Introduction

My presentation, ‘Is the Optic Disc Cupping or Sinking in Glaucoma?’ is based on my personal affliction and observation of glaucoma patients. During my residency about 40 years ago, I was found to have a high intraocular pressure (IOP) of about 30 mm of Hg. As a medical resident I still have the cardinal feature of primary open-angle glaucoma (POAG) which eventually led to blindness. Therefore, the optic disc may not be the primary site of injury, but instead existing in its entirety.

Background

What is intraocular pressure?

The cornea is a clear lens that is responsible for much of the refraction of the eye. After passing through the lens, the light is focused on the retina. The retina is a sensory tissue that contains photoreceptors, which reconvert light into electrical impulses that are transmitted to the brain. The cornea is covered by a thin layer of fluid called the aqueous humor. The aqueous humor is produced by the ciliary processes and flows through the pupil and into the anterior chamber of the eye. It helps to maintain the intraocular pressure (IOP) of the eye, which is necessary for the proper function of the eye. The IOP is measured in millimeters of mercury (mmHg). A normal IOP is between 10 and 22 mmHg, but it can vary depending on the individual.

What is glaucoma?

Glaucoma is a group of diseases that cause damage to the optic nerve and vision loss. There are several types of glaucoma, including primary open-angle glaucoma (POAG), primary angle-closure glaucoma (PACG), and normal-tension glaucoma (NTG). POAG is the most common form of glaucoma and is characterized by a gradual increase in IOP, which can lead to damage to the optic nerve and permanent vision loss. PACG is caused by an obstruction of the drainage angle of the eye, which can lead to high IOP and optic nerve damage. NTG is characterized by IOP within the normal range, but with damage to the optic nerve and vision loss.

The Puzzling Question

Why do some people develop glaucoma at a normal IOP such as 15 mmHg, while others not at a high IOP such as 30 mmHg?

Some physiological studies of glaucoma patients have useful optic disc or ONH IOP differences than the disc itself. These differences are in the form of larger disc diameter and lower IOP. Other studies have found that patients with HTG have the same IOP as normal controls. The physiological cup is the fibrous tissue base of the ONH which is surrounded by the sclera. The cup is the base of the ONH and may be formed by the retinal nerve fiber layer (RNFL) and the ganglion cell layer (GCL) of the retina. The RNFL and GCL are composed of nerve fibers from the ganglion cells of the retina. The RNFL is responsible for transmitting visual information from the retina to the brain, while the GCL contains the cell bodies of the retinal ganglion cells.

Hypothesis and Approach

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The optical disc is a critical feature of the eye, providing an important landmark for the location of the optic nerve, the place where the retinal nerve fibers converge and exit the eye. The disc is a circular structure located at the point where the retina connects to the optic nerve. It is the site of entry and exit of the retinal nerve fibers and is responsible for transmitting visual information from the retina to the brain. The disc is composed of several layers of tissue, including the outer limiting membrane, the inner limiting membrane, the retinal pigment epithelium, and the choroid. The disc is also surrounded by a depression called the physiological cup, which is formed by the downward indentation of the sclera. The physiological cup is an important feature of the ONH and is used in the diagnosis and management of glaucoma.

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Visual Fields

In 1889, James E. L. disc observed localised scotomas in the posterior pole of the eye in a patient with POAG. He found that these scotomas were located near the nasal border of the disc. These scotomas corresponded to areas of the retina that were not stimulated by light. The disc itself is a critical feature of the eye, providing an important landmark for the location of the optic nerve, the place where the retinal nerve fibers converge and exit the eye. The disc is a circular structure located at the point where the retina connects to the optic nerve. It is the site of entry and exit of the retinal nerve fibers and is responsible for transmitting visual information from the retina to the brain. The disc is composed of several layers of tissue, including the outer limiting membrane, the inner limiting membrane, the retinal pigment epithelium, and the choroid. The disc is also surrounded by a depression called the physiological cup, which is formed by the downward indentation of the sclera. The physiological cup is an important feature of the ONH and is used in the diagnosis and management of glaucoma.

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Figures

References
