

Trabeculectomy

If you have glaucoma and medications and laser surgeries do not lower your eye pressure adequately, your ophthalmologist (Eye M.D.) may recommend a procedure called a trabeculectomy.

In this procedure, a tiny drainage hole is made in the **sclera** (the white part of the eye). The new drainage hole allows fluid to flow out of the eye into a filtering area called a **bleb**. The bleb is mostly hidden under the eyelid. When successful, the procedure will lower your **intraocular pressure (IOP)**, minimizing the risk of vision loss from glaucoma. The surgery is performed in an operating room on an outpatient basis.

Some of the risks and complications from trabeculectomy surgery include the following:

- failure to control intraocular pressure, with the need for another operation;
- infection;
- bleeding in the eye;
- swelling in the eye;
- irritation or discomfort in the eye;
- eye pressure that is too low;
- cataract (in cases where cataract has not already been removed); and
- decreased or lost vision.

Antimetabolites

Certain medications, called antimetabolites, were originally developed to help treat some kinds of cancer. These same medications have also been found to be helpful when used with some types of glaucoma surgery.

These medicines may be applied to the eye during or after the surgery to reduce the growth of scar tissue, a common cause of failure in glaucoma surgery. **Mitomycin-C** and **5-fluorouracil (5-FU)** are the most commonly used antimetabolites for glaucoma surgery. When these antimetabolites are used with other medications that reduce inflammation, the success rate of surgery is greatly improved, especially for patients who are at high risk for excessive scarring.

Your ophthalmologist may consider using antimetabolite medicines with your glaucoma surgery if:

- you are having surgery on an eye that has been operated on before;
- you have inflammation in your eye (called **uveitis**);
- you have glaucoma due to new blood vessel formation within the eye;
- you are having glaucoma and cataract surgery at the same time;
- you are relatively young;
- you have more deeply pigmented skin; or
- your eyes are at risk for postoperative scarring.

In addition to the usual complications of glaucoma surgery, other risks associated with using antimetabolites include:

- eye pressure that is too low;
- leaking incisions;
- slower healing of the cornea;
- blurred vision;
- fluid in or behind the retina;
- thinning of the eye tissues; and
- infection.

If your ophthalmologist has decided to use antimetabolite medications, he or she will explain why they are recommended for you.

While some people may experience side effects from medications or surgery, the risks associated with these side effects should be balanced against the greater risk of leaving glaucoma untreated and losing your vision.

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Pigmentary Glaucoma

Pigmentary dispersion syndrome is a condition in which increased amounts of pigment circulate within the front portion of the eye. This often results in having pigment layered on the back of the cornea, thinning of the iris, and clogging of the ocular drainage system with pigment. This pigment can block the drainage channel enough to cause an increase in **intraocular pressure (IOP)**.

In cases of pigmentary glaucoma, the IOP often is very high, reaching levels above 40 mm Hg. Pigmentary dispersion leads to damage from glaucoma in 20% to 50% of patients. It is more common in males and often appears in people under 50 years of age.

Treatment is the same as for other forms of open-angle glaucoma, including medications, laser therapy, or surgery. With adequate treatment, the prognosis for pigmentary glaucoma is good.

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Prostaglandin Analogs and Prostaglandins for the Treatment of Glaucoma

While there is no cure for glaucoma, it can be controlled with proper management.

Elevated **intraocular pressure (IOP)** can damage the optic nerve, which can lead to vision loss. Treatment for glaucoma focuses on lowering IOP to a level that is unlikely to cause further optic nerve damage. This is known as the “target pressure” or “goal pressure.” The target pressure differs from individual to individual. Your target pressure may change during your course of treatment.

If you have glaucoma, your ophthalmologist (Eye M.D.) may prescribe medication to lower your eye pressure. There are many more choices for topical treatment of glaucoma today than there were only a few years ago. Your ophthalmologist has chosen to use a **prostaglandin analog** or **prostaglandin** medication to treat your glaucoma.

How do prostaglandin analogs or prostaglandins work?

