Glaucoma Laser Surgery
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LASER

- Originated as an acronym
  - Light Amplification by Stimulated Emission of Radiation
- Device that produces a nearly parallel, nearly monochromatic, and coherent beam of light by exciting atoms and cause them to radiate their energy in phase

Webster’s Dictionary
LASER

• First laser was built in 1960 by Theodore Maiman based on the theoretical work of Townes and Schawlow

• Development of many scientific, military, medical and commercial laser applications since its invention.
LASER

• Basic Design
  ▫ Gain medium
  ▫ Laser pumping energy
  ▫ High reflector
  ▫ Output coupler
  ▫ Laser beam
GLAUCOMA LASER SURGERY

Treatment goal:
1. Improve the balance of aqueous inflow and outflow
2. Improving/lowering the intraocular pressure
General Guidelines

• Informed consent
• Preparation of the patient
  ▫ Pre-operative medications
  ▫ Materials needed for the procedure
• Laser safety
• Post operative care
  ▫ IOP 1 hour post laser
  ▫ Post operative follow-up
GLAUCOMA LASER SURGERY

I. Laser directed to the trabecular meshwork
II. Laser directed to the iris
III. Laser directed to the ciliary processes
IV. Laser directed to the anterior hyaloid
V. Laser directed to enhance post incisional glaucoma surgery
Laser directed to the trabecular meshwork

Laser Trabeculoplasty
LASER TRABECULOPLASTY

• Introduced in 1979 by Wise and Witter
• Utilization of a continuous-wave argon laser, operated in the blue-green wavelength spectrum (454-529)
• Glaucoma Laser Trial (1990): procedure was at least efficacious as topical medical therapy
LASER TRABECULoplasty

- Despite favorable results, laser therapy did not replace medications as primary therapy for POAG (attrition in efficacy over time and introduction of PGAs)
- Limited to being an adjunctive therapy or intermediate step between failed med therapy and surgical intervention
LASER TRABECULOPLASTY

- Selective Laser Trabeculoplasty (1995)
- ALT vs SLT: similar IOP reduction
- Advantage of SLT over ALT: lesser tissue destruction, possible repeatability
LASER TRABECULOPLASTY

• SLT/Med Study (2012): SLT same efficacy as medications; repeatability of procedure
  ▫ SLT reduces or eliminates lifelong need for medications
    • Solves or decreases non-compliance issue
    • Avoid adverse drug reactions
    • Reduce/eliminate inconvenience of daily medication regimens
LASER TRABECULOPLASTY

Mechanism of Action

- Laser targeting the trabecular meshwork to enhance aqueous outflow
LASER TRABECULOPLASTY

Mechanism of Action

• Theories:

1. Mechanical

  ▫ Collagen and tissue contraction, and mechanical tightening of the trabecular ring (van der Zypen 1979)
  ▫ Not manifested in SLT
LASER TRABECULOPLASTY

Mechanism of Action

- Theories:
  
  2. Biochemical
    - Thermal energy modifies cellular activity
    - Secretion of cytokines
    - Induction of matrix metalloproteinases
    - Recruitment of monocytes
LASER TRABECULOPLASTY

Mechanism of Action

3. Cellular

- ALT stimulates increased cell division and repopulation of TM
- Repopulating cells perform the functions of trabecular endothelial cells (phagocytosis)
- Trabecular cells serve as pluripotent cells for TM
LASER TRABECULOPLASTY

Indications:

1. Ocular hypertension
2. Primary and secondary open angle glaucoma (including PDG and PXF)
3. Steroid induced glaucoma
4. Narrow angle glaucoma except if with synechial closure
LASER TRABECULOPLASTY

Contraindications:
1. Inflammatory glaucoma
2. ICE syndrome
3. Developmental glaucoma
4. Neovascular Glaucoma
5. Not effective in angle recession glaucoma (distortion of angle anatomy and TM scarring)
6. Lack of effect in one eye
LASER TRABECULOPLASTY

Goniolens
(Goldmann 3-mirror lens, Ritch lens or Latina Lens)
LASER TRABECULOPLASTY

Technique

• Aiming beam
  ▫ ALT – junction of the anterior non-pigmented and posterior pigmented edge of TM
  ▫ SLT – centered over trabecular meshwork and straddles the entire TM
LASER TRABECULOPLASTY

