

SLT: on the Glaucoma frontline

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Selective Laser Trabeculoplasty (SLT)

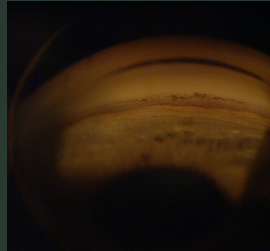
- Historically, SLT was recommended for Glaucoma patients with progression, not meeting target IOP, or on max therapy.
- SHOULD be considered for 1st line of tx.
 - Compliance
 - Cost
 - Quality of life
 - Side Effects of drops

SLT

- Frequency doubled Q-switch YAG (cold laser) 532nm
- Selectively absorbed by pigmented cells in TM
- Spares adjacent cells and TM from thermal injury
- Stimulates increased monocytes and macrophages in TM
- IOP reduction 20-30% (similar to prostaglandin)

SLT Pre-op

- Gonioscopy- very important
 - Must be able to visualize the TM on gonio
 - Patient must be able to tolerate procedure
- Instill Iopidine prior to SLT
- Proparacaine OU prevents blinking
- Diamox



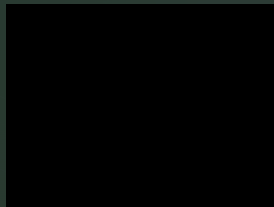
SLT VS ALT

- | | |
|--|---|
| <ul style="list-style-type: none"> ▪ Argon Laser Trabeculoplasty <ul style="list-style-type: none"> ▪ 514 nm argon laser ▪ lens placed to control the direction of the laser beam ▪ Laser burns small area of TM ▪ ~50 spots in 180 degrees of TM per tx. ▪ Not repeatable, causes scarring of TM | <ul style="list-style-type: none"> ▪ Selective Laser Trabeculoplasty <ul style="list-style-type: none"> ▪ Solid state laser 532nm Nd:YAG laser ▪ Pulse energy is ~100x lower than ALT ▪ Only targets pigmented cells TM. Can be done 360/tx. ▪ Repeatable |
|--|---|



SLT: Procedure

- Fire contiguous He-ne (helium-neon) beam spots on the TM
- Must see bubbles/tissue response evanescence through the TM.
 - Champagne bubbles, some blanching
 - Large bubbles reduce energy
 - No bubbles- energy needs to be adjusted higher.
 - ~25-40 spots/quadrant
 - ~120-150 spots 360 degree



HeNe beam spots on TM



SLT: Procedure

- 400 um spot size
- 0.4 – 1.5 mJoules (increased pigment may decrease power)
- 30 nanosecond pulse duration
- Treat 180 degrees (now 360)
- 100 spots

BCSC Vol 10 Glaucoma, 2016-2017, p 186-189.





SLT: Procedure

- 0.8-1.0mJ per shot energy to start
- More pigment = more effective
- Lower energy in higher pigmented TM and vice versa
 - low ~0.5 to 0.7mJ/shot
 - High ~1.1 to 1.3mJ/shot
- SLT lens
 - Prefer to start inferiorly, rotate clockwise. I→T→S→N
 - Start spots in middle and go each side.
 - Rotate 360 degrees



SLT : Post op

- Post op:
 - Short term NSAID
 - Acular LS 0.4% QIDx5 days (CES)
- Can help with pain
- Blunt inflammatory response but NOT completely.
- Inflammation is necessary
 - Break up cellular debris, body sees that as foreign, develops inflammatory response
 - A reaction that cleans out the drain and that's why we can see contralateral affects from a unilateral SLT.
 - 6-12 weeks to see full effect of SLT.

Indications:

- POAG
- NTG
- OHTN
- PXF Glc
- PDS Glc

Contraindications:

- Inflammatory glaucoma
- Angle closure glaucoma
- NVG



SLT - Indications

- POAG
- Prostaglandin trial
- Try drop for 1 month. If IOP lower then SLT will work
- If on drop stop for 1 month. If IOP higher then SLT will work.
- May be less effective in pseudophakes



