

ALT, SLT, LPI, ECP: Glaucoma Laser Alphabet Soup

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I. Laser Alphabet Soup

- A. ALT – Argon Laser Trabeculoplasty
- B. SLT – Selective Laser Trabeculoplasty
- C. LPI – Laser Peripheral Iridotomy
- D. ECP – Endoscopic Cyclophotocoagulation

II. ALT

- A. Standardized Laser Protocol 1979
 - 1. Mechanical effect – thermal burn
 - 2. Endothelial cellular activity
 - 3. Lowers IOP by 20–30% (5–8mmHg)
 - 4. Reduces diurnal IOP elevation by 25%
- B. Success Rate for ALT
 - 1. POAG: 80-97%; 1 year: 77-81%
 - 2. PXE: 97%; 1 year: 44-80%
 - 3. Pigment: 95%; 1 year: 44-80%
 - 4. Average: 50% at 5 years
- C. ALT Technique
 - 1. Target junction between pigmented and non-pigmented trabecular meshwork
 - 2. Spot size 50µm, 0.1 sec duration
 - 3. Power 600-800mW
 - 4. Blanching of TM or vaporization bubble
- D. 180 vs. 360 Degree Treatment – 180 Degrees
 - 1. Less post-operative iritis
 - 2. Less risk of IOP spike
 - 3. Remaining 180 degrees can be treated later
- E. 180 vs. 360 Degree Treatment – 360 Degrees
 - 1. Better initial IOP lowering
 - 2. Longer duration of effectiveness
 - 3. Less delay to do filter surgery if ALT not effective
- F. Glaucoma Laser Trial
 - 1. Compared ALT to Timolol 0.5%
 - 2. ALT – 61%: 1 year; 44%: 2 years
 - 3. Initially treated with ALT – needed less meds
 - 4. ALT at 7 years – lower IOP; less VF loss

5. ALT as first-line therapy

G. Complications of ALT

1. Early IOP spike (pre-treat with glaucoma meds)
2. Iritis – 49% (post-laser steroids)
3. PAS – 46% by 3 months (do not treat PTM/CB)
4. Hyphema – 2-5% (avoid vessels)
5. Corneal burn

III. SLT

A. Mechanism of Action

1. Selective photothermolysis of trabecular meshwork melanin granules
2. Short 3 nsec pulse – confines heat to target tissue
3. No widespread tissue destruction
4. Macrophage recruitment – clears pigment from trabecular meshwork

B. SLT Technique

1. Q-switched frequency doubled Nd:YAG
2. Spot size 400 μ m, 3 nsec duration
3. Power 0.8 to 1 mJ per pulse
4. Can treat 360 degrees
5. Adjust power to just before vaporization bubble

C. Success Rate For SLT

1. POAG: 90%, 6 months; 2 years: 75%
2. Not affected by degree of pigment in trabecular meshwork
3. Selective uptake – even light pigmentation responds
4. Heavy pigment – potential pressure spike afterwards
5. Repeatable

D. Complications of SLT

1. Iritis – 47% (post-laser NSAIDS)
2. IOP spike (pre-treat with glaucoma meds)

IV. LPI

A. Indications

1. Acute angle closure
2. Chronic angle closure
3. Intermittent angle closure
4. Incomplete surgical iridectomy
5. Occludable/narrow angle

B. Laser Protocol

1. Argon – pigment dependent
2. Nd:YAG – mechanically tears tissue
3. Treat superior iris – prevents monocular diplopia
4. Treat iris crypt – thinner tissue

C. Complications of LPI

1. Pupil distortion – seen with Argon
2. IOP spike > 10 mmHg in 20-30%
3. Hemorrhage: 20-40% of Nd:YAG
4. Corneal epithelial/endothelial burn
5. Iritis – treat with post-laser steroids
6. Lenticular opacities – Argon
7. Retinal/macular burn – Argon
8. Monocular diplopia
9. Patency failure – Argon

V. ECP

A. Terminology

1. Laser endoscope (endoprobe) – 810nm
2. endoscopy unit (console)
3. 20-gauge handpiece with optical fibers
 - a. image guide
 - b. light guide
 - c. laser guide
4. 110 degree panoramic field of view
5. depth of focus 1mm to 30mm

B. ECP Technique

1. Limbal vs. pars plana approach
2. Endoscope under iris, watch video monitor
3. 0.25 – 0.30 watts, continuous mode
4. Whiten and shrink ciliary processes
5. Try to treat 360 degrees
6. Post-laser: steroids every 2 hours
7. Stop glaucoma meds: 6 – 8 weeks

C. ECP Contraindications

1. Active uveitic glaucoma
2. IOP > 40 mmHg

D. Success Rate For ECP

1. 90% mean follow-up 13 months
2. 68% require at least one fewer glaucoma medication
3. Can combine with cataract surgery
4. Comparable results to trabeculectomy and shunt valve
5. Repeatable

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