Technique

- ALT: 50 µm spot size; 0.1s duration, power 500-1200mW
- SLT: 400 µm spot size; pulse 0.3ns; power 0.8-1.4mJ
- Greater TM pigmentation, lower power
- Lesser TM pigmentation, higher power
- Presence of champagne bubble or blanching of the TM.
- 50 spots over 180° (100 spots over 360°)
LASER TRABECULOPLASTY

Post-operative follow-up

- Follow up after 1-2 weeks, then 4-6 weeks then 3-4 months
- Patients are instructed to resume their usual anti-glaucoma drops after the laser
- Usually a decision to modify therapy based on IOP response after 6-8 weeks
LASER TRABECULOPLASTY

Complications:
1. Transient IOP elevation
2. Mild iritis
3. Peripheral anterior synechia
4. Corneal edema
5. Hyphema
6. Retreatment
New Generation Laser Trabeculoplasty

1. Micropulse Diode Laser Trabeculoplasty
   - Large spot, low irradiance treatment that emits a series of short, repetitive, near-infrared pulses
   - Each micropulse elevates the temperature trabecular cells enough to denature proteins but not high enough to cause coagulation necrosis
LASER TRABECULOPLASTY

New Generation Laser Trabeculoplasty

2. Titanium: Sapphire Laser Trabeculoplasty
   ▫ Delivers more energy per pulse than SLT, thus penetrating the angle more deeply
   ▫ Studies comparing ALT and TSLT showing lesser tissue damage of TSLT
LASER TRABECULOPLASTY

New Generation Laser Trabeculoplasty

3. Pattern Scanning Trabeculoplasty
   ▫ Computer-guided treatment method
   ▫ Apply a sequence of pattern laser spots onto the TM
   ▫ Thought to achieve a cellular response with less tissue scarring and coagulative damage
## LASER TRABECULOPLASTY

<table>
<thead>
<tr>
<th></th>
<th>SLT</th>
<th>MLT</th>
<th>TSLT</th>
<th>PLT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wavelength</td>
<td>532 nm</td>
<td>532, 577 or 810 nm</td>
<td>790 nm</td>
<td>532 or 577 nm</td>
</tr>
<tr>
<td>Spot size</td>
<td>400 μm</td>
<td>200–300 μm</td>
<td>200 μm</td>
<td>100 μm</td>
</tr>
<tr>
<td>Pulse duration</td>
<td>3×10^{-9} s</td>
<td>200–300×10^{-3} s</td>
<td>5–10×10^{-3} s</td>
<td>5–10×10^{-3} s</td>
</tr>
<tr>
<td>Energy or power per pulse</td>
<td>0.6–1.2 mJ</td>
<td>1000–2000 mW</td>
<td>30–50 mJ</td>
<td>500–1000 mW</td>
</tr>
<tr>
<td>Mechanism</td>
<td>Selective destruction of pigmented trabecular meshwork cells without thermal or collateral damage</td>
<td>Thermal effects without trabecular meshwork damage in repetitive microsecond pulses followed by intermittent rest period</td>
<td>Near-infrared energy with deeper penetration into the juxtacanalicular meshwork and the inner wall of Schlemm’s canal</td>
<td>Sequence of pattern laser spots on the trabecular meshwork without overlapping, much shorter pulse durations with more spots for the same area to reduce thermal injury diffusion distance</td>
</tr>
<tr>
<td>Recommended number of applications</td>
<td>50 or 100 confluent spots</td>
<td>60–100 spots or confluent spots</td>
<td>50 adjacent, non-overlapping laser spots</td>
<td>8 or 16 segments</td>
</tr>
<tr>
<td>Recommended extent of trabecular meshwork treatment</td>
<td>180° or 360° of trabecular meshwork</td>
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</tr>
<tr>
<td>Expected endpoint</td>
<td>Small bubbles</td>
<td>No visible tissue reaction</td>
<td>Mini-bubble or burst of pigments</td>
<td>No visible tissue reaction after energy titration</td>
</tr>
<tr>
<td>Repeatability</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes (theoretically)</td>
<td>Unknown</td>
</tr>
<tr>
<td>Common complications</td>
<td>IOP spikes and anterior uveitis</td>
<td>Burning or heat sensation. IOP spikes and anterior uveitis are uncommon</td>
<td>IOP spikes are possible</td>
<td>Transient IOP spikes are possible</td>
</tr>
</tbody>
</table>

IOP, intraocular pressure; MLT, micropulse laser trabeculoplasty; PLT, pattern scanning trabeculoplasty; SLT, selective laser trabeculoplasty; TSLT, titanium-sapphire laser trabeculoplasty.
Laser directed to the iris