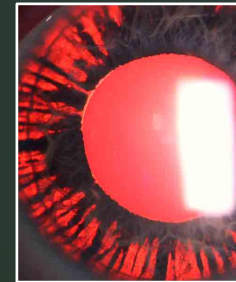
SLT - Indications

- NTG
- Expect 14-16% reduction
- Reduces diurnal variation



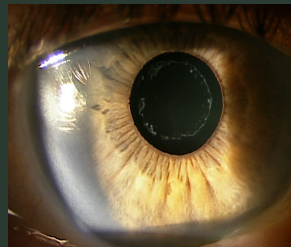
SLT - Indications

- Pigmentary Glaucoma
- Works very well (pigment)
- May have severe post Tx IOP spike
- 1 day IOP check**



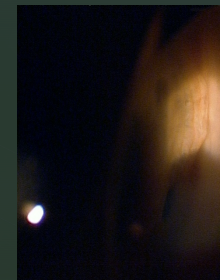
SLT - Indications

- Pseudoexfoliation Glaucoma
- Good response to SLT
- Reduces IOP spikes



SLT - Contraindications

- NAG
- Synechial angle closure
- NVG
- Uveitic
- Trauma with angle recession (+/-)
- ICE / Developmental
- Failure to work in fellow eye



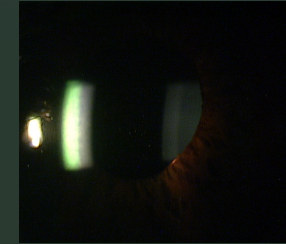
SLT - Complications

- Most common is IOP spike
- Transient
- Noted at 1 hour post-op
- Pre-op Apraclonidine or
lopidine, beta blocker, CAI
- We use Diamox 500 mg



SLT - Complications

- Low grade uveitis
- That's how it works so want
some
- Topical NSAIDs q.i.d. x 4-7
days



SLT - Complications

- Peripheral anterior synechiae

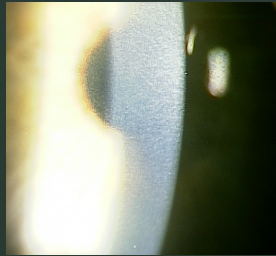


SLT - Complications

- Hyphema

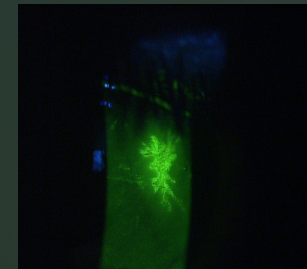
SLT - Complications

- Corneal inflammation and edema
- Similar in appearance to DLK



SLT - Complications

- Reactivate HSK



SLT - Complications

- Failure of procedure
- Persistent elevated IOP
- May need incisional surgery



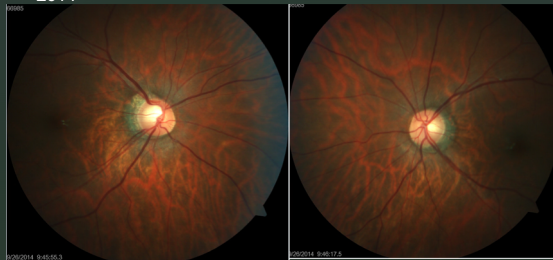
Case 1 NG 66985

- 28 yo Indian female
- Referred for a glaucoma eval
- **2014**- first time at CES
- Hx of s/p myopic LASIK sx in 2005
- VA: 20/20 OD and OS
- CVF: FTFC OD and OS
- PERRL, No APD
- IOP 14/14
- LASIK flap intact OD and OS**
- Color vision: 14/14 OD and OS
- Pachs: 429/406**
- Gonio: OD: CBB 1+ pigment, OS: CBB 1+ pigment
- CD: OD: 0.6/0.6v no drance heme
 - OS: 0.4/0.40, no drance heme

