Assisting With Lasers: YAG-PC, YAG-PI, and SLT

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Objectives

• Different laser procedures
• Why is this procedure necessary
• What is necessary in the case history
• What happens in the pre-screening
• What happens in the exam
• How do we educate the patient on the procedure
• Laser use and pre-cautions
• What are post-op instructions

Overview

• The different laser procedures discussed today will be:
  — YAG-PI
  — YAG-PC
  — SLT

• The disease associated with the procedure is as follows:
  • YAG-PI = Narrow angle glaucoma
  • YAG-PC = Post-cataract procedure
  • SLT = POAG = Primary Open Angle Glaucoma
YAG

• Yttrium-Aluminum-Garnet
  Posterior Capsulotomy (PC)
  Peripheral Iridotomy (PI)

YAG Posterior Capsulotomy

Used to eliminate posterior capsular opacities

YAG-PC

• YAG-PC Posterior Capsulotomy
What is a Cataract

- A cataract is a clouding of the lens inside the eye, which leads to a decrease in vision. It is the most common cause of blindness and is conventionally treated with surgery. Visual loss occurs because opacification of the lens obstructs light from passing and being focused on to the retina at the back of the eye.

Why Is The Procedure Needed?

- Over time, the posterior capsule may opacity or cloud up. This can be a problem before the procedure, but a hazy capsule scatters incoming light rays causing blurry vision, halos, glare, and other visual disturbances. Fortunately, there is a relatively safe, simple, and painless laser procedure that can clear the central portion of the posterior capsule, allowing light to pass clearly through the implant improving the clarity of vision and reducing or eliminating the image distortion, glare, and halos. This laser procedure is called a “YAG Posterior Capsulotomy” or “YAG PC.”
- Posterior capsulotomy is a posterior dissection of the capsule.

YAG-PC Posterior Capsulotomy

- The purpose of a laser capsulotomy is to remove a PCO. This procedure dramatically improves visual acuity and contrast sensitivity and decreases glare. The visual acuity before capsulotomy can be as poor as 20/400, but barring any other visual or ophthalmologic conditions, the patient will see as well after a laser posterior capsulotomy as after removal of the original cataract. Laser capsulotomies are usually performed once a patient’s vision is worse than 20/30.
- Glare issues, mostly under driving scenarios
- Not a secondary cataract – it is PCO

Exam

- Case Hx
  - Proper justification
  - Proper testing
- Documentation
  - Chief Complaint
  - Visual Acuity/Glare testing
  - Dilated exam
- Insurance requirements
  - Requirements (pre-Authorization)
- Patient education
  - Documentation
  - Informed consent (prior to sx)

YAG-PC Risks (Informed Consent)

- Retinal Tear or Detachment – Call our office immediately if any sudden increase in flashing lights, floaters, decreased vision, a curtain or veil waiving in your vision should occur
- Increased intraocular pressure (IOP)
- Dislocation of the IOL
- Loss of vision/eye/life
- Need for further treatment or surgery

YAG-PC Procedure

Dilate using:
Mydriacyl 1% +
Neosynephrine 2.5 %
Time instilled__________

Self Dilated

Discussion of secondary membranes cataract, pacified posterior lens capsule, laser surgery

* Patient must sign an informed consent prior to procedure
Procedure Continued

Specimens: □ NONE
EBL: □ NONE

LASER TYPE:

# Shots: Abraham □
Power: □
Total power: □

Iopidine instilled post op

Post Op 1 hour IOP__________________ mmHg
TIME ______________ am / pm

Iopidine

• Apraclonidine, also known as Iopidine, is a sympathomimetic used in glaucoma therapy. It is an α2-adrenergic agonist and a weak alpha-1 adrenergic receptor agonist. Topical apraclonidine is administered at a concentration of 1% for the prevention and treatment of postsurgical intraocular pressure elevation and 0.5% for short-term adjunctive therapy in patients on maximally tolerated medical therapy who require additional reduction of intraocular pressure. **One drop is usually added one hour prior to laser eye surgery and another drop is given after the procedure is complete.**