Peripheral Laser Iridotomy

Laser Iridoplasty
LASER PERIPHERAL IRIDOTOMY

- Concept of iridectomy as an effective treatment for glaucoma (1857)
- Incisional iridectomy by Albrecht von Graefe
- Mechanism of pupillary block as precipitating cause of ACG and resolution with peripheral iridectomy by Curran (1920)
LASER PERIPHERAL IRIDOTOMY

- Xenon arc photocoagulator by Meyer-Schwickerath (1956)
  - High incidence of corneal and lens opacities
- Ruby laser (1960s)
  - Success rate was high in brown irides
  - Inconsistent results with blue irides
LASER PERIPHERAL IRIDOTOMY

- Continuous wave argon laser (1970s)
- Q-switched neodymium:YAG
- Infrared diode laser
LASER PERIPHERAL IRIDOTOMY

Mechanism of action

• Creation of a hole in the peripheral iris to create a new pathway for the aqueous fluid to drain from the eye
LASER PERIPHERAL IRIDOTOMY

Mechanism of action

- Allows the iris to fall back to its normal position restoring the normal balance between the fluid behind and in front of the iris.
LASER PERIPHERAL IRIDOTOMY

Indications:
1. Primary angle-closure (acute, subacute, chronic)
2. Fellow eye of acute angle-closure glaucoma
3. Narrow/occludable angle
4. Miscellaneous conditions (phacomorphic glaucoma, aqueous misdirection, nanophthalmos, pigment dispersion syndrome, plateau iris syndrome)
LASER PERIPHERAL IRIDOTOMY

Contraindications:

1. Conditions that cause poor visualization of the iris
   a. Corneal edema
   b. Corneal opacity
   c. Flat anterior chamber

2. Angle closure due to synechial closure of anterior chamber angle
   a. Neovascular glaucoma
   b. Iridocorneal endothelial (ICE) syndrome
LASER PERIPHERAL IRIDOTOMY

Contraindications:

3. Uncooperative patient
   a. Patients who cannot sit comfortable at the laser table
   b. Patients who cannot keep the head still
LASER PERIPHERAL IRIDOTOMY

Materials:

- Abraham iridectomy lens or Wise lens
  - Plano-convex button affixed to the anterior surface which adds increased convergence to the laser beam, reducing the laser diameter thus increasing power density at the iris and decreasing it at the cornea
LASER PERIPHERAL IRIDOTOMY

• Location of the iridotomy site
  ▫ Superior quadrant is advised so site is covered by the upper lid
  ▫ Easier to achieve where iris is thinnest (base of iris crypts)
LASER PERIPHERAL IRIDOTOMY

• Continuous wave argon laser (1970s)
  ▫ Thermal effect (linear absorption) that depends on heat absorption of pigmented tissues
  ▫ Various combinations of laser parameters have been used depending on the method applied
    • Punch technique (higher power, shorter duration)
    • Thinning technique (lower power, longer duration)
LASER PERIPHERAL IRIDOTOMY

- Q-switched neodymium:YAG
  - Electromagnetic photodisruption (non-linear absorption) that is independent of iris pigmentation
  - Range employed depends on whether or not tissue has been thinned out by argon or not
    - Nd:YAG only (power: 3-7mJ with 1-2 pulses)
    - Thinned by argon (lower power)
LASER PERIPHERAL IRIDOTOMY

Q-switched neodymium:YAG

- Currently the preferred laser for performing iridotomies in many eyes
  - Fewer applications
  - Iridotomies easy to create regardless of iris pigmentation
  - Smaller sized iridotomy but do not close as often as in the argon in non-uveitic pupillary block
LASER PERIPHERAL IRIDOTOMY

Post-operative treatment and follow-up

• If pressure elevated, control and follow up the next day; otherwise follow up after 1 week to check patency of iridotomy site and check for significant inflammation
LASER PERIPHERAL IRIDOTOMY

Post-operative treatment and follow-up

- 1 month post op, check iridotomy patency, IOP gonioscopy, slitlamp and dilated fundus exam.
- Most closures occur within the first month following treatment; rare if patent for 6 weeks
LASER PERIPHERAL IRIDOTOMY

Complications:

1. Postoperative IOP spike
2. Intraocular inflammation
3. Iris bleeding and hyphema
4. Focal cataract
5. Posterior synechiae
6. Visual symptoms (blurred vision, haloes, lines, glare, diplopia)
LASER PERIPHERAL IRIDOTOMY

Complications:

