Iridoplasty, also known as gonioplasty, uses low-energy laser burns to the peripheral iris in order to widen the anterior chamber angle and/or break peripheral anterior synechiae. Patients requiring laser iridoplasty are most often diagnosed with plateau iris syndrome, either by ultrasound biomicroscopy or follow-up gonioscopy that demonstrates a narrow angle after laser peripheral iridectomy. Other indications for iridoplasty are nanophthalmos, microphthalmos, angle-closure glaucoma (ACG), and/or peripheral anterior synechiae.

Although early attempts by Krasnov and Kimbrough et al. to modify the peripheral iris had some success, the outcomes were limited by technique and instrumentation. The current use of argon lasers has led to a refinement in technique that has increased both anatomical and clinical success.

Regardless of the technique, the success of laser iridoplasty relies on the proper application of energy along the peripheral iris to achieve contraction of the tissue. When the peripheral iris shrinks, it pulls away from the trabecular meshwork and opens the drainage angle.

During iridoplasty, the laser light is converted to heat that causes contraction of stromal collagen, which is primarily responsible for the immediate anatomical change. Later alterations include a proliferation of fibroblasts with the formation of a contraction membrane. Careful technique (see Step-by-Step Technique for Iridoplasty) is important, because overtreatment can lead to coagulative necrosis of the blood vessels.

**INFORMED CONSENT**

The preoperative discussion with patients should include a description of the moderate, transient discomfort they will experience with each laser application. Patients often describe the feeling as a pinprick or a sensation of pressure.

**TECHNIQUE**

Iridoplasty is most often performed with an argon laser and topical anesthesia in an outpatient setting. The surgeon applies one drop of 2% pilocarpine to stretch the iris and maximize access to the peripheral iris. Treatment should not begin until the pupil is maximally contracted, as evidenced by a lack of response to light. Applying one drop of brimonidine or apraclonidine decreases the chance of postoperative IOP spikes, and a topical anesthetic drop, such as proparacaine, enhances the patient’s comfort.

There are basically two techniques for performing iridoplasty, direct and indirect. In the direct technique, which uses an Abraham lens (Ocular Instruments, Bellevue, WA) (Figure 1A), the surgeon applies laser energy perpendicular to the peripheral iris. With the indirect technique, which uses a single-mirror lens (Ocular Instruments) (Figure 1B), the ophthalmologist directs the beam at a low angle of incidence toward the peripheral iris and angle. The direct technique is easier to perform, but the indirect technique provides direct visualization of the angle during the procedure.

It is important to note that, when using an Abraham lens, the surgeon should adjust the laser’s settings to a lower energy and a larger spot size (for example, 200 to 300 mW and a 500-µm spot size). As opposed to
SURGICAL PEARLS

Figure 2. A surgeon’s view of laser burns with a single-mirror lens is shown. The burns cause the peripheral iris to contract away from the trabecular meshwork.

Figure 3. The iris laser burns had this appearance after peripheral iridoplasty.

the tangential application with a single-mirror lens, the direct laser application with the Abraham lens results in smaller spots and more concentrated burns. When using this lens, the surgeon should carefully overlap the limbus with the laser in order to treat the peripheral iris. Otherwise, the laser beam’s application will be too central. When using the single-mirror lens, the treatment should be as peripheral as possible without encroaching on the trabecular meshwork.

Surgeons typically use a spot size of 300 to 500 µm with a duration of 0.3 to 0.5 seconds. The ophthalmologist varies the power between 300 and 500 mW to achieve a tissue response without the formation of air bubbles or dispersion of pigment into the anterior chamber. Contraction of the iris with a deepening of the peripheral chamber should be visible at the time of treatment (Figure 2).