Pre-Op and Post-Op Instructions

Patient preparations instructions for YAG Laser:

- **Pre-op Instructions:**
  - **VISUAL:**
  - Pre-operative medications (proparacaine 0.5%, nepotol 0.5%, betamethasone 0.1%, Iopidine 1%)
  - Post-Op Instructions:
  - **VISUAL:**
  - IOP check 1 hour or 1 day after the procedure
  - DO NOT change your normal glaucoma medications
  - Use the medication prescribed the day of your procedure.
  - RTO office 6 weeks after your laser procedure.
Benefits of YAG-PC

- Improved vision
- Reduction of glare, halos, and other visual disturbances

YAG Posterior Iridotomy

Used to Prevent Narrow Angle Glaucoma

The YAG-PI

- Laser peripheral iridotomy (LPI) is the preferred procedure for treating angle-closure glaucoma caused by relative or absolute pupillary block.\(^1\) LPI eliminates pupillary block by allowing the aqueous to pass directly from the posterior chamber into the anterior chamber, bypassing the pupil.\(^2\) LPI can be performed with an argon laser, with a neodymium: yttrium-aluminum-garnet (Nd:YAG) laser, or, in certain circumstances, with both.
Open vs Narrow Angle

The PI Process

Who Should Have A YAG-PI

• In patients with acute angle-closure glaucoma, LPI should be performed after intraocular pressure (IOP) and intraocular inflammation are controlled. The aim is to prevent another attack of acute angle-closure glaucoma or progression to chronic angle-closure glaucoma. In patients with chronic angle-closure glaucoma, IOP may remain the same or be lowered after LPI, depending on the extent of peripheral anterior synechia.
YAG-PI

- Laser iridotomy can be done without admitting the person to a hospital. The person may need to see his or her doctor 1 hour after laser surgery. The person will also need to see the doctor for a follow-up exam as recommended.

Exam

- Case Hx
  - Proper justification
  - Proper testing
- Documentation
  - CC
  - Visual Acuity
  - Measure angles with Gonio lens
  - DO NOT DILATE
- Insurance requirements
  - Requirements (pre-Authorization)
- Patient education
  - Documentation
  - Informed consent (prior to sx)

Miosis

- Because post-laser IOP spike is a common complication of LPI, the eye should be pretreated with topical proparacaine, pilocarpine 1%, and either apraclonidine (0.5% or 1%) or brimonidine (0.1%, 0.15%, or 0.2%); the use of apraclonidine or brimonidine significantly reduces the risk of this complication.\(^4, 5, 6\) Pilocarpine is used to stretch the peripheral iris, making it thinner and easier to penetrate.\(^2\) Higher concentrations of pilocarpine are not recommended, because they can cause paradoxical angle closure.
Caution

• The fellow eye in a patient with acute angle-closure glaucoma or chronic angle-closure glaucoma has a 50% chance of developing acute angle-closure glaucoma. Therefore, if an occludable angle is noted on examination, LPI should be performed.

Hyperopic Patients

• Certain patients, especially hyperopic patients, are at increased risk of having narrow angles. Therefore, gonioscopy should be performed. If narrow/occludable angle is noted on the examination, LPI is recommended.

Optometry vs Ophthalmology

• There is a slight difference between optometry and ophthalmology when dilating patients. The threshold for optometry is lower because it is rare on a routine exam to end with a patient with a narrow angle glaucoma attack. Ophthalmology use more medication and is engaging in surgery, therefore, the risk is higher and they may desire the YAG-PI prior surgery.
**Contraindications**

- Contraindications for LPI include conditions that cause poor visualization of the iris, angle closure due to synechial closure of the anterior chamber angle, and a patient who is unable to cooperate.