7. Corneal decompensation
8. Miscellaneous (aqueous misdirection, recurrent herpetic keratouveitis, retinal/subhyaloid hemorrhage, choroidal/retinal detachment after argon LPI, stage I macular hole)
9. Closure of iridotomy site
LASER IRIDOPLASTY

• Gonioplasty by Krasnov and Kimbrough (late 1970s)
• Effort from penetrating to slower-burn contraction technique (iridoplasty)
• Argon laser: refinement of the technique that increased both anatomical and clinical success
LASER IRIDOPLASTY

Mechanism of action

• laser light is converted to heat causing contraction, thinning and flattening of the peripheral iris

• facilitates mechanical widening of the angle, visualization of angle structures and release of PAS.
LASER IRIDOPLASTY

Mechanism of action

• Short-term effect: due to heat shrinkage of collagen
• Long-term effect: due to contraction of a fibroblastic membrane
LASER IRIDOPLASTY

Indications:
1. Acute angle closure
2. Chronic angle closure
3. Plateau iris syndrome
4. Angle closure due to size/position of lens
5. As adjunct to laser trabeculoplasty
6. Nanophthalmos
LASER IRIDOPLASTY

Contraindications
1. Severe and extensive corneal edema/opacity
2. Flat anterior chamber
3. Synechial angle closure
LASER IRIDOPLASTY

Materials:

- Argon laser
- Abraham iridotomy lens/Ritch lens or Goldmann three-mirror lens
- Glycerin
LASER IRIDOPLASTY

• Settings: (to produce contraction burns)
  ▫ Using Abraham lens
    • 500µm spot size, 0.5-0.7s duration, and initially 240mW power
  ▫ Using Ritch/Goldmann 3-mirror lenses (use with caution)
    • Higher power, lower spot size
    • Can cause stromal destruction and inadvertent damage to TM
LASER IRIDOPLASTY

• Settings:
  ▫ Increased if no visible contraction/deepening of peripheral anterior chamber
  ▫ Decreased if there is bubble formation
  ▫ Lighter irides require more power than darker ones
  ▫ 20-24 spots over 360°
LASER IRIDOPLASTY

Post-operative treatment and follow-up

• Follow up in 1 week

• Follow for possible retreatment due to recurrence of appositional closure
LASER IRIDOPLASTY

• Complications:
  1. Mild post-operative iritis
  2. Diffuse corneal endothelial burns (larger and less opaque than post laser iridotomy)
  3. Transient increase in IOP
  4. Pigmented burn marks at laser sites
  5. Iris atrophy
  6. Decompression retinopathy
  7. Relatively widely dilated pupils (photophobia and anxiety) – may normalize in time
Laser directed to the ciliary processes

- Transcleral cyclophotocoagulation
- Endolaser cyclophotocoagulation
- Transpupillary cyclophotocoagulation
LASER CYCLOPHOTOCOAGULATION

• Destruction of ciliary body started in the 1930s
• Different methods include surgical excision, diathermy, cryotherapy, ultrasound and laser light
• Cyclophotocoagulation: most common procedure to perform cyclodestruction and can be performed using different laser wavelengths (ruby laser, Nd:YAG, argon, diode)
LASER CYCLOPHOTOCOAGULATION

• Diode laser (810nm wavelength) is the preferred laser since melanin in the ciliary epithelium better absorbs the laser’s wavelength thus more targeted destruction with less inflammation
  ▫ Delivered through transcleral, endoscopic probe or transpupillary
LASER CYCLOPHOTOCOAGULATION

Mechanism of Action

• Laser treatment of ciliary process to decrease inflow of aqueous humor and reduce IOP
• Laser applied through the anterior sclera (TSCPC) or through invasive direct application to the ciliary process (ECP or TPCPC)
Transcleral Cyclophotocoagulation

Indications:
1. Elevated IOP with poor vision/poor visual potential
2. Pain relief due to elevated IOP in a blind, painful eye
3. Glaucoma with severe conjunctival scarring
4. Medical condition precluding invasive surgery
5. Patients’ refusal to undergo invasive surgery
6. Primary surgical treatment for glaucoma
Transcleral Cyclophotocoagulation

Indications:
7. Refractive primary ACG, OAG
8. Neovascular glaucoma
9. Pseudophakic/aphakic glaucoma
10. Pediatric glaucoma
11. Glaucoma post PKP
12. Uveitic glaucoma
13. Silicone oil induced glaucoma
Transcleral Cyclophotocoagulation