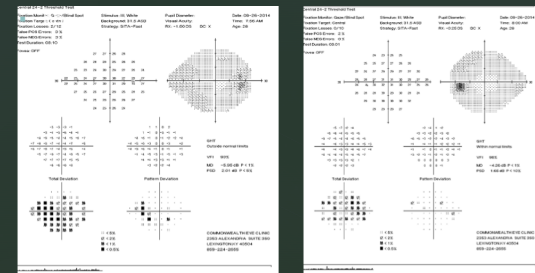


Case 1 NG 66985

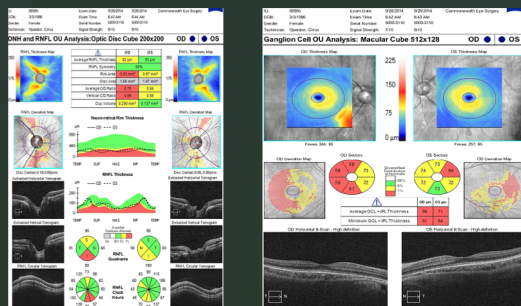
2014



2014 HVF



2014 OCT

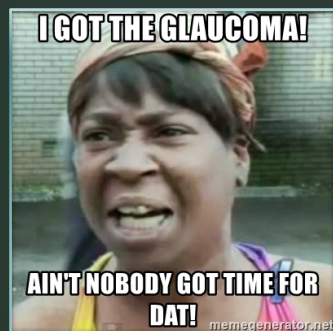


2014 Management

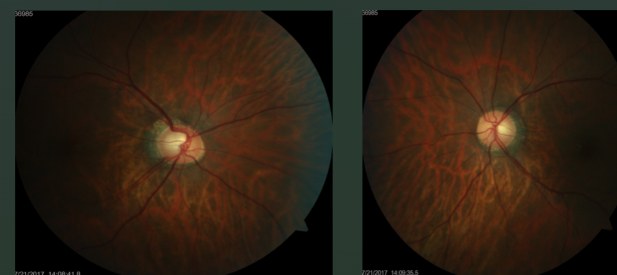
- Assessment :
 - Glaucoma suspect, low risk OU
 - Thin pachs (s/p LASIK)
 - ? Beginning nasal step OD
 - No family hx**
 - normal range IOP OU
- Plan:
 - Continue monitoring. RTC **6m** for IOP check and OCT.

2017 Return

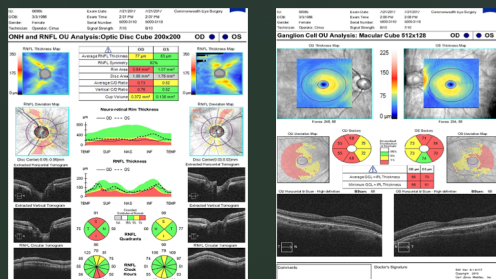
- Pt returns in **2017**
- IOP: 17/14
- ONH: OD: 0.70
- OS: 0.50



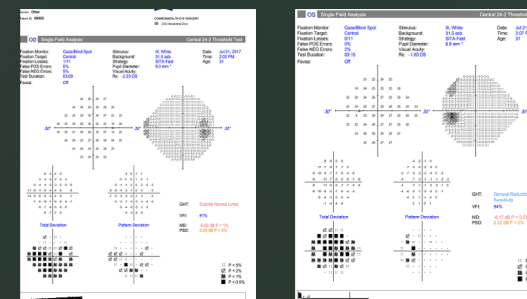
2017 Discs



2017 OCT



2017 HVF



2017 Management

- Assessment: Glaucoma, Open angle mild stage OD.
- Superior and inferior thinning on RNFL compared to 2014. GCC shows thinning OD and OS. ONH asymmetry OD>>OS.
- Plan: Discussed SLT vs gtts.
- Pt prefers drops for now. Start Lumigan qhs OD(sample given).
- RTC 1m for IOP check.
- IOP at 1m follow up: 9/12 mmHg
- Change in insurance, needs to transfer care to UK.



Case 1 NG 66985 2018

- Back at CES end of 2018
- Pt is pregnant and does not want to use drops in OS.
- Continue Lumigan qhs OD during pregnancy.
- 2019: After pregnancy. Using Lumigan qhs OU every 2-3 nights. Last used 2 days ago.
- Discussed SLT due to poor compliance. She prefers drops.
- IOP is up to 18/16 mmHg. Discussed compliance.