- Conditions causing poor visualization of the iris include the following:
  - Corneal edema
  - Corneal opacity
  - Flat anterior chamber
  - Neovascular glaucoma
  - Iridocorneal endothelial (ICE) syndrome
  - Patients who are unable to cooperate include the following:
    - Patients who cannot sit comfortably at the laser table
    - Patients who cannot keep the head still

**Narrow Angles**

- Acute angle-closure glaucoma
- Chronic angle-closure glaucoma
- Fellow eye of acute angle-closure glaucoma
- Narrow/occludable angle
- Miscellaneous conditions, including phacomorphic glaucoma, aqueous misdirection, nanophthalmos, pigmentary dispersion syndrome, and plateau iris syndrome
What is Selective Laser Trabeculoplasty

- It is a procedure that lowers IOP by using short pulses of low energy laser to target melanin-rich cells in the trabecular meshwork, which opens the drain where aqueous exits from the eye. This is performed in the anterior chamber.
- Current primary therapy for glaucoma is expensive medications
- Leading problem: medication compliance
Issues with Current Glaucoma Treatment

- Patient discomfort with meds
- Eye redness and irritation
- Changes in heart beat and pulse
- Changes in energy levels
- Changes in breathing
- Dry mouth
- Eye lash growth
- Blurred vision/changes in eye color
- Approximately 34% don’t react to meds

SLT Exam

- Case Hx
  - Proper justification
  - Proper testing
- Documentation
  - CC
  - Visual Acuity
- History of IOP/VF testing important
  - DO NOT DILATE (unless protocol)
- Insurance requirements
  - Requirements (pre-Authorization)
- Patient education
  - Documentation
  - Informed consent (prior to sx)

Who Would Be A Good Candidate for SLT

- SLT is a good option for most primary open angle glaucoma (POAG) patients. On average, it can lower the eye pressure by 5-7 points. It can be used as adjunctive therapy for those patients already on topical medications but may be intolerant to the medication or require a lower target eye pressure. OR, it can be used as primary treatment for patients with early/mild disease who would prefer to hold on using topical medications or do not believe they can be compliant with the every day regimen.

https://www.edow.com/glaucoma/slt-treatment-washington-dc/
**The SLT Procedure**

- SLT uses a 3 nano-second pulse
- 400 micron spot size
- Places energy on the trabecular meshwork to increase aqueous outflow by making larger openings

**Procedure Medications**

- **Tetracaine 1%**
  - 1 gtt x 2 q 5 mins
  - set 1:______ set 2: _____ (Right before going into surgery)

- **Pilocarpine 1%**
  - 1 gtt x 2 q 5 mins set 1:______ set 2: _____

- **Iopidine 0.5%**
  - 1 gtt ______________ Prior to procedure
  - 1gtt ______________ Post-operative

**Steps**

- **Pre-treatment**
  - Topical anesthetic
  - Alpha agonist (bromide tartrate)
  - Proxymethacaine hydrochloride
  - Miotic - Pilocarpine

- **Treatment**
  - Protocol for 360, 180, or 90 of TM
  - 50 shots not overlapping 3 – 9 o’clock
  - Pressure spike can be expected for up to 48 hours
  - Energy levels starts at .8m
  - Set spot size to 400nm
  - Latina SLT Gonio Lens

- **Post-treatment**
  - Acular or Ketorolac QID
  - Topical midsti
  - 24-Follow-up to monitor IOP
Risk Associated With SLT

- Complications with SLT are very rare. Post procedure inflammation is common but very mild and typically controlled with non-steroidal anti-inflammatory medications, like ibuprofen.
- Occasionally, one may have a rise in his/her eye pressure. However, this is usually transient and can be treated with topical medications for a short period of time.


