Glaucoma

Glaucoma is a disease in which the pressure in the eye is too high for the optic nerve to handle. It results in permanent nerve damage and vision loss. There are usually no symptoms of glaucoma until severe nerve damage has already occurred. Typically, the loss of vision starts in the peripheral vision, but it can affect the central vision as well. Glaucoma is the second leading cause of blindness in Americans, and is generally accepted as an inherited disorder. The underlying cause of glaucoma remains unknown.

The fluid within the eye, called the *aqueous humor*, nourishes the eye's lens and cornea. In healthy eyes, a pressure balance is maintained between the fluid that is produced by the eye and the fluid that drains from the eye via specialized filters called the *trabecular meshwork.* If an injury or other factors disrupt this balance, the pressure can rise in the eye, which may eventually damage the optic nerve. Some people's optic nerves are especially susceptible to damage and may even develop damage at normal pressures.

During an eye exam, the eyes are dilated so the doctor can see the retinas and optic nerves. Among other things, the doctor will look at the size of the cup in the center of the optic nerve. Usually, the cup occupies 40% or less of the nerve area. Larger cup to disc ratios may indicate the presence of glaucoma. The symmetry of the cup to disc ratios between the two eyes is also important. Assymetry is suspicious for glaucoma, even if the cup to disc ratios would otherwise fall into the normal range. The contour of the cups is also evaluated, as is the color of the optic nerves. The presence of bleeding on the optic nerve is a very concerning sign of possible glaucoma. The pressure in the eyes will also be measured. Eye pressure normally runs between 10-22 mm Hg, with fluctuations throughout the day. If the eye pressure or the optic nerve exam is suspicious of glaucoma, the doctor will get a visual field test. This is a computerized test in which lights are shown to the patient in the peripheral vision and the patient pushes a button when he/she sees them. The computer then can give a precise map of the patient's peripheral and central vision. There are certain patterns of visual field loss that are characteristic of glaucoma.

Not everyone with high eye pressure develops glaucoma. Some people have very tough optic nerves that can withstand high pressures. If a person has high eye pressure in the absence of visual field loss or optic nerve abnormalities, the condition is called ocular hypertension. The most recent research demonstrated that people with ocular hypertension should be treated to reduce their eye pressure to below 24 mm Hg, as pressures above that are associated with extreme risk to develop glaucoma. About one in five cases of glaucoma occur in people with eye pressure in the normal range.

There are several types of glaucoma. The most common is *primary open angle glaucoma*. Over time, the drainage angle of the eye becomes clogged and pressure in the eye becomes too high. *Angle closure glaucoma* results when the drainage angle in the eye is anatomically narrower than it should be and ultimately closes due to interference from the lens. The lens tends to grow larger as we age. The resulting reduced outflow of aqueous humor builds up pressure behind the iris (the colored part of the eye) and further reduces drainage. If enough pressure builds up behind the iris to force it against the drainage angle, the fluid outflow is suddenly blocked, causing a rapid and painful rise in eye pressure. This is called an *acute angle closure* attack. Acute angle closure attacks can be triggered by darkened environments or stress, which cause the pupils to dilate and create maximum contact between the lens and iris. In susceptible eyes, a laser hole can be created in the iris to prevent angle closure. *Secondary glaucomas* can appear as complication of eye surgery or advanced cataracts, or can result form eye injuries, certain eye tumors, or inflammation. *Pigmentary glaucoma* occurs when pigment from the iris flakes off and clogs the trabecular meshwork. *Neovascular glaucoma* occurs when abnormal new blood vessel growth clogs the drainage angles. Other types of glaucoma include *congenital glaucoma, juvenile open-angle glaucoma, developmental glaucomas (Reiger syndrome and aniridia),* and *pseudoexfoliation glaucoma.* Long-term use of steroid drugs can raise the eye pressure and cause glaucoma in genetically predisposed individuals.

The early stages of open-angle glaucoma are painless and vision loss is not noticed by the patient. It has been estimated that it takes

about 90% of nerve fiber loss to cause a blind spot noticeable by the patient. Slow rises in eye pressure are painless. The more optic nerve damage that exists at the time of diagnosis, the more likely it is that some or all sight will be lost. Understanding your risk and having your eyes examined according to a recommended schedule are the most important preventative steps you can take in guarding against loss of vision.

Certain risk factors increase a person's chances of developing glaucoma:

*elevated intraocular pressure
*anyone over age 60
*African-American over age 40
*family history of glaucoma
*nearsightedness
*past injury to the eye
*diabetes
*high blood pressure (although blood pressure has nothing to do with eye pressure)

Treatment of glaucoma consists of lowering the eye pressure. Usually, this is done with just eye drops. If pressure-lowering eye drops fail to lower the eye pressure enough to halt the progression of the glaucoma, or if allergies or side effects of the drops are not tolerated by the patient, laser or surgical procedures may be necessary. It is critical that the glaucoma patient use the prescribed medication and not neglect regular follow-up appointments.

In patients with glaucoma or who are suspected of beginning to develop glaucoma, the doctor will follow the disease by checking eye pressure, examining the eyes, and doing visual field tests. The standard follow-up schedule is every 6 months. The doctor may want to see a glaucoma patient more frequently if there is activity in the progression of the disease or if medications need to be changed.

Glaucoma is a preventable cause of blindness. Everyone with a family history of glaucoma and all African-Americans should be examined every 3-5 years between ages 20-39. Others in this age group should have an examination at least once during this time.

Between ages 40-64, people should be tested every 2-4 years. After age 64, examinations are recommended every 1-2 years. People with diabetes should be screened for glaucoma and other eye conditions every year.