A lack of response is often due to an inadequate energy level, an improper application of laser energy away from the periphery, or the presence of multiple peripheral anterior synechiae. In these cases, the surgeon should adjust the laser’s settings and location of

STEP-BY-STEP TECHNIQUE FOR IRIDOPLASTY

Step 1
The informed consent for iridoplasty includes an explanation of potential side effects such as:
• Pain/discomfort
• Inflammation
• Elevated IOP
• Changed pupillary shape/size
• Possible need for retreatment

Step 2
Pretreat the patient with:
• One drop of pilocarpine 2%
• One drop of brimonidine or apraclonidine
• One drop of proparacaine

Step 3
Set up laser:
• Power—300 to 500 mW (higher if needed)
• Spot size—300 to 500 µm
• Duration—300 to 500 milliseconds

Step 4
Place Genteal gel (Novartis Ophthalmics, Inc., Duluth, GA), Refresh Celluvisc (Allergan, Inc., Irvine, CA), or another clear lubricant on the single-mirror lens (or the Abraham lens, if you choose) and position the lens over the eye.

Step 5
• Treat the peripheral iris without encroaching on the trabecular meshwork.
• Increase the laser power as needed to cause the tissue to contract without forming bubbles or releasing pigment.
• Treat 360º.

Step 6
• Remove the lens and clean off the eye.
• Instill one drop of prednisolone acetate 1%.
• Recheck the IOP in 1 hour.
• Send the patient home with instructions to administer one drop of prednisolone q.i.d. for 4 days.
• Follow up in 1 week.
Iridoplasty involves an estimated six to eight spots placed in each quadrant, depending on the spot size, with the spacing of one to two spot diameters between applications (Figure 3). Although some ophthalmologists advocate only treating 180° degrees at a time, we have found 360° treatment to be safe, without an increase in the frequency of IOP spikes.

“Although some ophthalmologists advocate only treating 180° degrees at a time, we have found 360° treatment to be safe, without an increase in the frequency of IOP spikes.”

After the procedure, the eye receives a drop of a topical steroid or NSAID. The surgeon checks the IOP 1 hour after treatment. Our postlaser regimen usually consists of one drop of prednisolone acetate q.i.d. for 4 days. At the 1-week follow-up visit, we check the patient’s IOP and perform gonioscopy to re-examine the anterior chamber angle. Retreatment may be indicated in some cases and will consist of either overlapping the spots or adding a row of applications to the initial treatment.

OUTCOMES

Laser iridoplasty effectively treats a wide range of anterior segment conditions. Plateau iris syndrome, the most common condition for which the procedure is indicated, is caused by large or anteriorly positioned ciliary processes that push the peripheral iris toward the trabecular meshwork. Diagnostically, the angle remains closed or occludable despite laser iridotomy, and iridoplasty is required to lower the IOP or prevent closure. A study by Ritch et al.4 looked at the long-term effect of argon laser peripheral iridoplasty in eyes with plateau iris syndrome. The angle in 20 of 23 (87.0%) eyes remained open throughout the entire follow-up period (mean = 78.9 ± 8.0 months) after only one treatment, and the remaining three eyes required a single retreatment.

Studies have also shown that iridoplasty can be used as an initial treatment in acute angle closure.5,6 Early in the course of an acute angle-closure attack, the cornea is often edematous, and the view of the iris is poor. Performing laser peripheral iridotomy is not always possible, and medical management may not decrease the IOP.5 Lam et al.6 performed a randomized, controlled trial to compare argon laser iridoplasty with medical therapy as the initial treatment of acute ACG not amenable to laser peripheral iridotomy. The iridoplasty group received immediate laser treatment, and the medical treatment group was given intravenous acetazolamide, followed by oral acetazolamide, until the subjects’ IOP normalized. The laser group had a significantly lower IOP than the medically treated group throughout the first hour after the treatment’s initiation. No serious, laser-related complications occurred. Once the IOP normalized, the corneal edema resolved, and the peripheral laser iridotomy was performed.

CONCLUSION

Argon laser iridoplasty is a safe and effective procedure for patients with narrow angles and/or plateau iris syndrome whose angles remain narrow after laser iridotomy. When properly performed, the procedure consistently delivers a long-term benefit to individuals with plateau iris syndrome. Patients with acute ACG may also profit from iridoplasty in cases where immediate peripheral iridotomy cannot be performed.

A precise technique and an attention to detail are key to successful iridoplasty, and ophthalmologists should be familiar with the finer points of performing this laser procedure.

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