SLT Laser

- Additionally, using a contact lens makes the procedure easier. The advantages of doing so include the following[1]:
  - The laser energy is concentrated at the level of the iris
  - The number of corneal epithelial burns is minimized because the lens acts as a heat sink
  - The target structure is magnified with less loss of depth of field than occurs if magnification is simply increased with the slit lamp controls
  - The lens acts as a speculum; keeping the eye open minimizes fine eye movements

[Abraham or Wei Lens](https://www.edow.com/glaucoma/slt-treatment-washington-dc/)

These come in a disposable

- Normally the procedure will be done on the lower 180 degrees of the iris and then the top 180 degrees of the iris.
- Brown eyes and Blue eyes matter
  - ALT Argon Laser Trabeculoplasty
  - MLT Micro Pulse Trabeculoplasty
SLT Risks

• Glaucoma laser surgery may be followed by complications. Most patients notice some blurring of their vision after laser surgery. This generally clears within 20-30 minutes following the procedure and is usually related to the gel that is used on the lens during the procedure. The chance of your vision being permanently affected by this laser is very, very small. Although extremely rare and unusual, there may be bleeding within the eye, inflammation, cataract and increase in the pressure in the eye requiring different and more extensive treatment. It will take several weeks to determine how much of your eye pressure will be lowered with this treatment. You may require additional laser surgery to lower the pressure if you have a response but one that is insufficient to control the pressure.

SLT Contraindications

• Pediatric glaucoma
• Juvenile glaucoma
• Primary or secondary narrow angle glaucoma
• Inflammatory uveitic glaucoma
• Any disease that blocks the angle
• Unclear view of the trabecular meshwork

OSHA Safety Training
Risks

- The greatest risk of laser iridotomy is an increase in intraocular pressure. Usually, the IOP spike is transient and of concern to the surgeon only during the first 24 hours after surgery. However, if there is damage to the trabecular meshwork during laser surgery, the intraocular pressure may not be lowered enough and extended medical intervention or filtration surgery is required. Patients who undergo preventative laser iridotomy do not experience as great an elevation in IOP.

Read more: http://www.surgeryencyclopedia.com/La-Pa/Laser-Iridotomy.html#ixzz3seDD8bYB

- The second greatest risk of this procedure is anterior uveitis, or inflammation within the eye. Usually the inflammation subsides within several days, but can persist for up to 30 days. Thus, the follow-up care for laser iridotomy includes the application of topical corticosteroids. A posterior synechia, in which the iris may again adhere to the lens, may occur if intraocular inflammation is not properly managed.

Read more: http://www.surgeryencyclopedia.com/La-Pa/Laser-Iridotomy.html#ixzz3seDnjLJZ

Is The Procedure Painful?

- The surface of the eye is numbed by topical anesthetics for this procedure, but the iris is not; therefore, when the laser beam hits the iris to create the peripheral iridotomy, mild discomfort may occur. In general, only a few brief episodes of slight discomfort are associated with this procedure. Also, there is absolutely no discomfort postoperatively in the great majority of cases.
Complications

- For up to 64% of patients, one to three years after laser iridotomy, the IOP will rise above 21 mmHg, and long-term medical treatment is required. One-third of argon laser iridotomies will close within six to 12 weeks after surgery and will require a repeat laser iridotomy. Approximately 9% of Nd:Yag laser iridotomies must be redone for this reason. Closure of the iridotomy site is more likely if a uveitis presented after surgery. Up to 45% of patients will have anterior lens opacities after laser iridotomy, but these opacifications do not put the patient at an increased risk of cataracts.

http://www.surgeryencyclopedia.com/La-Pa/Laser-Iridotomy.html#ixzz3seAqFlxH

More Complications

- Other risks of this procedure include the following: swelling of, abrasions to, or opacification of the cornea; and damage to the corneal endothelium (the part of the cornea that pumps oxygen and nutrients into the iris); bleeding of the iris during surgery, which is controlled during surgery by using the iridotomy lens to increase pressure on the eye; and macular edema, which can be avoided by careful aim of the laser during surgery to avoid the macula. The macula is the part of the eye where the highest concentration of photoreceptors is found. Perforations of the retina are rare. Distortion of the pupil and rupture of the lens capsule are other possible complications. Opacification of the anterior part of the lens is common, but this does not increase the risk of cataract formation when compared with the general population.

