UPTOWN EYE SPECIALISTS

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Glaucoma

How is Glaucoma Diagnosed?

Glaucoma Testing

There is no single test for glaucoma. The diagnosis is made by evaluating the patient from a number of perspectives, using specialized instruments. **Tonometry** measures eye pressure. At Uptown Eye Specialists, we use applanation tonometry, because it is the most accurate method available. Applanation tonometry is quick and painless. **Pachymetry** measures the corneal thickness by ultrasound. Thin corneas may predispose a patient to glaucoma, whereas thick corneas may occasionally be considered somewhat protective.

Here are other tools we use:

Gonioscopy, This is what your physician sees when he performs gonioscopy. He is looking to see how much dark pigment is clogging the drainage meshwork, and whether the iris is floating up close enough to cause angle closure glaucoma. A special viewing lens is used and a drop of anesthetic makes the eye numb.

Dilated Optic Nerve examination. While special testing is extremely useful, it has not replaced a careful examination and assessment by your ophthalmologist. This is what he might see, a damaged optic nerve. This patient probably has NO SYMPTOMS!

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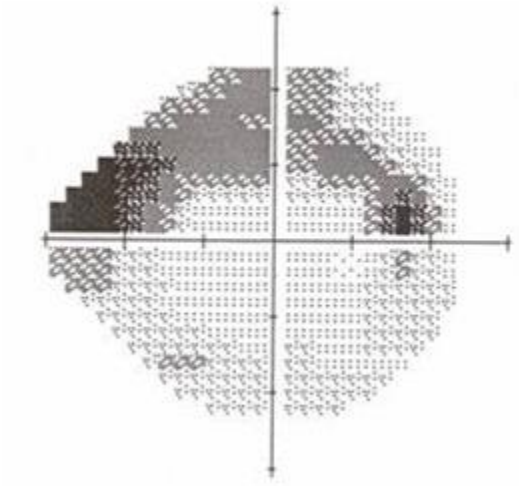
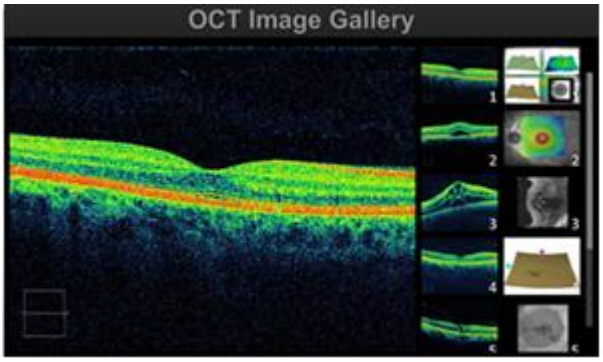
Visual field tests. The visual field gray-scale printout (right) corresponds to this kind of optic nerve damage. ***Visual field tests*** assess your peripheral vision. Early damage from glaucoma can often be detected by this test. At Uptown Eye we use the latest computerized technology to assess peripheral vision. Currently we are using the **Humphrey SITA 24-2** test. Both eyes are tested in 10 to 20 minutes and the visual field examination is usually repeated annually to monitor for progression of glaucoma damage. Once we have several reliable studies on a given patient, the glaucoma progression analysis ("**GPA**") software analyzes your visual field tests to determine whether your disease is stable, possibly worsening or getting worse. This provides a very useful "second opinion" for your doctor in making this assessment.



Optical Coherence Tomography (OCT). A Nerve fiber analysis is performed by our state of the art OCT, a scanning instrument with computerized image processing and analysis. A scanning low-energy light measures the optic nerve and the thickness of the nerve fiber layer (the nerve that carries the vision message from the eye to the brain). This is the nerve that is damaged in glaucoma. The test is usually repeated every 6 to 12 months.

Zeiss Meditec Cirrus OCT. This report contains details of the measurement for analysis. This is an example from a single examination, with comparison to a normal database.



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Treatment

Glaucoma is can be treated with drugs, lasers or surgery, or a combination of the three. Ophthalmologists have a wide variety of medications for treating glaucoma. The drugs slow the production of aqueous, enhance drainage of excess fluid from the eye, or both. By regulating the production of aqueous and/or its drainage from the eye, an intraocular pressure can be achieved that will not cause damage to the optic nerve. These treatments will not restore vision already lost to glaucoma. Rather, they are intended to stop its progress.