Prostaglandin analogs and prostaglandins lower IOP by increasing the outflow of the aqueous humor, the fluid made continuously by the eye. All of these medications are taken once a day, except for Rescula, which is taken twice per day.

What are the prostaglandin analog and prostaglandin medications?

- latanoprost (Xalatan)
- bimatoprost (Lumigan)
- travoprost (Travatan)
- unoprostone (Rescula)

Possible side effects of prostaglandin analogs or prostaglandins

All medications, including eyedrops, can have side effects. Some people taking these eyedrops may experience

- redness of the eye;
- darkening of the iris (the colored part of the eye); this color change occurs slowly and may not be noticeable for months or even years;
- increased growth, thickness, and pigmentation of the eyelashes;
- eye irritation or itching;
- blurred vision;
- darkening of the eyelid skin;
- muscle aches (rare); and
- headaches (rare).

Patients with a history of uveitis (inflammation in the eye), ocular herpes infection, or swelling in the retina (called cystoid macular edema) should use this medication with caution. If you have a history of

any of these conditions, please discuss it with your doctor.

Medication tips

For each medication that your ophthalmologist prescribes, make sure you understand the following:

- the name of the medication;
- how to take it;
- how often to take it;
- how to store it;
- if you can take it with your other medications (make sure all of your doctors know about all the different medications you take, including any nonprescription medications);
- what the possible side effects may be;
- what you should do if you experience side effects; and
- what you should do if you miss a dose.

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Pseudoexfoliation Glaucoma

Pseudoexfoliation glaucoma is a relatively common form of open-angle glaucoma that can cause significantly high eye pressures. This condition is marked by a dust-like material that is observed inside the eye on the surface of the iris and lens. This material can clog the ocular drainage system, **increasing intraocular pressure (IOP)**. It can occur in one or both eyes and is most commonly seen in patients over the age of 70. Pseudoexfoliation glaucoma is found in all ethnic groups, but it is most commonly seen in people of Scandinavian ancestry.

Treatment is often required for pseudoexfoliation glaucoma, consisting of medication, laser treatment, or surgery. Pseudoexfoliation can cause increased complications with cataract surgery. With proper treatment and monitoring, patients with pseudoexfoliation glaucoma tend to do well. Early diagnosis is important.

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Selective Laser Trabeculoplasty

Selective laser trabeculoplasty (SLT) is a laser surgical procedure used to help lower **intraocular pressure (IOP)** of patients with open-angle glaucoma. SLT is used to treat the eye's drainage system, known as the **trabecular meshwork**—the mesh-like drainage canals that surround the iris. Treating this area of the eye's natural drainage system improves the flow of fluid out of the eye, helping to lower the pressure.

The laser used in SLT works at very low levels. It treats specific cells selectively, leaving untreated portions of the trabecular meshwork intact. For this reason, SLT, unlike other types of laser surgery, may be safely repeated many times.

SLT is typically performed in the ophthalmologist's (Eye M.D.'s) office or an outpatient surgery center. The procedure usually takes about five to ten minutes. First, anesthetic drops are placed in your eye. The laser machine looks similar to the examination microscope that your ophthalmologist uses to look at your eyes at each office visit.

You will experience a flash of light with each laser application. Most people are comfortable and do not experience any significant pain during the surgery, although some may feel a little pressure in the eye during the procedure.

Most people will need to have their pressure checked after the laser treatment, since there is a risk of increasing IOP after the procedure. If this does occur, you may require medications to lower the pressure, which will be administered in the office. Rarely, the pressure in the eye increases to a high level and does not come down. If this happens, you may require a surgery in the operating room to lower the pressure.

Most people notice some blurring of their vision after the laser treatment. This typically clears within a few hours. The chance of your vision becoming permanently affected from this laser procedure is very small.

Most patients can resume normal daily activities the day after laser surgery. You may need to use eyedrops after the procedure to help the eye heal properly.

Risks associated with SLT include:

- increased pressure in the eye, possibly requiring medication or surgery;
- inflammation in the eye;
- bleeding;
- damage to the cornea, iris, or retina from the laser light;
- failure to adequately lower the eye pressure; and
- need for repeat laser surgery.