2019 - 2020

- 06/2019: First time seen by TP
- 06/2019: Using drops every other day, hasn't used in 1 week b/c using allergy drops.
 - IOP 20/20 mmHg
 - Highest IOP since 2014 at CES. Discussed benefits of SLT. Pt agrees to SLT.
- Plan: SLT OD then OS.
- Continue Lumigan qhs OU for now.
- 7/2019: SLT OD

SLT Parameters:	
SLT with Magnaview Gonioscens 3-nc 400 micron spot size	
Takes	103
Milipules	1.0

- IOP 30 mins post SLT OD: 12mmHg
- Use Acular LS QID x 3 days OD
- 08/05/2020: 1 year post SLT OU
 - IOP: 10/9mmHg

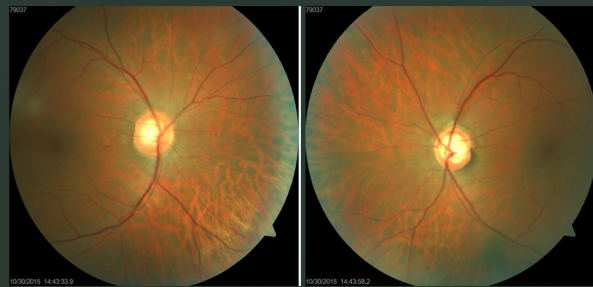


Case 2 SG 79307

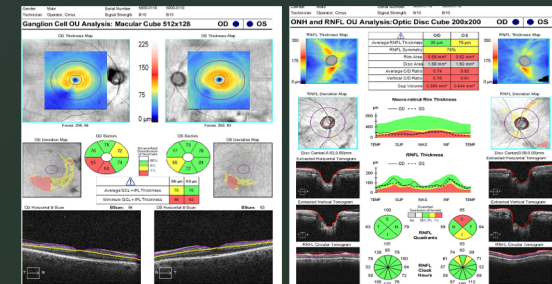
- CC: 59 yo wm, referred for glaucoma eval. Wears monovision CL (2015). Primary OD was monitoring but has noticed some worsening.
- VA CC: OD: J1+ and OS: 20/25+1
- CVF: FTFC OD and OS
- PERRL, no APD OU
- SL exam: 1+NS, AC: D&Q
- IOP: 19/18 mmHg
- Pachs: 576 / 576
- ONH:
 - OD:0.70 no Drance heme
 - OS:0.70 no Drance heme
 - Note disc size
 - Choroidal nevus, OS



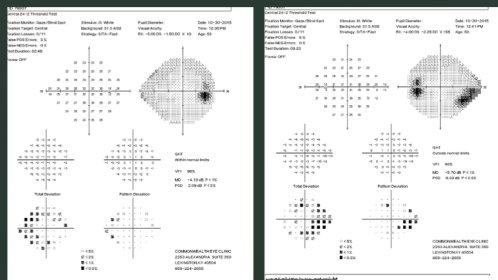
SG 79307 (2015)



SG 79307 (2015)



SG 79307 (2015)



SG 79307 (2015)

- Assessment:
 - Glaucoma suspect, Open angle OS>OD. High risk
 - No definite VF defect OD, possible inferior nasal step OS (first HVF)
 - Normal range IOP without drops.
- Plan:
 - RTC **2 weeks** for IOP check and Gonioscopy.
 - Will consider initiating tx at the follow up.



SG 79307 (2021)

- Primary OD calls on 1/21 and would like the patient to be seen ASAP.
- Referring OD knows that the patient is bad at keeping appts but wants us to schedule him for GLC work up **ASAP**. IF we can get him to come in.

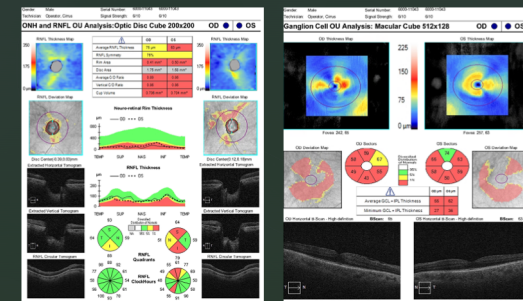


SG 79307 (2021)