There are a number of eyedrops that may be used for glaucoma, and no one particular class of medications is appropriate for all patients. **Prostaglandins** and **beta-blocker** eyedrops are among the drugs initially used to lower aqueous production. **Alpha-2 agonists**, and **carbonic anhydrase inhibitors** are other classes of medications that are used. In most cases, glaucoma can be managed with a single drug or drug combination. However, within 2 years after starting drug therapy, most patients need new or additional medications. All medications have risks and side effects. For example, people with certain heart and breathing conditions should be careful using beta-blockers. Patients should maintain their prescription regimens and discuss side effects or problems with their physicians. When purchasing over-the-counter cold, flu or headache medications, or other drugs, people taking glaucoma medication should discuss their selections with a pharmacist, who can help them avoid potentially dangerous drug interactions.

Patients can reduce side effects by reducing the eyedrop absorption in the blood stream. Patients can do this by closing their eyes and pressing on their tear ducts (near the bridge of the nose) for 3-5 minutes after instilling eyedrops.

Glaucoma and Pregnancy

All available glaucoma medications cross the placenta and are secreted into breast milk during lactation; thus, they have a potential for side effects to the fetus and nursing children. One way to reduce such risks is to minimize all glaucoma eyedrops and choose laser or filtration surgery if intraocular pressure is too high.

Laser Surgery for Glaucoma

Laser surgeries lower intraocular pressure by enhancing the drainage of aqueous fluid or slowing its production. The kind of laser surgery used depends on the type of glaucoma being treated. The length of time the pressure remains lowered depends on the type of laser surgery, the type of glaucoma, and the patient's individual characteristics.

In some cases, laser surgery may have to be repeated to control the intraocular pressure more effectively. Typically, medications will still be needed to maintain fluid pressure within the eye, although a lower dose than previously used may be sufficient. If the laser therapy does not lower

the pressure in the eye satisfactorily or the effects wear off, the surgeon may recommend conventional surgery.

What to expect

Laser surgeries are performed in a doctor's office in a facility called an ambulatory surgical center or in a hospital. Although some patients may experience a slight stinging sensation, the procedures are usually painless. In some instances, local anesthetic agents are used, in which case there is little if any discomfort.

When the procedure is over, patients may experience blurred vision and some irritation. Normal activities, such as driving and work, may be resumed the next day.

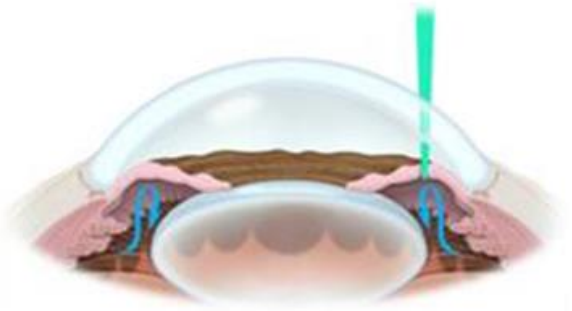
Risks

As with all surgery, there are risks. Risks of laser glaucoma procedures may include a short-term increase in intraocular pressure or an excessive drop in pressure. Both complications are rare and controlled with glaucoma medications. There is a small risk for cataract formation after some types of surgery.

Benefits

Failure to control glaucoma can result in destruction of the optic nerve and permanent blindness of the affected eye. Reducing or preventing raised intraocular pressure by laser therapy is effective in reducing the risk of blindness from glaucoma.

Laser for Open Angle Glaucoma



Laser for Narrow Angle Glaucoma

Laser Treatment for Primary Open-Angle Glaucoma (POAG)

- Selective laser trabeculoplasty (SLT) reduces intraocular pressure by enhancing drainage of excess aqueous fluid. The laser increases drainage by selectively treating certain cell tissue of the trabecular meshwork. The meshwork is at the entrance of the drainage canals. SLT treatments can occasionally be repeated if necessary.

- Argon laser trabeculoplasty (ALT) reduces intraocular pressure by opening the drainage canals of the eye. In many cases, drugs will continue to be needed to maintain safe intraocular pressure after this procedure.

