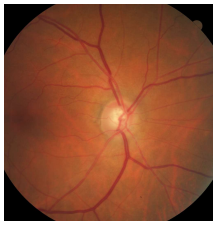
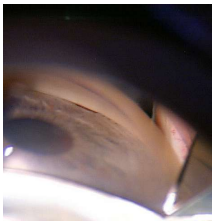
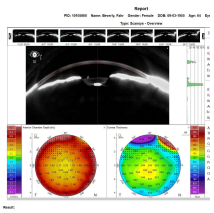




Glaucoma Update 2025

Michael Cymbor, OD, FAAO

COPE 98000-GI

1

Disclosure

- Key opinion leader and/or speaker for:
  - Optovue
  - Quidel
  - New World Medical
  - LKC Technologies
  - Allergan
  - Tarsus
  - Thea
  - Topcon
- All financial relationships have been mitigated

2

Fred H. Carlin, O.D. Community Vision Foundation

3

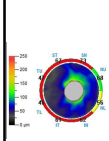
Ways to reach out

mcymbor@nittanyeye.com

MIKECYMBOR.COM

4

Is this your treatment paradigm?




Diagnosis	---->	PG	---->	PG+1	PG+2	---->	SLT	---->	MIGS	Trab




5

A Traditional Glaucoma Philosophy

- Medications first, more meds, even more meds
- Laser
- (MIGS)
- Filtration surgery
- This was the mantra of my optometry school and residency training

6

An Interventional Glaucoma Philosophy

- Intervene with laser/MIGS at the earliest time that it makes sense in the risk/reward paradigm
- Rely on patient compliance when necessary
- Use drops as "bridge therapy"

7

Interventional Glaucoma

- Interventional glaucoma (IG) is an attitude, a proactive approach rather than a reactive approach, that entails **early predictive diagnostics**, active and advanced monitoring, and **early and more aggressive intervention**.
- IG addresses some of the major issues of topical drops, which have issues with **compliance** and **side effects**.

8

"Glaucoma is a surgical disease"

Steven R. Sarkisian Jr, MD
Glaucoma Today 2020

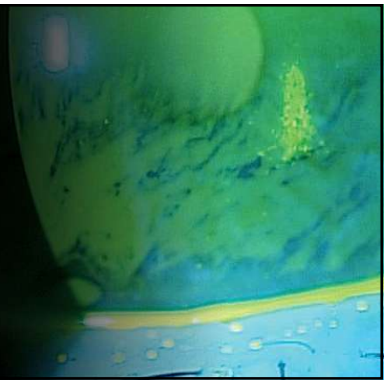
9

Case

- 60 Y/O W/F referred by local OD
- Started on PG 3 months ago
- TMax 23 OD and 22 OS
- Treated IOP 17 OD and 16 OS
- cclOP 21.3.6 OD and 20.4 OS
- CCT 556 and 547
- CH 10.1 and 11.0
- No family history
- BP 139/87 amd NS1

10

TBUT 3 seconds OU



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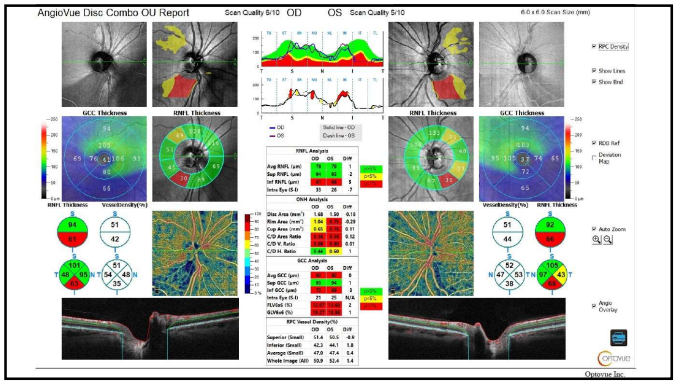

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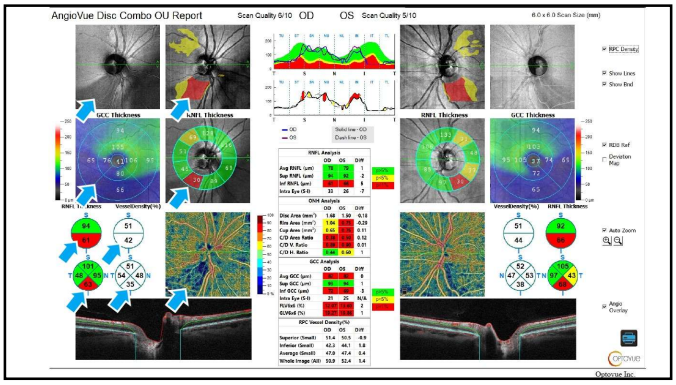

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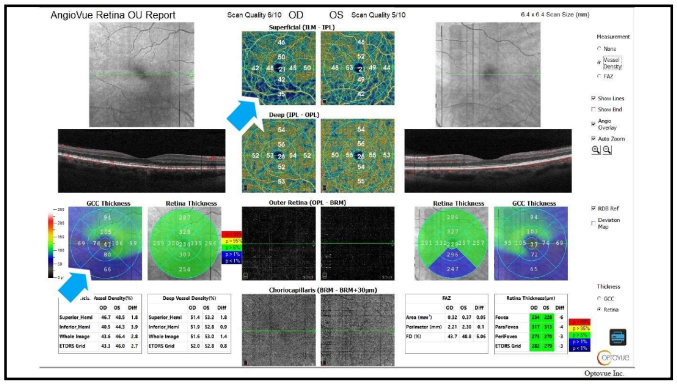

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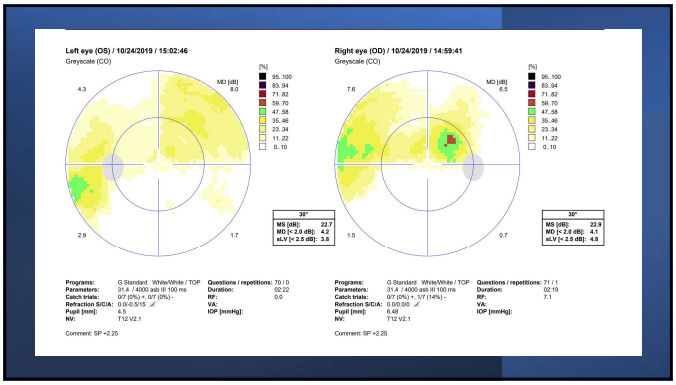