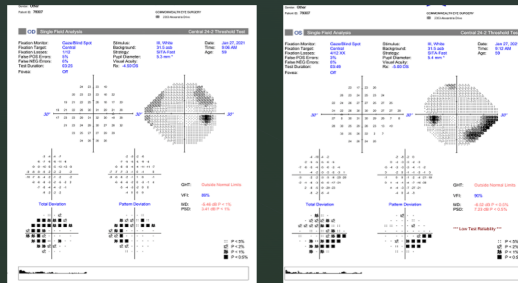
- | | |
|--|---|
| <ul style="list-style-type: none"> VA CC: <ul style="list-style-type: none"> OD: 20/30-2 OS: 20/25-3 (-)fam hx for ocular dx. HVF: FTFC OD and OS PERRL, no APD OD and OS SL: trace-1+ NS OD and OS IOP: 20/19 mmHg | <ul style="list-style-type: none"> CV: 14/14 Gonio: TM visible OD and OS. Pachs: 591/593 ONH: <ul style="list-style-type: none"> OD: 0.80/0.85v, no drance heme OS: 0.80/0.85v, no drance heme |
|--|---|



SG 79307 (2021)



SG 79307 (2021)



SG 79307 (2021)

- Assessment:
 - POAG OU
 - HVF defect OD and OS that correlates to ONH and OCT.
 - Discussed compliance, SLT vs drops.
- Plan:
 - SLT OD then OS
 - Start Lumigan qhs OU. D/C after SLT depending on IOP control.

SG 79307 (2021)

- SLT OD
- Use Acular LS 0.4% QID x 3 days
- 30 mins post SLT IOP:
 - OD: 13 mmHg

SLT Medications Pre Op

	Time 1/initials
Proparacaine 0.5% 2 gtt	1106 cm
Iopidine 0.5% 1 gtt	1106 cm
SYSTANE® Gel Drop 2gtt	
Diamox (Acetazolamide) 500 mg po	1106 cm

SLT Parameters:

Takes	SLT with Magnaview Gonioscens 3 nq 400 micron spot size
Millijoules	88
	73

SG 79307 (2021)

- 3 weeks s/p SLT OD
- SL: unremarkable
- IOP: 11/10 mmHg
- D/C Lumigan QHS OD, Continue in OS
- Plan: SLT OS today, RTC 1m for IOP check.

SG 79307 (2021)

SLT OS

SLT Medications Pre Op	
	Time 1/initials
Proparacaine 0.5% 2 gtt	8:55 km
Iopidine 0.5% 1 gtt	8:55 km
SYSTANE® Gel Drop 2gtt	
Diamox (Acetazolamide) 500 mg po	8:50 km

- Use Acular LS 04% QID x 5 days
- 30 mins post SLT IOP:
 - OS: 10 mmHg

SLT Parameters:	
Takes	SLT with Magnaview Gonioscens 3 mc 400 micron spot size
Millijoules	107/1.0
	102

SG 79307 (2021)

- Follow up
 - 2m s/p SLT OD, no drops
 - 1m s/p SLT OS, still on Lumigan QHS.
 - IOP: 13/12 mmHg
- Plan:
 - Discontinue Lumigan OS. RTC 1m for IOP check.
 - 4/21/21: TA 10 mmHg OU, no meds

SLT for NTG BMC Ophthalmology

- Efficacy of a single SLT in NTG: decrease in IOP and meds at 1year
- Inclusion criteria: NTG pts on glc meds
- Exclusion criteria: previous glc sx, SLT or intraocular sx.
- All underwent 1m washout.
- Target: 30% reduction in IOP.
- 1 session of SLT 360 degrees
- Meds restarted at 1 month post SLT
- IOP checked at 3,6, and 12m.

<https://www.bmcophth.com/content/10/1/108/10714955-0-1>

SLT for NTG BMC Ophthalmology

- Results:
 - 41 eyes
 - Mean pre op IOP 14.3 ± 3.4 mmHg while on 1.5 ± 0.8 meds
 - post-washout IOP was 16.2 ± 2.2 mmHg
 - Mean IOP at 12m: 12.2 ± 2.2 mmHg while on 1.1 ± 0.9 meds
- Statistically significant decrease in # of meds following SLT (P < 0.0001)
- A single session of SLT for NTG achieved an additional 15% IOP reduction while using 27% less medication at 1 year compared to pre-study levels