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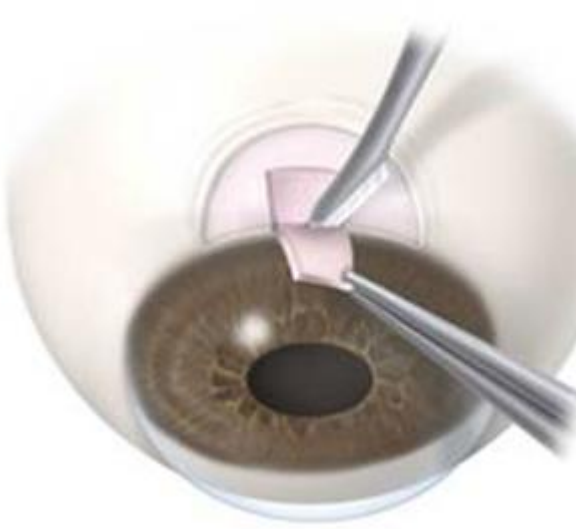
Laser Treatments for Narrow-Angle Glaucoma

- Laser peripheral iridotomy (LPI) reduces excessive intraocular pressure by making a small hole in the iris, the colored part of the eye. Narrow-angle glaucoma occurs when the angle between the iris and cornea, the clear front part of the eye, is too small. The hole allows the iris to move back from the cornea, opening the angle and enhancing aqueous flow.

Incisional Glaucoma Surgery

As noted above, conventional surgery or filtering microsurgery is used when management of glaucoma through medication and laser surgery has failed or is less desirable. **Trabeculectomy** is most commonly used to prevent or curtail damage to the optic nerve by reducing intraocular pressure. In this procedure, a small incision is made in the sclera of the eye (see Diagram below) and a flap of tissue is left to cover the incision, allowing slow release of fluid from the inside the eye to its outer layers. The procedure results in the formation of a small blister-like bump called a "bleb." The bleb is covered by the eyelid and is usually not visible. The excess fluid is carried away as it is absorbed into the bloodstream.



Surgery to create new drainage area (hides under upper eyelid)

"Bleb," new drainage area, after surgery

A new modification of trabeculectomy, is **non-penetrating deep sclerectomy or viscocanalostomy,** where a full-thickness hole in the eye is avoided. Instead, a very deep dissection is performed in the sclera and trabecular meshwork. Intraocular pressure is lowered as fluid oozes through a permeable thin layer of tissue that is created by the viscocanalostomy. A bleb may be formed, but it is usually smaller than one that would be formed following trabeculectomy.

In case of complicated glaucoma or patients who have had multiple surgeries, the use of a **tube-shunt** or seton is required. These devices, which include the Ahmed Valve, Baervedlt device, or Molteno device, have a plastic tube that is placed in the eye, which drains to an external reservoir placed outside the eye.

What to expect

Microsurgical procedures are performed in an ambulatory surgical center or on an outpatient basis at a hospital. Patients are usually given limited intravenous sedation but may be given general anesthesia. Medication may also be administered around the eye to prevent its movement. Typically, patients are relaxed and experience little if any discomfort.

Risks and benefits

The risks of incision surgery are small. Nevertheless, as with any incision, there is the risk of bleeding and infection. The eye may be red or inflamed, with discomfort and pain. In some instances, the procedure may not reduce eye pressure as intended. Loss of too much pressure can result in a loss of vision. As with laser surgeries, there are occasional instances in which the pressure is too high or too low. When this occurs, medications or additional surgeries may be needed to control the condition. In some instances, cataracts may develop. In very rare circumstances, an eye can be removed as a result of surgery. As with all procedures or medications, the risks need to be balanced with the benefits of saving vision in the affected eye. Failure to control glaucoma can result in destruction of the optic nerve and permanent blindness in the affected eye.

Success rates for glaucoma filtering surgery are about 70% to 90% for at least 1 year. In some instances, the surgically created drainage channel may “heal” or close, in which case high intraocular pressure can recur. The healing or closure of the drainage opening is a natural process that is more likely to develop in younger people. To prevent or retard closure, drugs such as mitomycin-C and 5-fluorouracil may be administered. If necessary, the surgery can be repeated in the same eye.