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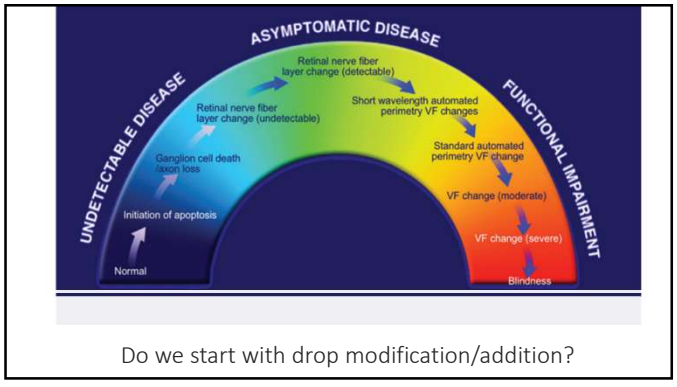

Do we start with drop modification/addition?

17

Patient admits to noncompliance

18

Compliance

- **"All things considered; our patients are probably taking their drops 50% of the time."**

Harry Quigley, MD at Optometric Glaucoma Society, New Orleans 2015

19

SLT

- Reduces IOP 25% at 3 years.
- SLT targets the pigmented cells of the trabecular meshwork, causing a restructuring which promotes aqueous outflow.
- Potential complications include IOP spikes and inflammation.

Katz LJ, Steinmann WC, Kabir A, Molineaux J, Wizov SS, Marcellino G. Selective laser trabeculoplasty versus medical therapy as initial treatment of glaucoma: a prospective, randomized trial. Journal of glaucoma. 2012 Sep 1;21(7):460-8.

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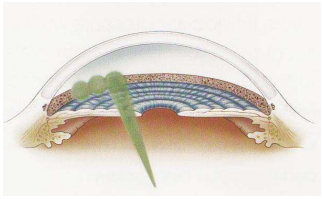
SLT

- "MAY be" offered as first line treatment



Wong MO, Lee JW, Choy BN, Chan JC, Lai JS. Systematic review and meta-analysis on the efficacy of selective laser trabeculoplasty in open-angle glaucoma. Survey of Ophthalmology. 2015 Jan 1;60(1):36-50.

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LIGHT Trial

▶"Selective laser trabeculoplasty **should be** offered as a first-line treatment for open angle glaucoma and ocular hypertension, supporting a change in clinical practice."

3 Years	n=652	5x LESS	78.2%	
MULTI-CENTER RANDOMIZED	SLT 329 DROPS 323	Adverse Events SLT 30 DROPS 150	SLT DROP FREE @ 3 YEARS	Surgical Intervention SLT 0 DROPS 11

Selective laser trabeculoplasty versus eye drops for first-line treatment of ocular hypertension and glaucoma (LiGHT): a multicentre randomised controlled trial
Gazzard, GusAmbler, Gareth et al. The Lancet, Volume 393, Issue 10180, 1505 – 1516. 2019.

22

SLT Light Trial 6 year data

Glaucoma Symptom Scale scores were **worse** in the eye drop arm.

At 6 years, 94.2% of eyes initially treated with SLT were at target, compared with 94.7% of eyes initially treated with medication.

Of eyes in the SLT arm, **69.8%** remained at or less than the target IOP without the need for medical or surgical treatment

More eyes in the drops arm **exhibited disease progression** (26.8% vs. 19.6%, respectively

Trabeculectomy was required in 32 eyes in the drops arm compared with 13 eyes in the SLT arm

More cataract surgeries occurred in the drops arm (95 compared with 57 eyes

No serious laser-related adverse events occurred.

Gazzard G, Konstantakopoulou E, Garway-Heath D, et al. Laser in Glaucoma and Ocular Hypertension (LiGHT) Trial: Six-year results of primary selective laser trabeculoplasty versus eye drops for the treatment of glaucoma and ocular hypertension. Ophthalmology. 2023;130:139-151

23

Diagnosis

- POAG – moderate stage OU
- Hypertensive Retinopathy
- Cataracts
- Treatment - SLT

24

2 week follow up

- ccIOP 19.1 OD and 19.2 OS
- Next step?
  1. Add a drop
  2. Durysta
  3. Cataract surgery + MIGS

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Durysta

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Durysta

This is the **first study evaluating the 24-h IOP**-lowering effects of 10-ug injectable bimatoprost implant ('Durysta'), which was approved for a one-time use by the FDA in 2020.

The study evaluated 24-h IOP by measuring habitual position IOP (e.g., sitting during daytime and supine at nighttime) using Goldmann applanation tonometry and the pneumatonometer at week eight after administration, when they were housed in a **sleep lab**.

Efficacy and safety were also evaluated at **12 months**. Thirty-one participants with POAG and OHT were included in this trial. There was a control group of patients (n = 6) who received once-daily bimatoprost 0.1%.

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Durysta

This reduction in 24-hour habitual position IOP fluctuation occurred primarily because of a reduction in diurnal IOP fluctuation.

The bimatoprost implant provided a more sustained IOP-lowering effect over 24 hours than topical bimatoprost 0.01%.

74% of patients remained controlled at one year with a single administration.

Single Administration of Bimatoprost Implant: Effects on 24-Hour Intraocular Pressure and 1-Year Outcomes, Weinreb RN; Christie WC; Medeiros FA et al., Ophthalmology. Glaucoma, 2023; 6: 599-608

28

Benefits/Concerns of Durysta

- Adherence issues are bypassed through the single injection and tolerability seems to be better for patients.
- It is possible that the stronger observed reduction in IOP fluctuations provide improved glaucoma control.
- The most common adverse event was conjunctival hyperemia (35.5%).
- Repeated administration is somewhat a concern to corneal health
- More studies are needed to provide assurances on long-term corneal safety.