<https://www.bmcophth.com/content/10/1/108/10714955-0-1>

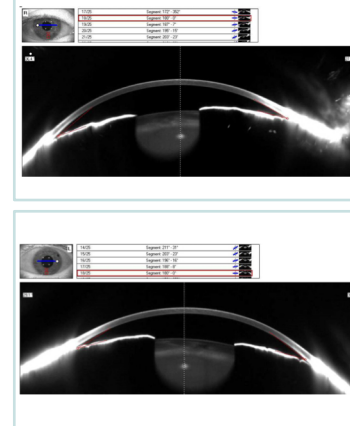
SLT vs medical therapy

- Compared SLT vs drug therapy for OAG and OHTN.
- 127 eyes
- Randomized to SLT or medical therapy (PGA) group
- Primary outcome: IOP reduction.
- Baseline IOP: 24.5Hg SLT group and 24.7mmHg for med group.
- Results: IOP post tx
 - 12m follow up
 - SLT: 18.2mmHg and Medical tx: 17.7mmHg
- No Statistically significant difference b/w the two groups
- More additional tx was necessary in med group than SLT to maintain IOP.
- Safe and effective initial tx for OAG/OHTN

Meta-Analysis of SLT vs Medical Therapy for OAG/OHTN

Secondary OAG

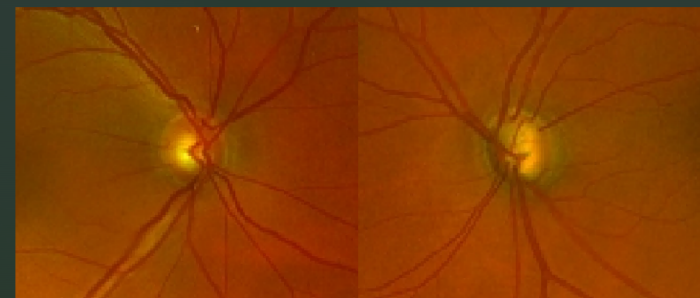
- D.B 61 yo w/ SLT eval
- Ocular hx:
 - Narrow angles, s/p LPI OU
 - Elevated IOP OS>>OD.
- Fam Hx: father- glc
- Uses "unknown" drop qhs OU for high IOP, forgot to use drop last night.
- CC VA: OD: 20/25; OS:20/25-



Secondary OAG

- CVF:
 - FTFC OD, constricted OS
- APD OS
- SL exam:
 - Vortex keratopathy OU
 - Shallow and quiet AC OU
 - PI patent OU
 - 1+ NS OU
- IOP: 20/35mmHg
- Gonio: Some TM visible, bowing anteriorly OU
- CD: 0.65 OD; 0.90 mostly cupped out OS, no drance heme OU

Fundus photos



Secondary OAG

- Assessment:
 - Elevated IOP OS
 - Narrow angles OU
 - s/p LPI OU
 - Cataracts: Not visually significant.
- Plan:
 - SLT OS
 - Start Combigan BID OS.
- 2m follow up s/p SLT OS
 - No longer on Combigan
- IOP: 21/18 mmHg
- Plan: Primary OD will continue monitoring.

The Laser in Glaucoma and OHTN (LiGHT) trial

- Is SLT or medical tx superior in OHTN and POAG.
- Prospective, multicenter, pragmatic, randomized controlled trial.
- 718 untreated patients
- Method: randomized SLT vs medical therapy group. Followed for 3 years.



The Laser in Glaucoma and OHTN (LiGHT) trial

- Outcomes based of several criteria: quality of life, efficacy, cost, and safety (EQ-5D-5L).
- Results: 555 POAG, 163 OHTN
 - 70% Caucasians
 - Median IOP pre tx: OHTN: 26mmHg, POAG: 23mmHg
 - Median baseline VF deviation: OHTN: -0.81dB, POAG: -2.82dB
 - Cost of SLT £205 vs over the 36 months of the trial, drops for OAG and ocular hypertension cost an additional £465
 - SLT as first line tx reduced costs and has similar or better IOP lowering compared to medical therapy.

The Laser in Glaucoma and OHTN (LiGHT) trial

- Conclusion:
 - SLT provides better IOP stability than drops with lower costs.
 - ~75% of the patients had good IOP control at 36 months without drops.
 - Medical tx group had slightly higher rate of VF progression.

THANK YOU



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Teng, C., MD. (n.d.). Search Selective Laser Trabeculoplasty (SLT) Compilation [Video]. <https://www.youtube.com/watch?v=-umZO624hKQ>