LASER IRIDOTOMY
Recommended Standard of Care
By the Philippine Glaucoma Society

Definition:
Laser treatment performed to connect anterior and posterior chambers to relieve pupillary block, reverse appositional angle closure and prevent formation of peripheral anterior synechiae (PAS).

Indications:
1. Primary angle closure (PAC/occludable angle with either raised intraocular pressure or peripheral anterior synechiae) or primary angle closure glaucoma (PAC with glaucomatous optic nerve head damage), due to relative pupillary block, with areas of trabecular meshwork (TM) visualization on dynamic/indentation gonioscopy
2. Acute primary angle closure or acute primary angle closure glaucoma
3. Fellow eye of acute primary angle closure attack eye if the chamber angle is anatomically similar to the first eye
4. Presence of pupillary block, seclusio pupillae or occlusio pupillae
5. Initial therapy for suspected plateau iris syndrome and malignant glaucoma
6. May be used as a temporizing procedure for phacomorphic glaucoma
7. Primary angle closure suspects (PACS/ occludable angle, no peripheral anterior synechiae, normal intraocular pressure, normal optic nerve head and normal visual field) with increased risk of long-term visual loss from angle closure glaucoma in cases of:
    a. Documented progressive narrowing of the angles
    b. Narrow occludable angles but repeated pupil dilation is required for diagnosis or treatment of other disorders
    c. Narrow occludable angles and medication is required that may provoke angle closure
    d. Quality of life is compromised by the threat of acute angle closure
    e. Symptoms that suggest intermittent angle closure
    f. Patient's occupation / vocation makes it difficult to access immediate ophthalmic care (e.g., frequently travels to underdeveloped parts of the world, merchant seaman, etc.)

Contraindications:
1. Poor visualization of the iris such as corneal edema, corneal opacity and flat anterior chamber
2. Conditions due to anterior pulling mechanism synechial angle closure such as neovascular glaucoma and iridocorneal endothelial (ICE) syndrome
3. 360 degrees peripheral anterior synechiae
4. Patient who is unable to cooperate.

Risks
The risk of potential complications can be decreased with careful and proper technique. Possible complications are the following:
1. Temporary blurring of vision
2. Visual disturbances such as halos, lines, crescent, ghost image, glares, spots and shadows. These symptoms are likely to occur in large exposed iridotomies, especially if it crosses the tear meniscus.

3. Corneal epithelial and/or endothelial burns with argon (especially with bubble formation and proximity to endothelium)
4. Intraocular pressure (IOP) spikes
5. Postoperative inflammation
6. Intraoperative bleeding
7. Posterior synechiae
8. Iridotomy closure
9. Failure to penetrate
10. Localized lens opacities or cataract progression
11. Rarely: retinal damage, retinal / subhyaloid hemorrhage, cystoid macular edema, malignant glaucoma, decompression retinopathy, corneal endothelial decompensation, Descement's membrane detachment

Equipment required:

- **Laser**
  1. Photo-disruptive laser (e.g., Q-switched Nd: YAG laser)
  2. Photocoagulative laser (e.g., Argon, Continuous wave frequency-doubled Nd:Yag 532 nm or Diode laser)
  3. Combination of photo-disruptive and photocoagulative laser
- **Iridotomy lens**
  A laser iridotomy contact lens is needed to keep the eyes open, stabilize the eye, focus the laser beam and provides additional magnification such as the Abraham lens (+66 diopters) and Wise lens (+103 diopters).

Qualifications of the surgeon

1. A licensed medical doctor who underwent a formal residency training in ophthalmology and has experience performing laser iridotomy.

Preoperative preparation:

1. Perform a comprehensive non-dilated ophthalmologic examination with emphasis on the detailed assessment of the iridocorneal angle by dynamic/indentation gonioscopy.
2. Explain the procedure including expected outcomes, potential risks and benefits.
3. Secure informed consent
4. Topical Pilocarpine 2% or 4% may be given to reduce iris thickness
5. For prevention of IOP spike or post-op inflammation, you may consider using the following:
   a. Oral or intravenous acetazolamide for severe glaucoma or acute primary angle closure
   b. Topical alpha-2 agonist (0.15% to 0.2% brimonidine) prior to the procedure or immediately afterwards
   c. Steroid drops
6. Topical anesthesia
7. Topical glycerine, systemic acetazolamide, intravenous mannitol or oral hyperosmotic agents to be considered if the cornea is edematous in cases of acute angle closure attacks
8. Systemic anticoagulants may be stopped to decrease the risk of bleeding as long as the risk – benefit ratio is justified.