Single Administration of Bimatoprost Implant: Effects on 24-Hour Intraocular Pressure and 1-Year Outcomes, Weinreb RN; Christie WC; Medeiros FA et al., Ophthalmology. Glaucoma, 2023; 6: 599-608

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Next step?

- Cataract surgery + KDB

30

The issue of cataracts

- "Golden Moment"
- "Up to 20% of cataract patients have glaucoma, but only around 20% of those patients have cataract surgery + MIGS"
- Gus Gazzard, MD
- Morefields Eye Hospital
- Interventional Glaucoma Podcast, March 12th

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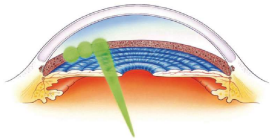
More SLT

Why you need it

- Removes burden of compliance
- Primum non nocere - OSD
- Cost effective
- Better quality of life

Why you don't

- Drops are adequate



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Interventional Glaucoma Management

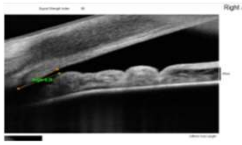
Always factors in noncompliance

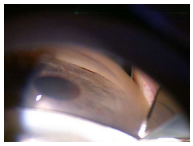
Intervene at the earliest time that it makes sense in the risk/reward paradigm

33

Case

- 63 Y/O W/M referred to the Glaucoma Institute of State College
- IOP's 23.7 and 21.8 on bimonidine and 0.5% timolol, both bid
- "Open angle"
- Grade 2 cataracts, correctable to 20/25, cataract glare to 20/50
- Gonio – posterior TM barely visible with PAS
- Pachs 523 and 528





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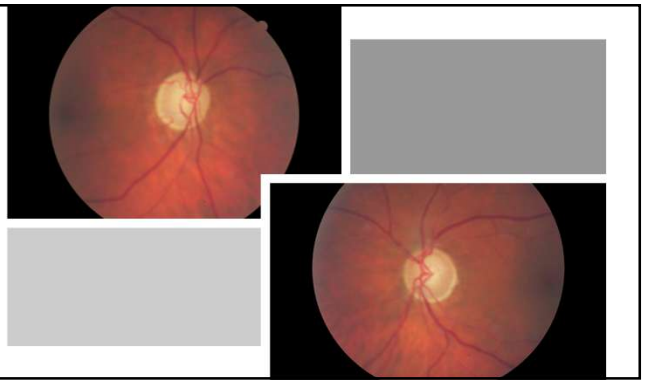

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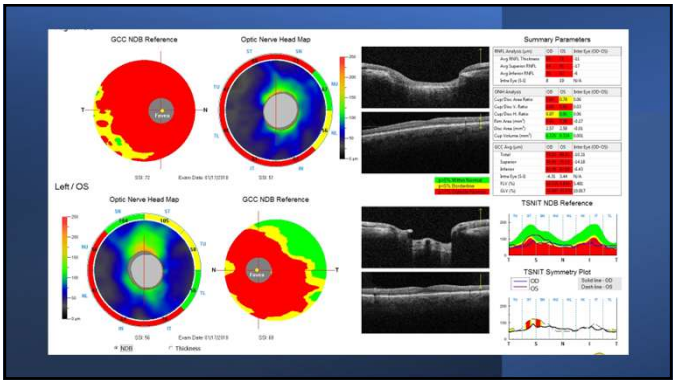

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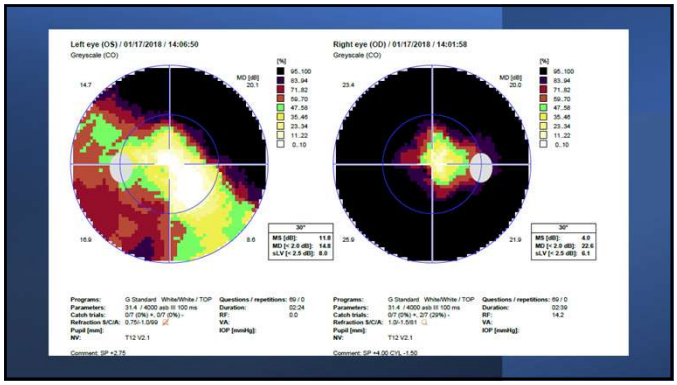

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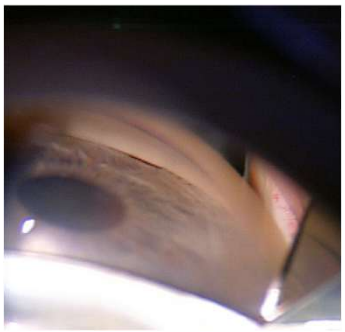
Must look at the angles



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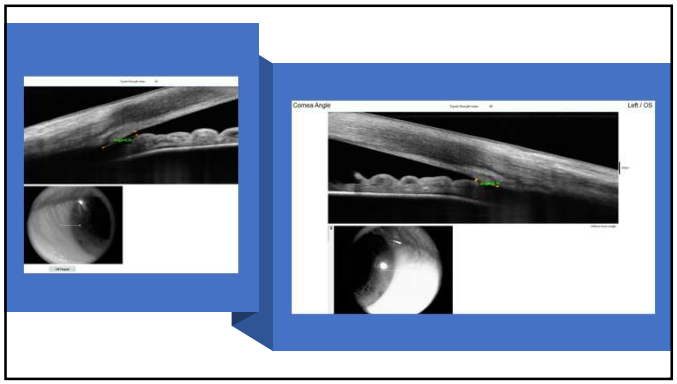

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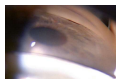
Primary Angle Closure Suspect (PACS)

Primary Angle Closure (PAC)

Primary Angle Closure Glaucoma (PACG)



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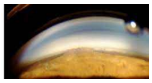

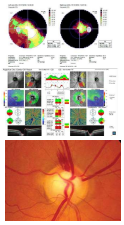

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Treatment options

- PI
- Cataract surgery
- Cataract surgery + KDB goniotomy
- Cataract surgery + KDB goniotomy + goniosynechialysis