• Materials
  ▫ 810-nm diode laser with G-probe
Transcleral Cyclophotocoagulation

• Materials
  ▫ Retrobulbar injection (50:50 mix of 2% lidocaine and 0.75% bupivacaine ± hyaluronidase)
  ▫ Lid speculum
  ▫ BSS to moisten ocular surface
  ▫ Cotton-tipped applicator to rotate/stabilize eyes
  ▫ Prednisolone acetate
  ▫ Atropine
Transcleral Cyclophotocoagulation

Surgical Procedure

▪ Initial settings: duration of 2000ms and power of 2000mW
▪ Inspection of G-probe for defects that may cause conjunctival injury/suboptimal transmission of energy
Transcleral Cyclophotocoagulation

Surgical Procedure

- Position the probe at the limbus to ensure the footplate is in complete contact with ocular surface
Transcleral Cyclophotocoagulation

Surgical Procedure

- Increase power until an audible “pop” is heard indicating overtreatment (lower power)
- Ocular surface must be wet at all times to prevent overheating and burning of conjunctiva and underlying tissues
Post-operative care:

- 1 gtt of Prednisolone and atropine immediately post op and patch overnight
- Day 1 post op: start prednisolone 4-6x/day and cycloplegics 2-4x/day
- Anti-glaucoma meds to be tapered
- Prednisolone and cycloplegics to be tapered based on inflammation and patient comfort
Endoscopic Cyclophotocoagulation

- Offers direct visualization of the ablation’s location and effect on target tissue; allows adjustment of treatment parameters to optimize tissue response and spares underlying pigmented tissue.
Endoscopic Cyclophotocoagulation

- Historically reserved for disease refractory to medical or other surgical interventions
- With refinement of equipment, may be used earlier in the course of treatment
- Effective in treating pediatric glaucoma refractory to other medical/surgical interventions
Endoscopic Cyclophotocoagulation

• Indications

1. Refractory glaucoma
2. Neovascular glaucoma
3. Glaucoma undergoing phacoemulsification as alternative to combined cataract and glaucoma filtering surgery
4. Eyes with medically controlled glaucoma undergoing phacoemulsification (to reduce dependence on medical glaucoma treatment)
Endoscopic Cyclophotocoagulation

Surgical procedure
• Anesthesia
  ▫ Retrobulbar anesthesia
  ▫ Topical anesthesia
    • Lidocaine jelly onto the cornea
    • Intracameral PF lidocaine into the anterior chamber
Endoscopic Cyclophotocoagulation

Approaches:

1. Pars plana
   - Easier for phakic/aphakic vitrectomized eye
   - Allows visualization of ciliary processes completely
Endoscopic Cyclophotocoagulation

Approaches:

2. Clear cornea incision
   ▫ Can proceed regardless of phakic status and may be done without vitrectomy/create incisions proximate to retina
   ▫ Incisions are self-sealing
   ▫ Possible injury to cornea and iris, and incomplete visualization of ciliary process
Endoscopic Cyclophotocoagulation

Components of ECP laser unit:
- Diode laser (pulsed continuous-wave energy at 810 nm)
- Xenon light source
- Helium-neon aiming beam
- Video monitor and recorder
- Endoprobe (20 gauge with a full view of 110° and depth of focus of 1-30 nm)
Endoscopic Cyclophotocoagulation

• Technique:
  ▫ Adequate cohesive viscoelastic applied between the iris and the anterior lens capsule
  ▫ Laser probe is placed inserted in the anterior chamber using a surgical microscope
Endoscopic Cyclophotocoagulation

• Technique:
  ▫ Locate the ciliary processes through the video monitor and perform the laser photocoagulation
  ▫ Entire ciliary process should be treated (180-360°)
Endoscopic Cyclophotocoagulation

- **Technique:**
  - **Settings:** Power 0.2W, continuous wave mode
  - **Goal:** achieve whitening and shrinkage of the ciliary process by positioning the probe closer or further from processes
  - At the end of procedure, viscoelastic is removed, inflate anterior chamber with BSS and seal the wound
Endoscopic Cyclophotocoagulation

• Post-operative care
  ▫ 1 gtt of prednisolone, NSAID and a 4th gen fluoroquinolone
  ▫ 3 meds serve as post op drops with tapering of steroids slowly over 1-2 months to control inflammation
Transpupillary Cyclophotocoagulation

- Indicated in patients who have visible (anterior) ciliary processes
- Performed with a slit-lamp delivery system through a Goldmann three-mirror lens
- Most useful in patients with traumatic aniridia or very large sector iridectomies
- Can be effective in treating malignant glaucoma
Transpupillary Cyclophotocoagulation

