Introduction

GLAUCOMA is one of the leading causes of blindness. Glaucoma is slow progressive optic neuropathy characterized by irreversible damage of the ganglion cell layer, nerve fiber layer, death of optic nerve axons and collapse of the lamina cribrosa leading to cupping of the optic nerve head and visual field loss ***(Ruth E. Swiderski et al., 2000).***

Diagnosis of glaucoma depends on (optic nerve changes, visual field loss and IOP elevation). Since glaucoma damage is irreversible we need to diagnose it early and follow it up accurately.

IOP elevation is strong risk factor for glaucoma, but it is not diagnostic as some patients have glaucoma changes without rise in IOP and we call it (normal tension glaucoma), some other people have elevated IOP without glaucomatous changes and we call it (ocular hypertension) ***(Ivan Goldberg et al., 2002).***

We know that visual field study is not effective in early diagnosis of glaucoma as the optic nerve damage happens first and it is irreversible. So the researchers tried to update different methods of optic nerve evaluation, and we will discuss in this study:

- Optic coherence tomography (OCT):

OCT is a noninvasive, noncontact, high-resolution procedure capable of producing cross-sectional images and measurement of the optic nerve head and neurosensory retina.Measurements are made using low-coherence light coupled into a fiber optic Michelson interferometer, with a short

coherence length super-luminescent diode source (820 nm) and a tissue resolution of approximately 10 mm ***(Ilgaz S. Yalvac et al., 2009).***

- Stereoscopic optic nerve head photography (discam):Recently, a digital optic disc stereoscopic camera known as Discam has become available. This device allows rapid acquisition and storage of a pair of monochromatic stereoscopic optic disc images it is an effective way of capturing and analyzing digital stereoscopic optic disc images ***(Velota CT , Anna B and Stephen A,2002).***

- Optic nerve head analyzer:

stereoscopic ONH photography does not provide a truly accurate system for interpretation of ONH appearance and change over time. Because of these limitations, more quantitative, objective and reproducible methods of ONH analysis have been developed. Many types of ONH analyzers are developed ***(Kalina PH et al., 1994).***

- Confocal scanning laser tomography (Heidelberg Retina Tomography):

The HRT is a confocal scanning laser ophthalmoscope that uses a 670nm wavelength diode laser to scan the retinal surface on multiple consecutive parallel focal planes. For each x, y location, the pixel with the highest reflectivity on the z-axis across the focal planes is used to identify the retinal surface and construct a topographic image of the ONH and peripapillary retina ***(Giovanni Taibbi et al., 2009).***

- Scanning laser polarimetry:

Scanning laser polarimetry is a technique that is used to evaluate the thickness of the retinal nerve fiber layer. It has been shown to have a high accuracy for diagnosing glaucoma. In a subset of eyes, atypical retardation patterns may be present that do not match the expected retinal nerve fiber layer appearance ***(Lemij et al., 2008).***

- Ocular perfusion dynamics study:

1) Doppler ultrasound of orbit:

With the recent use of Doppler ultrasound of the orbit, a noninvasive examination of the retrobulbar circulation has been made possible. Recent reports using orbital Doppler ultrasound showed that glaucoma patients tend to have a lower retrobulbar vessel blood velocity than control subjects ***(Hakki Birinci et al., 2002)***

2)Heidelberg retinal flowmetry:

The ability to measure and accurately quantify perfusion of ocular tissues is fundamental in understanding physiologic hemodynamics and diseases marked by compromised blood flow such as glaucoma, age-related macular degeneration, and diabetic retinopathy. An established method of retinal and optic nerve head blood flow assessment, the Heidelberg retinal flowmeter provides noninvasive measurements of retinal capillary blood flow through confocal scanning laser Doppler flowmetry ***(Itay Ben Zion et al., 2009).***

- Retinal thickness analyzer:

Evaluates retinal thickness at the posterior pole of the fundus in ocular hypertension (OHT) and open-angle glaucoma (OAG), and used to correlate morphometric findings with visual sensitivity as determined by automated perimetry. The RTA can reveal increased hemispheric thickness asymmetries in both OHT and OAG eyes. In OAG eyes thickness asymmetries are associated with corresponding perimetric asymmetries ***(Salgarello Tommaso et al., 2005).***