41

Eagle

- compared LPI with clear lens extraction by looking at patients over 50 years old with mild to moderate **PACG**
- a presenting IOP above 30mm Hg
- Found
  - **A reduction in the need for further medications or glaucoma surgeries in the clear lens extraction group along with**
  - **A better quality of life**
  - **A better cost-effectiveness over a 10 year period**

- avanbakht M, Azuara-Blanco A, Burr JM, et al. Early lens extraction with intraocular lens implantation for the treatment of primary angle closure glaucoma: an economic evaluation based on data from the EAGLE trial. BMJ Open. 2017;7(1):e013254

42

Large difference in the 2 groups in topical med usage

Medications at 36 months

# of medications*	Lens Extraction*	Laser PI*
0	126 (60·6%)	45 (21·3%)
1	33 (15·9%)	67 (31·8%)
2	15 (7·2%)	46 (21·8%)
3	3 (1·4%)	19 (9·0%)
4	1 (0·5%)	4 (1·9%)
Mean ± SD*	0·4 ± 0·8*	1·3 ± 1·0*

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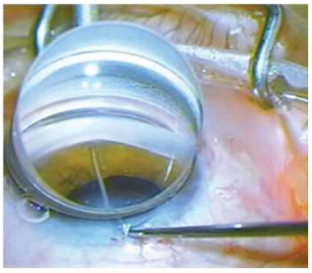
Issue of timing

Goniosynechialysis



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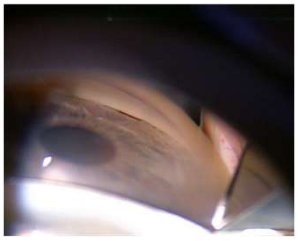
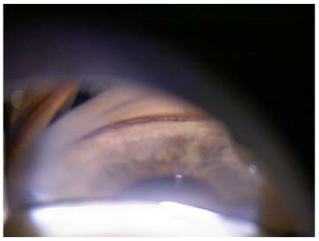
Cataract surgery + goniosynecialysis + KDB goniotomy





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6-Year KDB Goniotomy Study

- **90 eyes of 53 patients with glaucoma**
- **Objective**: Evaluate long-term safety and efficacy of Kahook Dual Blade (KDB) goniotomy, with or without phacoemulsification.
- **Findings**:
  - **IOP Reduction**: Average of 28% (baseline 18.6 mmHg; post-op 13.9 mmHg).
  - **Medication Reduction**: 30.8%.
  - **Safety**: Minimal complications, no severe adverse events.
  - **Surgical Success**: 46.2% at 6 years.

Vasu P, Abubaker Y, Boopathiraj N, Wagner IV, Lentz PC, Dorairaj E, Shokair A, Qozat I, Miller DD, Dorairaj S. Clinical Outcomes of Excisional Goniotomy with the Kahook Dual Blade: 6-Year Results. Ophthalmol Ther. 2024 Oct;13(10):2731-2744. doi: 10.1007/s40123-024-01016-8. Epub 2024 Aug 16.

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Study Insights and Limitations

- **Advantages**:
  - Longest follow-up data for KDB.
  - Consistent surgical technique by a single surgeon.
  - Real-world outcome representation.
- **Limitations**:
  - Retrospective design, lack of randomization.
  - Non-standardized medication regimens and IOP measurements.
  - High patient attrition rate (42% lost to follow-up).
- **Conclusion**: KDB goniotomy is a reliable long-term solution for various glaucoma subtypes.

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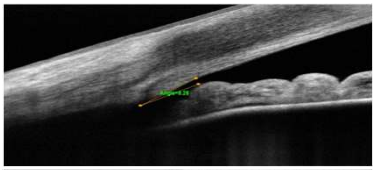
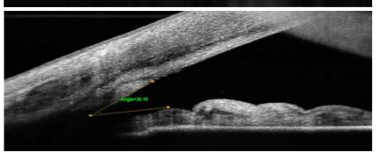
Better 1 or 2?
3years later...





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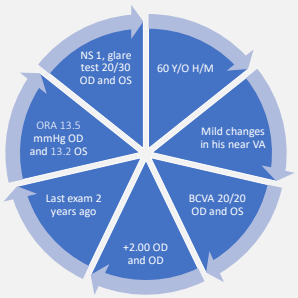
Angle Case



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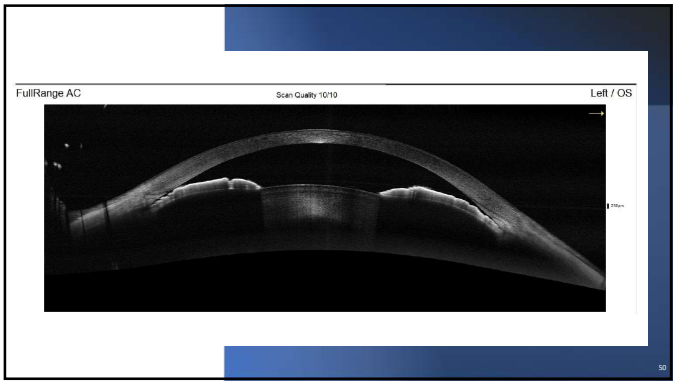

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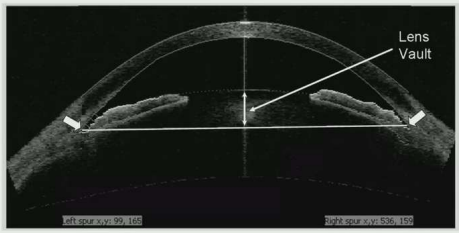
Lens vault



Area of the lens above a line drawn from scleral spur to scleral spur

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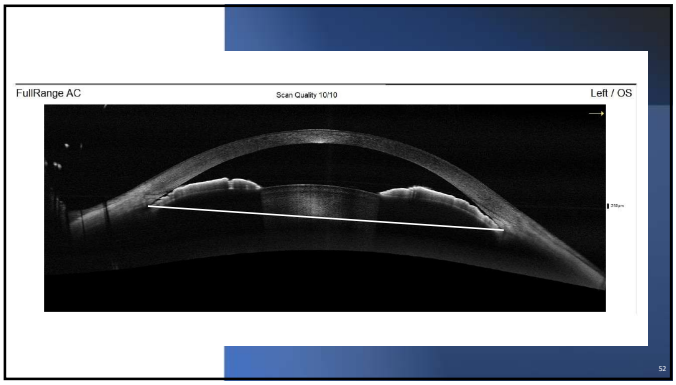

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What about dilation?

