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Glaucoma

Overview

Glaucoma is a disease that causes a loss of peripheral vision. It can be very insidious and people often don't even know they have it. In severe cases it can lead to blindness. The disease results from damage or destruction to nerve cells (retinal ganglion cells) that transmit information to the brain. These cells have long axons or nerve fibers that carry signals from photoreceptors inside the eye to an area of the brain where vision is processed. During an eye examination an eye doctor will see increased cupping or thinning of the rim of the optic nerve head as a result of nerve fiber loss. The exact cause of glaucoma is still undergoing much research and likely has many underlying risk factors. One major risk factor is an elevated intraocular pressure (IOP), however, having an elevated IOP does not mean that one has or will get glaucoma. The most effective treatment for glaucoma is lowering IOP.

Normal Vision

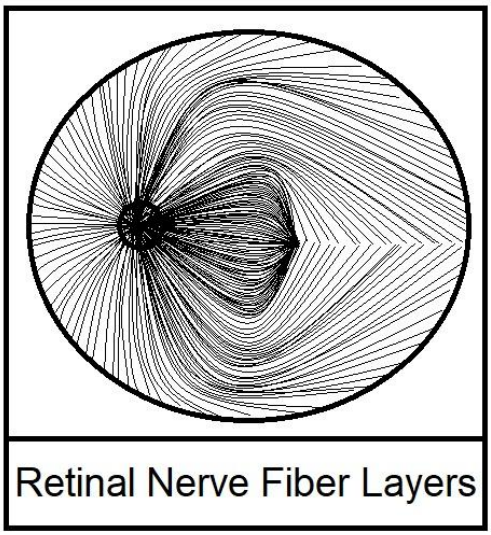
Vision with Advanced Glaucoma

Signs and Symptoms

Many times individuals with glaucoma are completely unaware that they have it. It usually has a very insidious onset. Glaucoma is most commonly first diagnosed by an observant eye doctor through a dilated eye exam. In advanced cases of glaucoma people might run into things or not see things to the side of them. In individuals with a very high IOP there can be symptoms of nausea, unexplained headaches and eye pain.

Causes

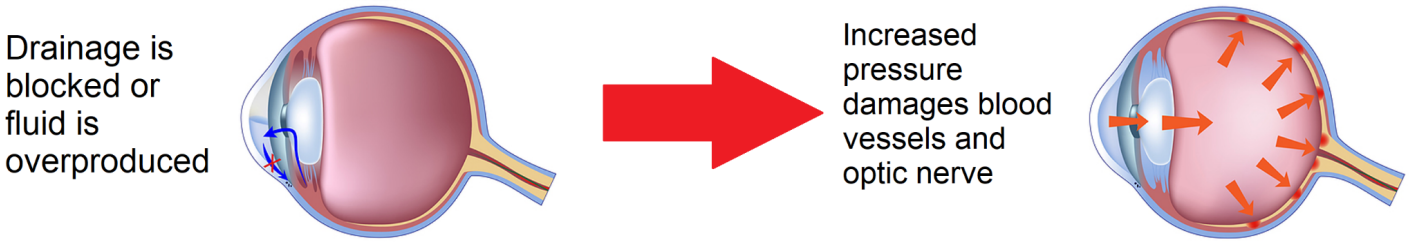
The exact cause of glaucoma is not fully understood and remains an area of research that focuses on the loss of ganglion cells and their nerve fibers.



Retinal Nerve Fiber Layers

However, there is a strong correlation between glaucoma and a high IOP. High intraocular pressure is caused by an overproduction or blockage of fluid in the anterior segment of the eye.

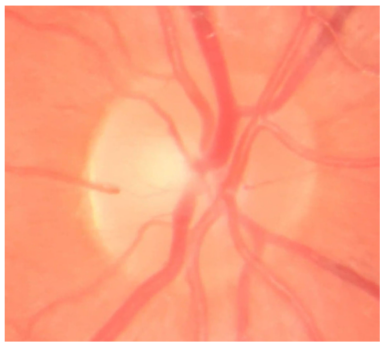
Development of Glaucoma



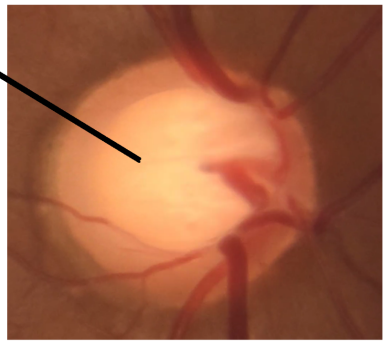
Strong risk factors include a first-degree relative with glaucoma, African-American ethnicity, old age and a thin central corneal thickness. Other risk factors include high myopia, hypertension, diabetes, narrow anterior chamber angles (area where fluid drains out of the eye) and a history of ocular trauma.

