors[1]
Age[2,3]	Surgical trauma	Insufficient Vault[2,4,5]
Refractive status[3]	• Early onset (< 3M) associated with surgical trauma	• Disturbance of aqueous flow[1] • Interference with lens metabolism[1] Anterior Subcapsular Cataract (ASC)

1. Chen et al. Metaanalysis of cataract development after PIOL surgery. J Cataract Refract Surg 2008; 34:1181–1200.
2. Gonvers et al. Implantable contact lens for moderate to high myopia: relationship of vaulting to cataract formation. J Cataract Refract Surg 2003; 29: 918–24
3. Sanders DR. Anterior subcapsular opacities and cataracts 5 years after surgery in the visian implantable collamer lens FDA trial. J Refract Surg. 2008 Jun;24(6):566-70
4. Schmidinger et al. Long-term changes in posterior chamber phakic intraocular Collamer lens vaulting in myopic patients. Ophthalmology 2010; 117:1506–1511
5. Alfonso et al, Central vault after phakic intraocular lens implantation: Correlation with anterior chamber depth, white-to-white distance, spherical equivalent, and patient age J Cataract Refract Surg 2012; 38:46–53

Cataract formation



ASC and Cataract Surgery	N	MRSE (D)	Follow Up	Clinically Significant ASC
MICL DFU	526	-10.06	3 years	0.4%
Kamiya Arch Ophthalmol 2009	56	-9.83	4 years	1.8%
Sanders J Refract Surg 2007	311	-10.06	5 years	1.3%
Alfonso J Cataract Refract Surg 2011	188	-10.76	5 years	0.5%
Alfonso J Cataract Refract Surg 2015	1531	-7.27	5 years	1.4%
Brar EC Ophthalmology 2015	615	NR	5 years	0.7%
Schmidinger Ophthalmology 2010	84	-16.40	6 years	17%
Lee Clin Exp Ophthalmol 2015	281	-8.74	7 years	1.8%

Concluding pearls

- Clear lensectomy in young myopes leads to higher RD rates, phakic IOL may be better option
- Skill-set required for phakic IOL surgery is very similar to cataract surgery
- GENTLE surgical manuevers are critical
- High myopes should all be counseled on this option for vision correction

Thanks for your attention