Should we perform gonioscopy?

53

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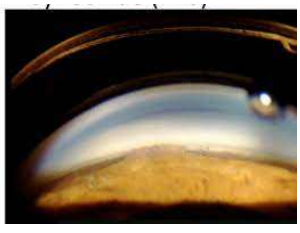
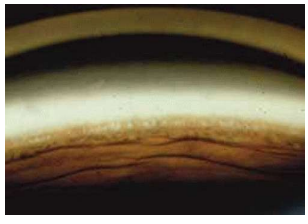
Gonio Tip

Synechiae vs Iris Processes





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No PAS

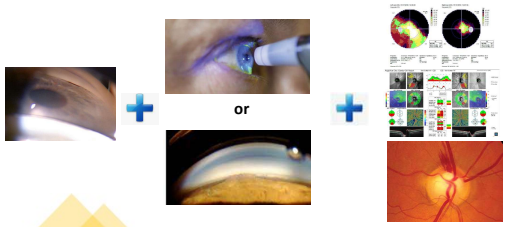
OCT, VF, nerves all look nonglaucomatous

55

Primary Angle Closure Suspect (PACS)

Primary Angle Closure (PAC)

Primary Angle Closure Glaucoma (PACG)



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Next step?

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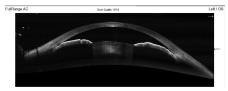
OD Coder YouTube

- **Anterior Segment OCT 92132**
- $29.25 in State College, PA
- Written order and interpretation
- 2x/year
- Pathologies
  - Corneal scars and opacities H17.11-.89
  - Corneal edema H18.20-.233
  - Anatomical Narrow Angle H40.031-033
  - Degeneration of iris (pigmentary) & ciliary body H21.221-.233
  - Pupillary and iris cysts H21.271-.89
  - Open angle with borderline findings – HIGH risk H40.021-.023
  - Corneal transplant rejection/failure T86.8401-.8403



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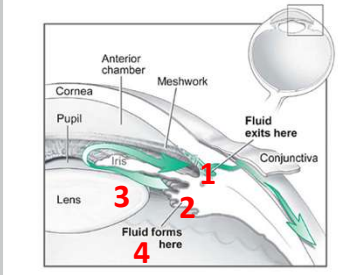
- Obstruction can occur at 4 areas

1. Iris-pupillary block
2. Ciliary Body – Plateau iris
3. Lens – phacomorphic
4. Posterior to lens - malignant



Nei.nih.gov

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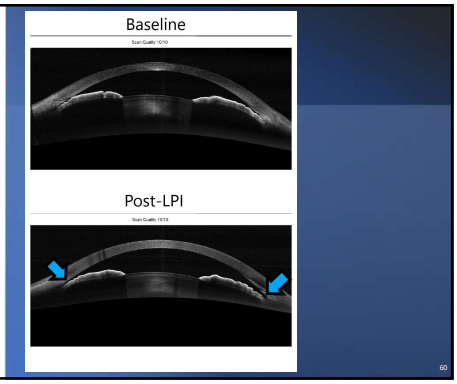

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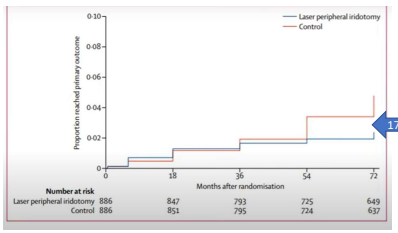
ZAP

- should LPI be recommended for all PACS patients to prevent PAC and/or PACG?
- One eye was randomly chosen for PI, other eye acted as a control
- Endpoints – IOP greater than 24mmHg, PAS, acute angle closure

He M, Jiang Y, Huang S, Chang DS, Munoz B, Aung T, Foster PJ, Friedman DS. Laser peripheral iridotomy for the prevention of angle closure: a single-centre, randomised controlled trial. The Lancet. 2019 Apr;393(10181):1609-18.

61

ZAP



- End of 3 years – not much going on, continue study another 3 years
- showed a statistically significant but clinically small decrease in the risk of PAC conversion and **recommend against the widespread use of prophylactic LPIs in their study population**
- 44 PACS patients needed treatment to prevent one new PAC case over six year
- 126 needed to prevent one case of PACG

62

ZAP – 14 year data!!!

- 69% reduced risk of PAC with LPI
- NNT to prevent 1 case of PAC at 14 years is 12.35
- "prophylactic LPI should be recommended preferentially to those at the highest risk because the annual incidence of PAC was low"

Yuan Y, Wang W, Xiong R, Zhang J, Li C, Yang S, Friedman DS, Foster PJ, He M. 14-Year Outcome of Angle-Closure Prevention with Laser Iridotomy in the Zhongshan Angle Closure Prevention Study: Extended Follow-Up of a Randomized Controlled Trial. Ophthalmology. 2023 Apr 6.

63

What about dilation?

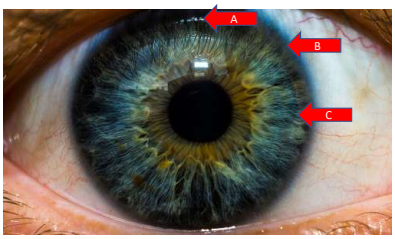
- Dilated 6 or 7 times
- 2.5% and 1%
- Everyone received 250 mg diamox
- If 8mmHg increase, drop of pilo and brimonidine

64

Highest Risk of Closure

- Closed in all 4 quadrants
- Average refractive error of +4.00

65



- Untreated eyes narrowed by 20%
- A is most efficacious
  - Xu BY, Friedman DS, Foster PJ, Jiang Y, Pardeshi AA, Jiang Y, Munoz B, Aung T, He M. Anatomic Changes and Predictors of Angle Widening after Laser Peripheral Iridotomy: The Zhongshan Angle Closure Prevention Trial. Ophthalmology. 2021 Jan 23

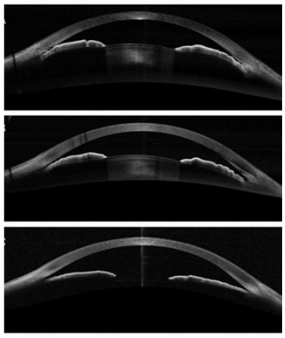
66

ANA-LIS

- 45% reduced risk of PAC with LPI
- NNT at 5 years from becoming PAC is 22

Baskaran M, Kumar RS, Friedman DS, Lu QS, Wong HT, Chew PT, Lavanya R, Narayanaswamy A, Perera SA, Foster PJ, Aung T. The Singapore Asymptomatic Narrow Angles Laser Iridotomy Study: five-year results of a randomized controlled trial. Ophthalmology. 2022 Feb 1;129(2):147-58.