It will take several weeks to determine how much SLT will lower your eye pressure. You may require additional laser or glaucoma drainage surgery to lower the pressure if it is not sufficiently lower after the first laser treatment.

Most patients must continue to take medication in order to control and maintain their IOP; however, surgery can lessen the amount of medication needed.

While some people may experience side effects from medications or surgery, the risks associated with these side effects should be balanced against the greater risk of leaving glaucoma untreated and losing your vision.

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Seton Surgery for Treating Glaucoma

The purpose of glaucoma drainage surgery is to help control the pressure in your eye and preserve your vision. If the **intraocular pressure (IOP)** remains too high, your optic nerve becomes damaged, leading to vision loss and eventual blindness.

In cases of severe **open-angle glaucoma** or **chronic (long-term) glaucoma**, if your eye is at high risk for scarring and your IOP needs to be lowered to preserve your vision, your ophthalmologist (Eye M.D.) may recommend placing a tiny drainage tube in your eye called a **seton**.

The drainage tube creates a new channel for fluid to flow from the eye to a filtering area, called a bleb. A tiny plate placed on the eye helps the bleb form and remain open. The tube is covered with a patch and is typically not seen or felt. This procedure is performed in the operating room on an outpatient basis.

When successful, seton surgery will decrease the pressure in your eye, minimizing the risk of vision loss from glaucoma.

Some of the complications of seton surgery may include:

- failure to control eye pressure with the need for repeat surgery;
- eye pressure that is too low;
- irritation or discomfort;
- double vision;
- infection;
- bleeding;
- cataract; and
- erosion of the tube, requiring repeat surgery.

While some people may experience side effects from glaucoma medications or surgery, the risks associated with these side effects should be balanced against the greater risk of leaving glaucoma untreated and losing your vision.

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Traumatic Glaucoma

If your eye is injured, there is a chance you will develop traumatic glaucoma. A direct blow to the eye can cause bleeding or inflammation in the eye, which may lead to an acute rise in eye pressure. This condition can typically be managed with eyedrop medication. However, if the **intraocular pressure (IOP)** is very high or if blood remains in the eye, surgical treatment may be required.

If an eye is hit hard enough to cause bleeding in the front part of the eye, this is called a **hyphema**. A hyphema increases the possibility of a rise in IOP. Various medications can bring the pressure down to a safe zone until the blood decreases or disappears.

In cases of a hyphema, there is also a chance of a future increase in IOP. The chance of developing elevated IOP and glaucoma following a hyphema is thought to be approximately 8% over a patient's lifetime. Therefore, anyone who has had eye trauma should be sure to have intraocular pressure checks every year. If your ophthalmologist (Eye M.D.) notes an increase in your eye pressure, he or she can find ways to control it.

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Steroid Glaucoma

Steroid or glucocorticoid medications are used to treat a variety of medical conditions. They can be administered by mouth, nasal sprays or inhalers, eyedrops, or injections. No matter how the medication is taken, up to 20% of patients taking steroid medications develop elevated **intraocular pressure (IOP)**.

If eye pressure does become elevated, sometimes the steroid medicine can be stopped or decreased, helping to alleviate the problem. If the steroid medication was given by injection in or around the eye, the eye pressure may be harder to control.

If medical therapy does not adequately lower IOP, surgery may be required. As with other forms of glaucoma, if IOP can be controlled, patients tend to do well.

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Normal-Tension Glaucoma

Normal-tension glaucoma typically means that glaucoma damage has been detected in an eye with so-called “normal” **intraocular pressure (IOP)**—that is, an eye that has not had documented pressure above 20 mm Hg. Ophthalmologists increasingly believe that this condition is a continuum of the same glaucoma process seen in those people with higher IOP.

Normal-tension glaucoma is diagnosed by examining the appearance of the optic nerve or by detecting abnormalities on visual field tests.

One large study showed that progressive damage and visual field loss can be significantly reduced in people with normal-tension glaucoma by lowering their IOP by 30% or more.

Other conditions can sometimes be mistaken for normal-tension glaucoma, so thorough eye and medical examinations are often required to make this diagnosis. Often the IOP will be measured at different times during the day to see if there are any pressure elevations. Other tests may also be necessary.