Testing & Evaluation

Testing and evaluation for glaucoma includes a dilated fundus exam and measurement of IOP by your eye doctor. They should closely look at your optic nerve head for increased cupping and nerve fiber loss. Photographs of the optic nerve head are important for future comparison.

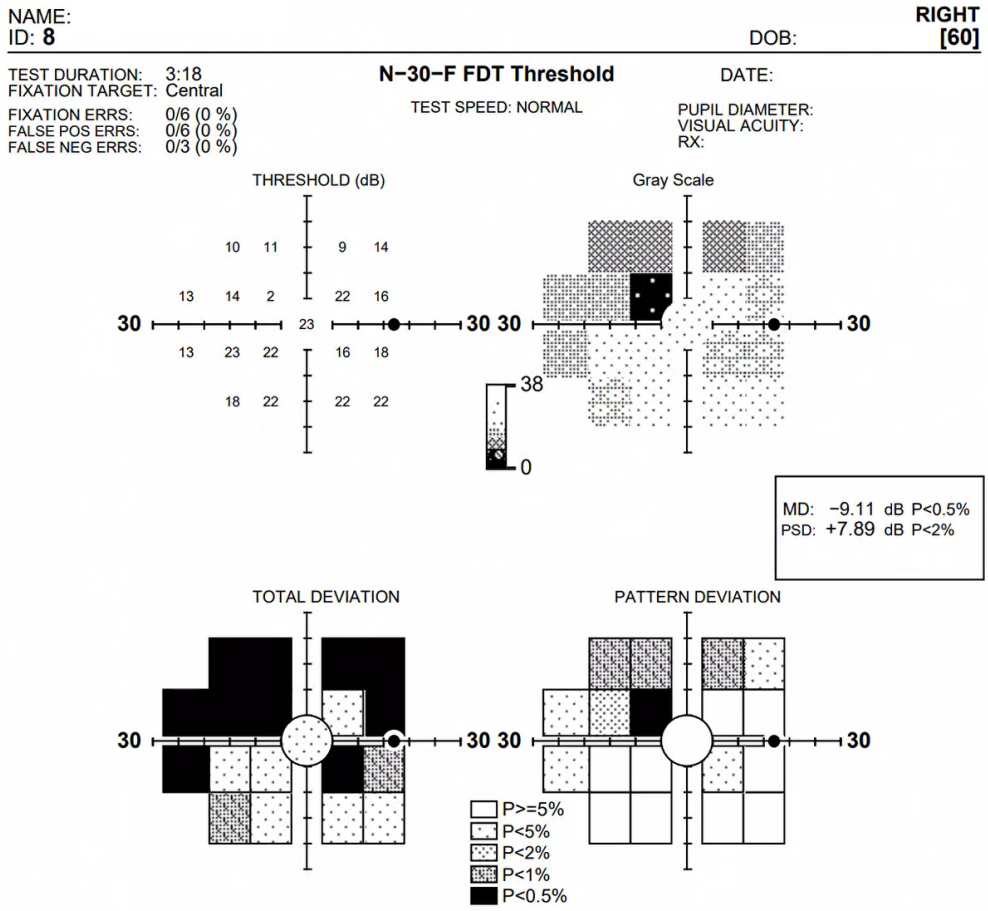


Normal Optic Nerve Head

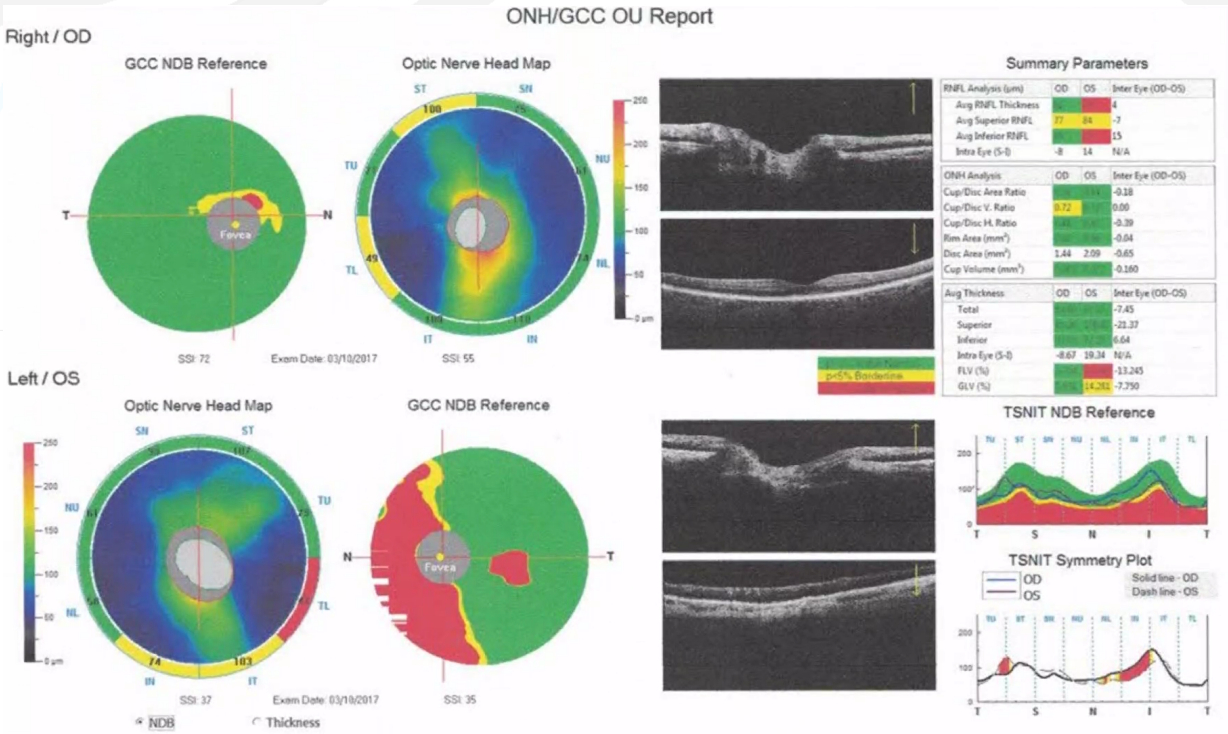


Optic Nerve Head with Glaucoma

A visual field needs to be done on both eyes that checks for loss of peripheral vision as shown below.



Scanning lasers are available that are capable of optically measuring the thickness of the nerve fiber layer at the optic nerve head. They have improved early diagnosis and starting of treatment.



To determine the type of glaucoma a patient has, gonioscopy is performed. Gonioscopy uses a specialized mirror placed on the eye to look at the drainage structures in the anterior chamber angle. If

the angle is open then the patient will have *open-angle glaucoma* or if the angle is narrow they will have *narrow* or *closed angle glaucoma*.

Management

The only known treatment option that has proven beneficial is to reduce IOP. This is most commonly done with the use of topical medications. There are five types of drops that can be prescribed. They include beta blockers, carbonic anhydrase inhibitors, alpha agonists, prostaglandin analogs and rho kinase inhibitors. In some cases they are used in combination and multiple times a day. A laser procedure called SLT is also used to lower IOP, but it may only be effective temporarily.

Minimally invasive glaucoma surgery (**MIGS**) uses microscopic stents to drain fluid from the eye. These surgeries have safer outcomes, quicker recoveries and higher success rates. For those with advanced glaucoma or an elevated IOP non-responsive to other treatments a surgical procedure called a trabeculectomy is done. This procedure creates a "valve" on the eye that lets fluid escape when the pressure becomes elevated.

Websites

All About Vision: http://www.allaboutvision.com/conditions/glaucoma.htm

American Optometric Association: http://www.aoa.org/Glaucoma.xml

National Eye Institute:
https://www.nei.nih.gov/learn-about-eye-health/eye-conditions-and-diseases/glaucoma

The Glaucoma Foundation: http://www.glaucomafoundation.org/index.php