67



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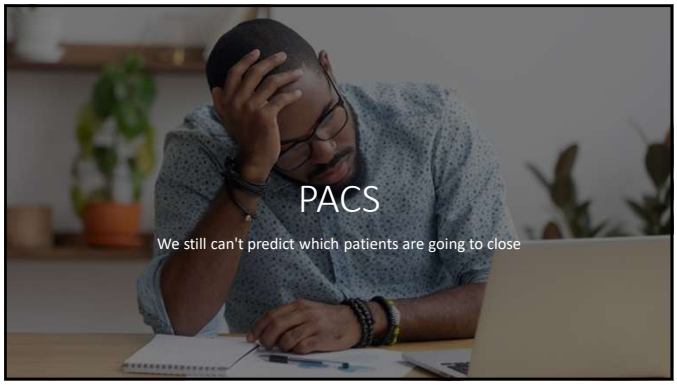

69

What do we do with PACS?

- In our clinic, we typically follow most asymptomatic PACS patients every six to 12 months. We monitor for changes in the angle, optic nerve and visual field.
- While we approach each patient individually, we generally perform LPI, clear lens exchange or cataract extraction if:
  - the patient mentions symptoms suggestive of closure
  - has a family history of angle-closure
  - if they show progression of angle narrowing or progression to PACG
  - they need frequent dilation
  - they are unusually hyperopic

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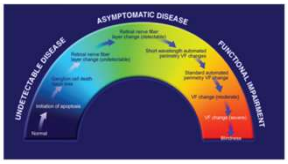
Interventional Glaucoma Management

Improved Patient Compliance and Quality of Life
Enhanced Safety and Reduced Risk
Sustained Efficacy and Cost Effectiveness

71

Interventional Glaucoma Management

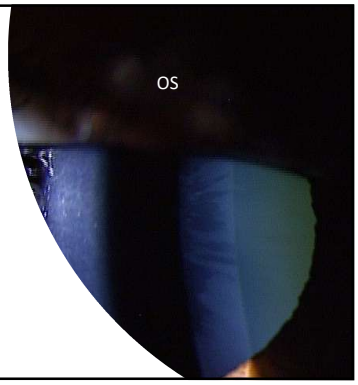
Consider SLT as 1st line → Always considers how the angle affects the disease → Consider cataract surgery earlier → Never miss an opportunity to combine cataract surgery with MIGS



72

CASE
71 Y/O WF
TYPE 2 DIABETES

2013
Exam NCT 17 and 15



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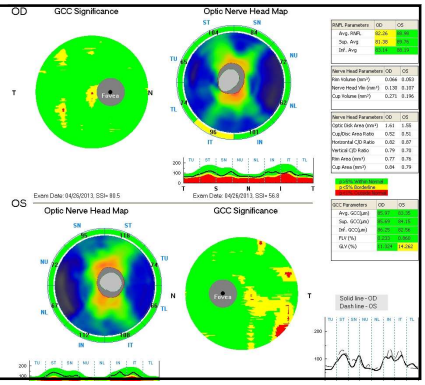
2013



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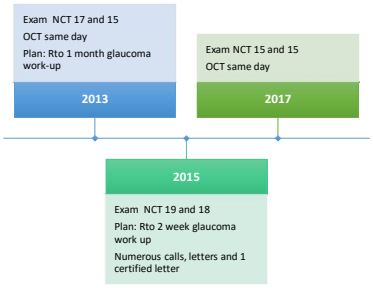
CASE – PSEUDO
OR EX
71 Y/O WF
TYPE 2 DIABETES



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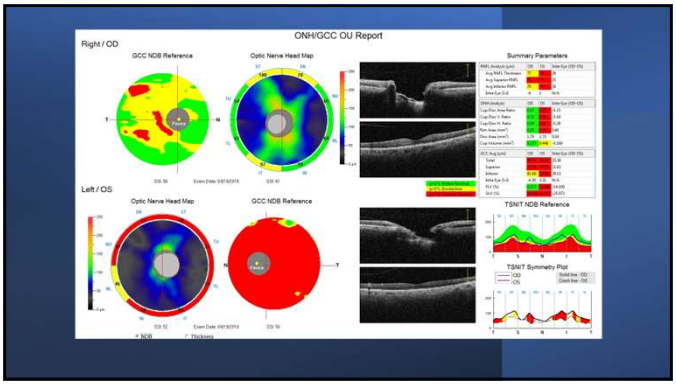

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DX: EXFOLIATION GLAUCOMA OS

Treatment: Begin Lumigan qhs OU

Send to Glaucoma Institute

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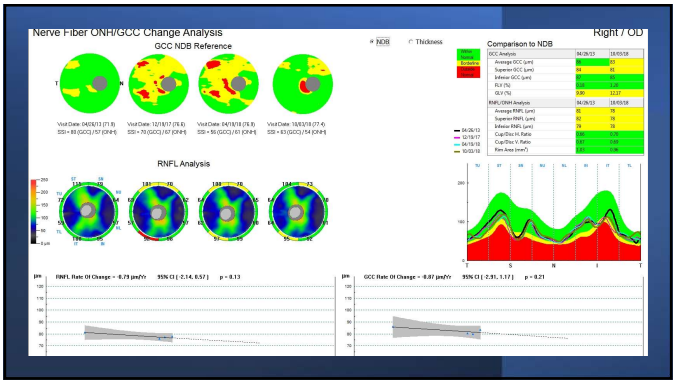

