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The Eye-Q Newsletter

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Primary Open Angle Glaucoma – Beyond Eye Drops

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Introduction

Glaucoma is a group of eye diseases that causes a slow and painless loss of vision. *Primary Open Angle Glaucoma* (POAG) is called the silent thief of sight because it has no symptoms. Unlike *Acute Angle Closure Glaucoma* (Eye-Q Newsletter vol 10, No 2) it does not make your eyes red or cause pain. It is the second leading cause of blindness in North America after cataract. Over 50% of the people who have glaucoma don't know it since symptoms of visual loss are generally not recognized until the disease reaches advanced stages. Glaucoma affects about 2% of adults over the age of 40. Rarely, glaucoma can present at birth or in childhood.

The cause of glaucoma is unknown, but there are several risk factors that increase your chances of developing glaucoma. These include high eye pressure (called intraocular pressure, or IOP), older age, being African-American or Hispanic, and having a family history of glaucoma. Anyone with any of these risk factors should get regular eye examinations to look for glaucoma beginning before the age of 40.

Glaucoma damages vision by gradually destroying the fine nerve fibers that travel from the retina and converge to become the optic nerve, which connects your eye to your brain, and carries visual information to your brain for processing. Each nerve is like an electric cable containing about 1 million nerve fibers. As these nerve fibers are damaged and lost, the nerve becomes 'cupped' and you lose your vision (Fig 1). Your peripheral vision, or side vision, is lost first. If the glaucoma remains untreated, the vision loss creeps in toward the center, first causing tunnel vision, and then eventually, blindness.

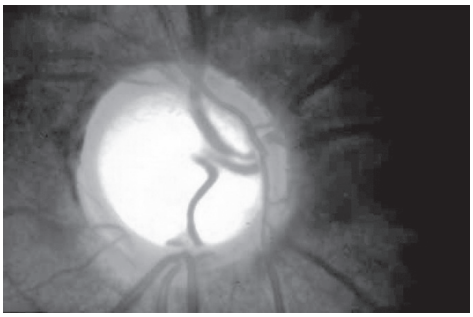

Fig. 1. Optic nerve head cupping in Glucoma.

The cause of optic nerve damage in glaucoma is not known, but since most eyes with glaucoma have high IOP, it is likely that high IOP plays a role in damaging the nerve (Fig 2). IOP is a measure of the fluid pressure inside the eye. The front chambers of the eye are filled with clear fluid called *aqueous* that is produced in one area called the *ciliary body* and drains out in another area called the *angle* (Fig 3). In glaucoma, the flow through the drainage structure of the eye becomes impaired, and fluid coming into the eye cannot get out, raising the IOP. A large segment of people with glaucoma have what is considered to be normal IOP. In some cases, the pressure may be normal during the day when it is checked but spike up during the night. In others the IOP may never reach abnormally high levels and they are considered to have *Normal Pressure Glaucoma.* This may account for up to 30 to 40% of all POAG. To make matters more complicated, not everyone with high IOP has glaucoma. This is known as *ocular hypertension* and is considered a risk factor for developing glaucoma.

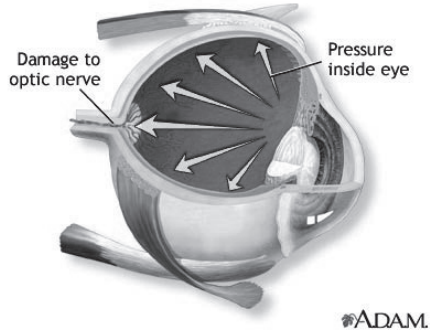

Fig. 2. Effect of increased pressure.

Anatomy

The anterior chamber angle is the anatomical angle created where the peripheral iris plane meets the cornea (Fig 3). In this angle is the trabecular meshwork where aqueous fluid in the anterior chamber drains out of the eye into the general circulation. In acute angle closure glaucoma this angle may narrow or close completely, impeding drainage and raising intraocular pressure (IOP). By definition, in

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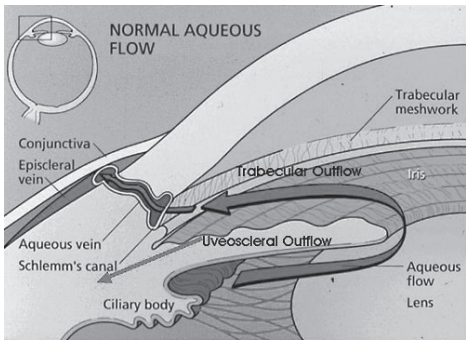

Fig. 3. Normal aqueous flow.