Read more: http://www.surgeryencyclopedia.com/La-Pa/Laser-Iridotomy.html#ixzz3seG57ycy

Complications

- When the iridotomy hole is large, or if the eyelid does not completely cover the opening, some patients report such side effects as glare and double vision. The argon laser produces larger holes. Patients may also complain of an intermittent horizontal line in their vision. This may occur when the eyelid is raised just enough such that a small section of the inferior part of the hole is exposed, and disappears when the eyelid is lowered. Blurred vision may occur as well, but usually disappears 30 minutes after surgery.

Read more: http://www.surgeryencyclopedia.com/La-Pa/Laser-Iridotomy.html#ixzz3seGjmFRK
Alternatives

• An alternative to laser iridotomy is surgical iridectomy, a procedure in which part of the iris is removed surgically. This was the procedure of choice prior to the development of laser iridotomy. The risks for iridectomy are greater than for the laser iridotomy, because it involves an incision through the sclera, the white tunic covering of the eye that surrounds the cornea. The most common complication of an iridectomy is cataract formation, occurring in more than 50% of patients who have had a surgical iridectomy. Since an incision in the eye is required for surgical iridectomy, other procedures, such as filtration surgery—if needed in the future—will be more difficult to perform. Studies comparing the visual outcomes and IOP control of laser iridotomy with surgical iridectomy show equivalent results.

Read more: http://www.surgeryencyclopedia.com/surgery/laser-iridotomy.html#ixzz3seCTEuwb

Brown Eyes vs Blue Eyes

More energy is required for brown eyes

Trabecular Meshwork

**Figure 2**

Aqueous humor leaves the eye through a tiny channel called the trabecular meshwork, which is located just in front of the iris.
Laser Cautions

• It is important to remember that this laser emits high levels of either invisible or visible laser radiation which can cause permanent and irreparable eye and tissue damage. Always observe precautions for laser safety including using warning signs, safety glasses and only operating the laser in a safe environment that provides protection to casual observers.

• When servicing the SeLecTor Deux always observe Safety precautions and warnings as indicated in this manual. When not viewing through the binoculars and in particular when the cover is removed from the Laser Arm wear safety glasses of OD4 or greater @ 1064nm/532nm to protect your eyes.

Observed By All Users

• DO NOT look directly into or at the Laser beam or at specula laser reflections. Direct and reflected laser light can cause permanent eye injury.

• DO NOT operate the laser unless observers are using the correct protective eyewear. Protection is afforded by using protective eyewear having an optical density of OD4 at 1064/532 nanometers wavelength. This information must be present on the eyewear.

• DO NOT use objects, that can readily reflect light, in the vicinity of the Laser beam to avoid reflecting the beam in a hazardous manner.

• DO NOT use the Laser in the presence of flammable agents as the focused laser beam may cause ignition. There is no AP / APG protection.

• DO NOT operate the Laser unit without all the cables connected as there is a risk of electric shock from the back panel connectors. Invisible and visible laser radiation is emitted from the Laser aperture during operation of the equipment.

• DO NOT try to service or repair the laser other than what is included in this manual. Service should only be performed by an authorized agent of the manufacturer.

• DO NOT use the Laser on a patient without first checking the operation of the Laser and verifying the optical alignment of the treatment SeLecTor Deux to the Aiming beams.

• ALWAYS use the lowest energy settings possible when treating a patient with the laser and start the treatment at minimum energy. ALWAYS note the “Preset Energy” display when adjusting the Energy and confirm the actual test fire energy is close to the Preset value.

• DO NOT put the Laser into TREAT mode until ready to operate on the patient.

Cont...

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References


Read more: http://www.surgeryencyclopedia.com/La-Pay/Iridotomy.html#ixzz3sdlRgFo7

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Thank you so much