If your ophthalmologist (Eye M.D.) believes that you have normal-tension glaucoma, he or she may begin treatments to lower your IOP. This can be done with medications, laser treatment, or surgery.

Patients with adequately treated normal-tension glaucoma have a good prognosis, especially when the disease is caught early in its course.

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Peripheral Iridotomy

If your ophthalmologist (Eye M.D.) suspects that you have “narrow” or “closed” angles, this means that the drainage channel of your eye is blocked or nearly blocked, placing you at high risk for elevated intraocular pressure and vision loss. This is called **angle-closure glaucoma**.

An acute attack of angle-closure glaucoma is marked by very high eye pressure and complete blockage of the drainage channel in the eye. Symptoms include pain, red eye, and decreased vision.

To treat angle-closure glaucoma, your ophthalmologist will perform a **peripheral iridotomy (PI)**, creating a surgical opening within the upper part of the iris (the colored part of the eye) using a laser. This opening is typically so small that it cannot be seen with the naked eye. The opening in the iris allows fluid to flow from behind the iris through the opening, allowing the iris to fall back into a more normal position and opening the drain.

This laser treatment is always performed on an outpatient basis, often in the ophthalmologist’s office. The treatment will not improve your vision, but it can help prevent vision loss from a dangerous type of glaucoma. The side effects of the treatment can include the appearance of a “light streak,” a temporary rise in intraocular pressure, and inflammation.

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Visual Field Testing

Because it has no noticeable symptoms, glaucoma is a difficult disease to detect without regular, complete eye exams.

One particular test, called a **visual field test** (or perimetry test), measures all areas of your eyesight, including your side, or peripheral, vision. A visual field test can help find certain patterns of vision loss and is a key way to check for glaucoma. It is very useful in finding early changes in vision caused by nerve damage from glaucoma.

To take this painless test, you sit at a bowl-shaped instrument called a **perimeter**. While you stare at the center of the bowl, lights flash. Each time you see a flash you press a button. A computer records the location of each flash and whether you pressed the button when the light flashed in that location. At the end of the test, a printout shows if there are areas of your field of vision where you did not see the flashes of light. This test shows if you have any areas of vision loss. Loss of peripheral vision is often an early sign of glaucoma. Regular perimetry tests are an important technique for learning how, if at all, your vision is changing over time. It can also be used to see if treatment for glaucoma is preventing further vision loss.

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Optic Disc Topography

To monitor the progression of glaucoma, ophthalmologists (Eye M.D.s) check the condition of the optic nerve. One method for checking the optic nerve is with **optic disc topography** using a confocal scanning laser. This technique creates a three-dimensional image of the optic nerve head. Much like a CT scan, pictures that appear as slices of the nerve head are taken and then are reconstructed in a three-dimensional fashion.

This technique can be used to establish a baseline measurement and to help monitor for progressive damage in the future. In conjunction with the clinical exam, optic disc topography can also help identify certain patients who are at greater risk for glaucoma.

The results of optic disc topography can help your ophthalmologist monitor changes and make clinical decisions regarding the severity of your glaucoma.

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Optic Disc Photographs

Photographic images of the optic disc are essential for monitoring glaucoma.

Glaucoma damage is seen clinically as loss of the nerve fiber layer and an associated thinning of tissue at the optic nerve head. With this damage, ophthalmologists (Eye M.D.s) look for what they call “cupping” of the optic nerve. Stereoscopic disc photos of the optic nerve are helpful in providing a baseline of information about the optic nerve’s condition for future comparison. These photographs are taken in the ophthalmologist’s office using a special camera that can create a stereo image.

Because one ophthalmologist may interpret the appearance of optic nerve cupping differently from another ophthalmologist, optic disc photography is invaluable because it helps create a baseline for future comparison. Your ophthalmologist later may take additional pictures for side-by-side comparison. These can help identify signs of glaucoma progression.

Despite many new imaging techniques for glaucoma, disc photos and a careful clinical examination are still the standard of care for glaucoma.

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