POAG, the angle remains anatomically open but there is reduced flow through the trabecular meshwork. Some patients have open angle glaucoma caused by other factors such as ocular inflammatory disease, trauma, or infections. Pigment dispersion syndrome and pseudoexfoliation are two conditions that can cause open angle glaucoma by clogging up the trabecular meshwork with pigment or other debris and impairing flow.

Evaluation

A thorough examination for glaucoma should include the measurement of IOP. But since some eyes can have glaucoma without high IOP, a careful examination of the optic nerve looking for glaucoma damage is essential. A special view of the anterior chamber angle and measurement of corneal thickness are also important. If the IOP is high or the optic nerve looks damaged (or both), a special test called a visual field test should be performed. The visual field test shows whether or not you've lost any peripheral vision to glaucoma. Photographs or imaging scans of the optic nerve may also be done to assess damage.

Treatment

If you are diagnosed with glaucoma, treatment is available to save your vision. Unfortunately, the vision that is already lost cannot be returned. The goal of glaucoma treatment is to lower IOP, stop the optic nerve damage and preserve the remaining vision. This is true regardless of the IOP level at the time of diagnosis. Several studies have confirmed that lowering IOP even in normal pressure glaucoma can preserve vision and visual field. Several kinds of treatment are available to lower IOP. These include eye drops, laser therapy, and surgery.

Eye drop medications lower IOP by either reducing the amount of fluid entering the eye or increasing the amount of fluid exiting the eye. There are several different kinds of glaucoma medications, and each differs in terms of both its ability to lower IOP and its potential side effects.

Until now laser therapy was used primarily when medications failed to successfully lower IOP, or for patients who could not tolerate medications due to side effects. Recent advances in laser therapy have produced lasers so safe and effective that they are being used as first line treatment instead of medications. If medications and/or laser therapy fail to bring the IOP down to a safe range, surgery is available to lower IOP.

Selective Laser Trabeculoplasty (SLT)

Selective Laser Trabeculoplasty (SLT) uses a Nd:Yag laser to selectively target pigmented cells in the tabecular meshwork of the drainage angle. A biologic response is triggered leading to enhanced fluid outflow and reduced IOP. Unlike the Argon laser used previously for this purpose SLT produces no thermal damage to tissue, thus making it safer and repeatable. This painless procedure is performed in the office in a matter of minutes in which the laser is directed through a mirrored contact lens held against the eye (Fig 4). Effectiveness is evaluated 4-8 weeks later.

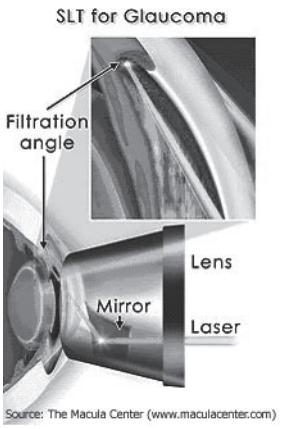

Fig. 4. SLT for Glaucoma.

SLT on its own is effective in controlling IOP over 90% of the time as a primary treatment. When used as a second line treatment in patients using glaucoma drops many patients were able to discontinue one or more of their eye drops and maintain good IOP control. The effect appears to last with only 25% needing a repeat treatment within 5 years. Repeat treatments can produce similar effects but the amount of IOP reduction is less with each successive re-treatment. Because SLT has such an impressive outcome and safety profile it is being considered early in the treatment strategy for open angle glaucoma, in many patients taking the place of eye medications as first line therapy.

Not all patients with open angle glaucoma respond as desired to SLT or topical drops and in these refractory cases surgery may be required for control of intraocular pressure.

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