• Can be performed with argon green or frequency doubled Nd:YAG laser
• Long-term pressure control is short
• Results are variable
• Limiting factor in this procedure may be total number of ciliary processes visualized and treated
LASER CYCLOPHOTOCOAGULATION

Complications:

1. Complications from the retrobulbar anesthesia
   a. Pain
   b. Bleeding
   c. Infection
   d. Injury to retro-orbital vessels and optic nerve
   e. Bruising
   f. Periorbital swelling
LASER CYCLOPHOTOCOAGULATION

Complications:
2. Pain
3. Hyphema
4. Iridocyclitis
5. Chronic low-grade AC inflammation
6. Conjunctival burns
7. Hypotony
8. Vision loss
LASER CYCLOPHOTOCOAGULATION

Complications:

9. Phthisis bulbi
10. Malignant glaucoma
11. Necrotizing scleritis
12. Sympathetic ophthalmia
LASER CYCLOPHOTOCOAGULATION

Complications reported with ECP:

1. Fibrin exudates
2. Hyphema
3. Cystoid edema
4. Vision loss
5. Traumatic injury to iris
6. Phthisis bulbi (rare)
7. Endophthalmitis (rare)
8. Sympathetic ophthalmia (rare)
Laser directed to the anterior hyaloid
HYALOID DISRUPTION

• Use of Nd:YAG laser to treat aqueous misdirection/malignant glaucoma
HYALOID DISRUPTION

- Perform a capsulotomy (pseudophakic eye) and disruption of anterior hyaloid in an attempt to create a passageway for aqueous to flow forward instead of being trapped in the vitreous
- Post-op atropine and steroids
HYALOID DISRUPTION

• Complications:
  ▫ Worsening of elevated intraocular pressure, CME, retinal detachment, cataract, IOL damage, endophthalmitis, iritis, vitritis, macular holes, and corneal edema, treatment failure (proceed to vitrectomy or lensectomy/vitrectomy)
Laser directed to enhance post incisional glaucoma surgery

Internal approach
• Goniosynechiolysis
• Goniopuncture

External approach
• Laser suture lysis
• Laser for overfiltering/failing blebs
INTERNAL APPROACH

• Laser is used to remove any overlying tissue that is obstructing the outflow of aqueous
• May use argon or Nd:YAG lasers
• Uses goniolens
GONIOSYNECHIOLYSIS

• Create a vibration/incision on top of synechiae; directly incise membrane; pulling iris away from sclerostomy by shrinking
GONIOPUNCTURE

• For Post-Non Penetrating Glaucoma Surgery:
  ▫ creating small tears in the Descemet’s membrane to allow fluid to flow from the anterior chamber to scleral lake
INTERNAL APPROACH

- Complications: hyphema, iris prolapse, scarring tissue, IOP elevation, choroidal detachment, hypotony, severing the stent of the Schlemm’s canal, iritis, vitreous hemorrhage, zonular tear, retinal detachment, shallow/flat anterior chamber, cataract, corneal decompensation.
EXTERNAL APPROACH
LASER SUTURE LYSIS

• Laser is used to cut scleral flap sutures after trabeculectomy to allow more aqueous to flow without disrupting the conjunctiva
• Indicated for elevated IOP secondary to tight sutures in the early post operative period
• May use argon or diode lasers
LASER SUTURE LYSIS

• Uses nylon suture lens to provide clear view of the suture under the conjunctiva
Lasers for Overfiltering Blebs

- Remodeling the bleb with Nd:YAG or argon laser causes flattening, whitening and wrinkling of conjunctival epithelium through photocoagulation.
- Conjunctival surface may be painted with photoabsorbent dye to enhance absorption.
LASER FOR FAILING BLEBS

- Disruption of subconjunctival and episcleral fibrosis found within the bleb which prevents aqueous from escaping into the conjunctival blood vessels or percolating through the conjunctiva itself
- Use Abraham iridotomy lens
EXTERNAL APPROACH

• Complications:
  ▫ Iatrogenic bleb perforation, external aqueous leaks, flat chambers, malignant glaucoma, iris incarceration, pupillary retraction towards bleb, large blebs, conjunctival pigmentation, subconjunctival hemorrhage, elevated IOP, bleb failure, AC reaction
Post operative Follow-up

• Check IOP 1 hour post laser
• Start topical steroids/NSAIDs for 1 week