Procedure:

- **Iridotomy Site:**
  1. Should be placed as peripheral as possible, preferably in an iris crypt or thin looking area, and avoiding iris vessels.
  2. The location may be at the superonasal or superotemporal peripheral iris covered by the upper eyelid. The 3 or 9 o'clock position are acceptable alternative sites. Other sites on the peripheral iris may be considered if there is difficulty in placing it in the aforementioned areas. However, the area along the tear meniscus should be avoided.

- **Laser Application:**
  1. A full thickness hole is created using the available laser (photocoagulative, photodisruptive, or a combination of both lasers)
  2. Photocoagulative laser pre-treatment can be done before iris penetration with the photodisruptive laser to minimize intraoperative bleeding.
  3. Recommended laser settings are available in the references cited. Adjust the settings according to individual patient response.

Endpoint

Perforation is assumed when pigment, mixed with aqueous, flows into the anterior chamber. The iris falls back and the anterior chamber deepens. An adequate iridotomy size is approximately 200 to 500 microns (0.2 to 0.5mm).

Postoperative Management:

1. Check the IOP 30 minutes to 3 hours after the procedure. Systemic acetazolamide or mannitol may be indicated if IOP rises rapidly. Discharge patient only when IOP stable at safe level.
2. Topical steroid 4-6 times a day for 4-14 days depending on inflammation
3. Stop topical pilocarpine and taper other topical IOP-lowering drugs as indicated.
4. Follow-up examination within 1 week and 4-6 weeks postoperatively.
5. Adjunctive glaucoma medications should be started in patients with residual elevated IOP.

Treatment Goals:

The immediate goal of laser iridotomy is to create connection of the anterior and posterior chambers of the eye thereby eliminating the pressure gradient between the two chambers. The long-term goal is to relieve pupil block, reverse appositional angle closure, and prevent or retard formation of peripheral anterior synechiae.

Follow-up and monitoring:

The patency of the iridotomy should be confirmed by the direct visualization of the lens through the iridotomy but may not be seen in all cases. Transillumination through the pupil or the iridotomy is not a reliable indicator of patency. If patency is uncertain check with gonioscopy, reconsider the mechanism, perform ultrasound biomicroscopy (UBM) / anterior segment optical coherence tomography (AS-OCT) if available and/or place additional low power photodirsuptive laser applications to the edge of the iridotomy site, while avoiding damage to the lens anterior capsule. Evaluation of the iridocorneal angle by gonioscopy, IOP measurement and assessment of the optic nerve head status should be performed at each follow up visit. If glaucomatous optic nerve head damage is suspected, additional tests are recommended for documentation, such as automated perimetry $\pm$ optic nerve head photographs $\pm$ quantitative imaging of the optic nerve head

(e.g., OCT). The interval of follow up should be every 3 to 12 months, depending on the iridocorneal angle status, severity of glaucomatous optic nerve head damage (if present) and IOP. More frequent follow up is required if there is medically uncontrolled IOP, progressive angle closure and/or glaucomatous progression.

Documentation:

1. Pre-operative written or digital medical records with the following information
    a. Visual acuity
    b. Intraocular pressure
    c. Cornea and anterior segment findings
    d. Iridocorneal angle findings by dynamic/indentation gonioscopy, if visible. When applicable, printouts of additional ancillary tests to visualize the iridocorneal angle (e.g., AS-OCT, UBM).
    e. Description of the optic nerve head status, if visible
2. Informed consent
3. Operative technique
4. Post-operative written or digital medical records with the following information
    a. Visual acuity
    b. Intraocular pressure
    c. Cornea and anterior segment findings
    d. Gonioscopic findings
    e. Description of the optic nerve head
    f. Automated perimetry, optic nerve head photograph and/or quantitative imaging of the optic nerve head, as indicated

References

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5. World Glaucoma Association. Angle Closure and Angle closure Glaucoma, Concensus Series 3. Amsterdam: Kugler Publications; 2006.
6. ICO Guidelines for Glaucoma Eye Care. 1st ed. San Francisco: International Council of Ophthalmology; 2016.

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