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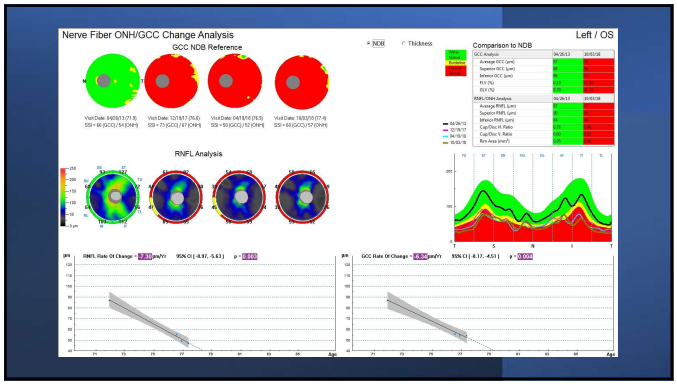

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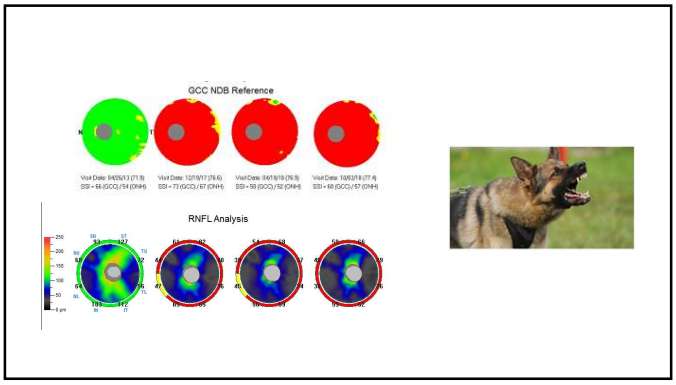

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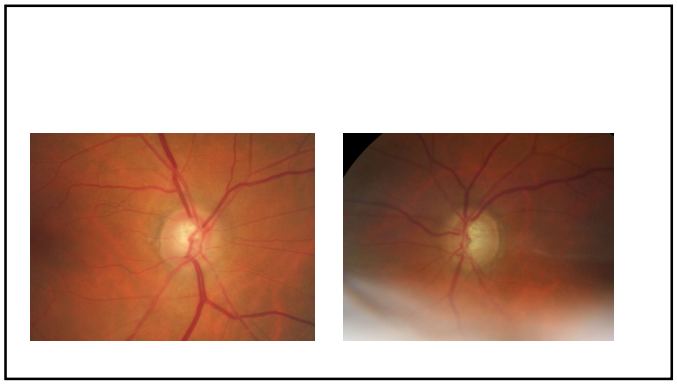

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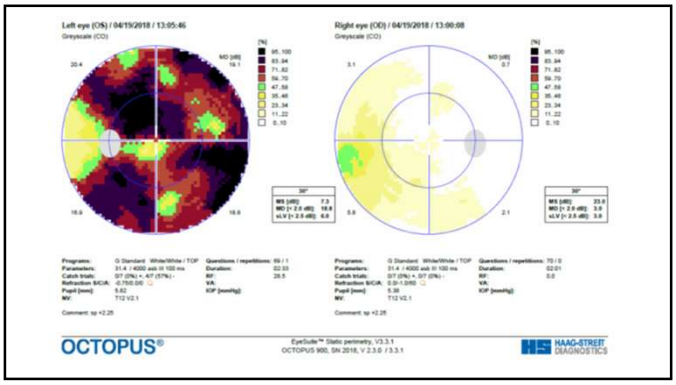

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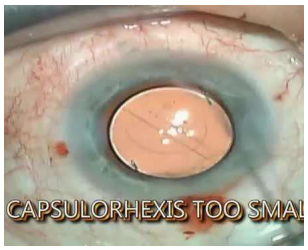
MEDICAL
LASER
SURGICAL
GENETIC

Exfoliation Treatment

83

Cataract Surgical Consequences of iris damage due to exfoliation

- SMALL CAPSULORHEXIS
- INCREASED RISK OF PHYMOSIS
- INCREASED TRAUMATIC FORCES TO ZONULE
- DIFFICULTY EXTRACTING LENS NUCLEUS
- INCREASED RISK OF CAPSULAR TEAR



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Cataract surgery in Exfoliation

Lower IOP more than cataract surgery in non-exfoliation patients…including POAG

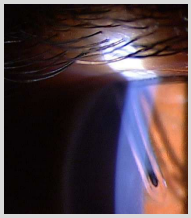
Why?

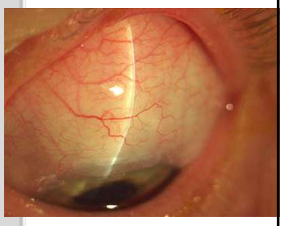
Theories
- Reduces exfoliation liberation
- Cataract surgery washes out exfoliation material
- Deepens A/C

85

SURGICAL

- MIGS
  - Xen
- Trabs/Tubes





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FUTURE THERAPY?

Gene transfer

87

Exfoliation

"THE TYPE OF GLAUCOMA THAT YOU HAVE IS GOING TO TRY TO MAKE ME LOOK BAD"

88

Exfoliation is #1 in…

GLAUCOMA-RELATED LAWSUITS

89

Affects 70 million worldwide
20% of all glaucoma
30-50% of patients with Exfoliation will develop glaucoma

Exfoliation by the #'s

90

Ocular targets

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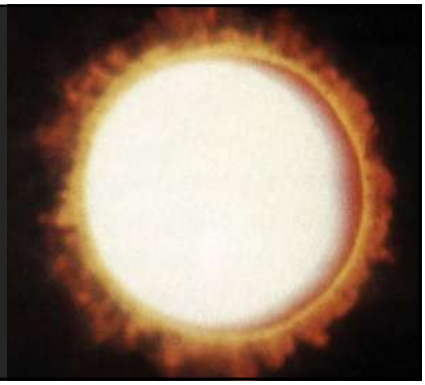
Ocular targets

92

Transillumination in Exfoliation



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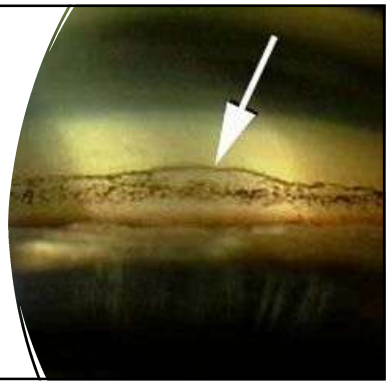
angle

- Dense TM pigment
- Sampolesi line
- Production of EX fibers in TM
- Disorganization of TM and Sclemm's canal

XFS can be open or closed angle



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No show protocol

Why you need it	Why you don't
• Good patient care • Offers some protection in a lawsuit-related catastrophic vision event	• Additional staff time and cost • Lawsuits are rare

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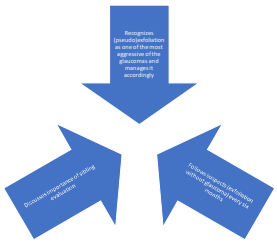
Personalized Glaucoma Management



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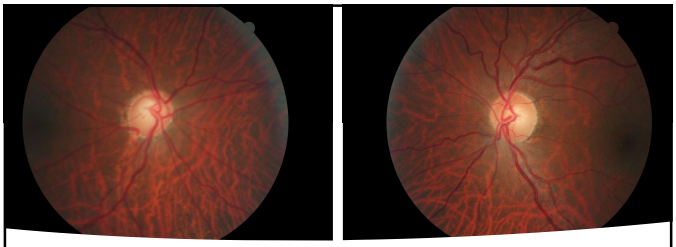
Case

- 55 Y/O H/M
- Referred to Glaucoma Institute of State College
- Pigmentary Glaucoma OD
- Medicated with Lumigan qhs OD and Combigan bid OD
- cclOP 47.2 and 14.7
- Pachs 511 and 514
- Corneal hysteresis 7.4 and 9.4

97



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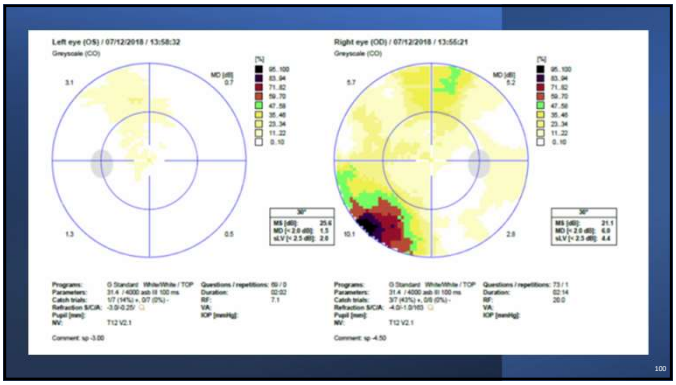

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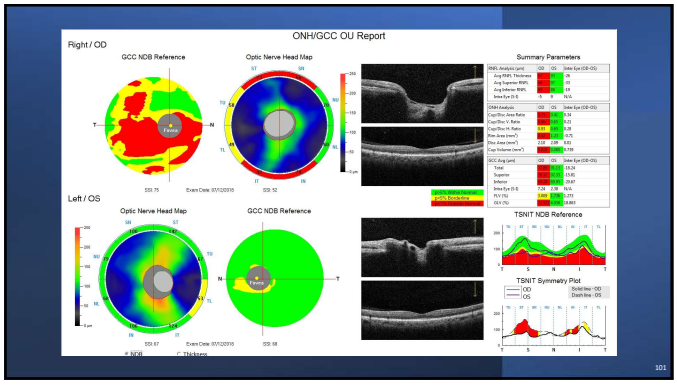

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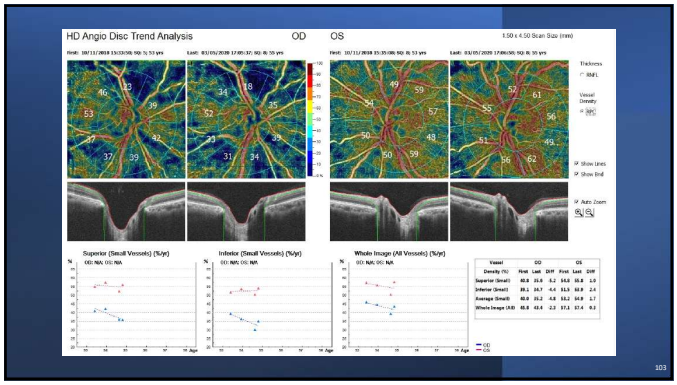
Treatment

- Proceeded with next day SLT OD
- 2 months later, IOP's high teens/low twenties on meds
- 1.5 years later, IOP's increasing into 30's, adjust meds
- 2 years later, IOP's hit 40 OD and 25 OS , on maximum meds

102



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Treatment

Send for possible trabeculectomy OD and MIGS OS

Surgeon to "attempt GATT, switch to Trab if necessary"

Performed GATT OU successfully

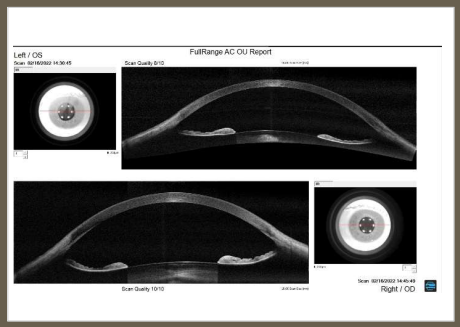
104

1 year later…

IOP's 14.9 and 15.2

On Combigan bid OU

105



Still another example

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Medical Treatment

Pilocarpine	Alpha agonists	B blockers
CAI	PGA	TM meds?

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PDG Considerations

Topical	
SLT – very effective	small chance of permanent IOP spike consider limited laser shots and/or reduced energy
MIGS effective	Particularly GATT/KDB, etc
May need trabs in aggressive cases	

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Personalized Glaucoma Management

Recognizes pigment dispersion as one of the most aggressive of the glaucomas

Understands the "ticking time bomb" nature of the disease

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Thank You

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MIKECYMBOR.COM

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