Updates On Optic Disc And Nerve Fiber Layer Imaging In Glaucoma

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Of Master degree in Ophthalmology

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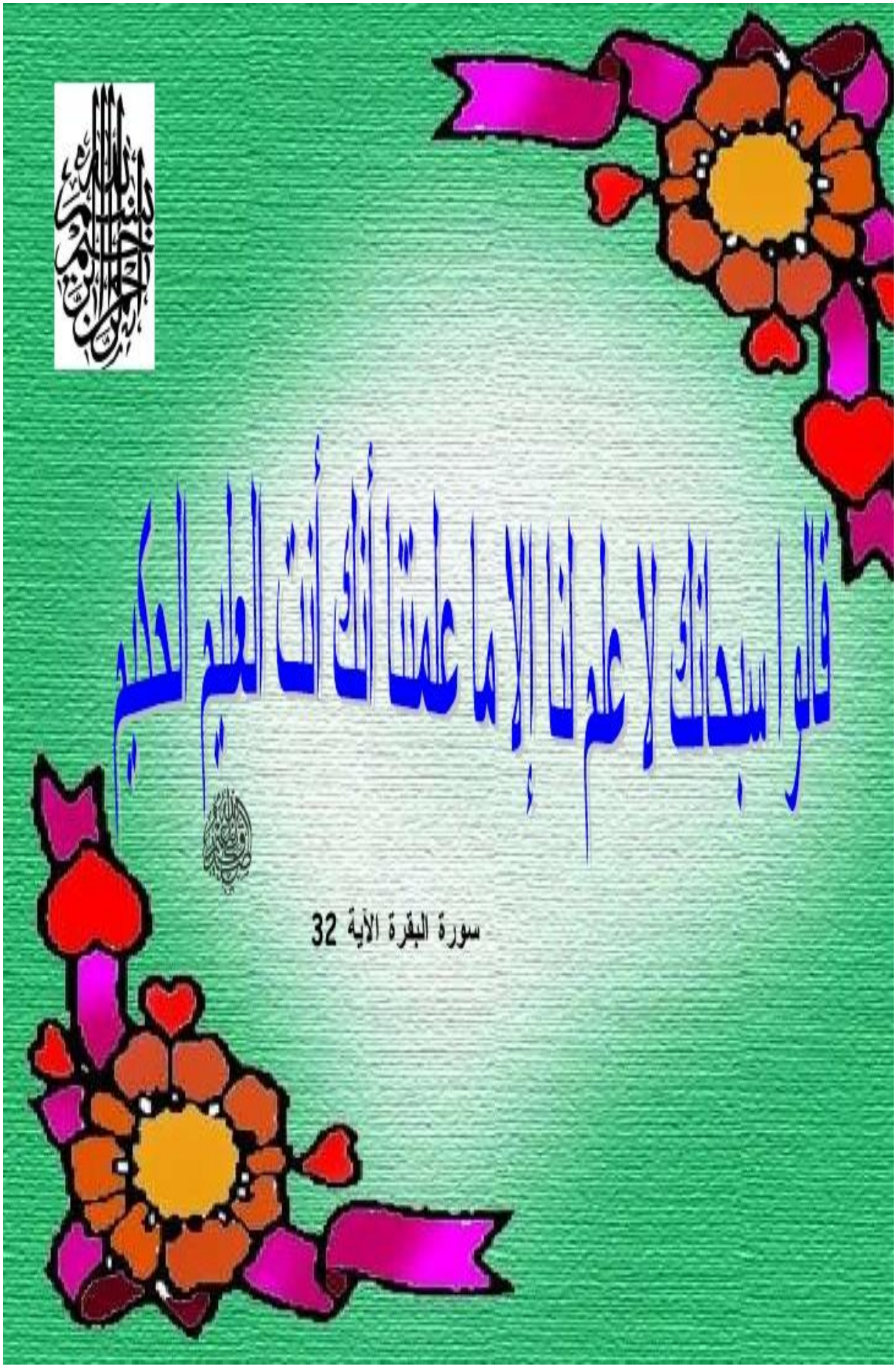
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List of Abbreviations

AION	Anterior Ischemic Optic Neuropathy
Ar	Arachnoid
C/D ratio	Cup To Disc Ratio
CRA	Central Retinal Artery
CRV	Central Retinal Vein
CSLO	Confocal Scanning Laser Ophthalmoscopy
CSME	Clinically Significant Macular Edema
Du	Dura
FCC	Fixed Corneal Compensator
FD	Fourier Domain Technology
Fig.	Figure
GPA GDx	Guided Progression Analysis
GON	Glaucomatous Optic Neuropathy
HRT	Heidelberg Retina Tomography
HTG	High-Tension Glaucoma
ILM	Internal Limiting Membrane
IOP	Intraocular Pressure
ISNT	Inferior, Superior, Nasal Temporal
LASIK	Laser Assisted in-Situ Keratomileusis
MIT	Massachusetts Institute of Technology
MMPs	Metalloproteinases
NFI	Nerve Fiber Indicator
NFL	Nerve Fiber Layer
NTG	Normal-Tension Glaucoma
OBF	Ocular Blood Flow
OCT	Optical Coherence Tomography
OHTS	Ocular Hypertension Treatment Study
ONH	Optic Nerve Head
POAG	Primary Open-Angel Glaucoma
PP	Perfusion Pressure
PRK	Photorefractive keratectomy

V	ial Vessels
DS	anked Segment Distribution
GCs	etinal Ganglion Cells
NFL	etinal Nerve Fiber Layer
PE	etinal Pigment Epithelium
TA	etinal Thickness Analyzer
D	pectral Domain
LP	canning Laser Polarimetry
PCA	hort Posterior Ciliary Arteries
D	ime Domain
SD	opography Standard Deviation
SNIT graphs	emporal, Superior, Nasal, Inferior, Temporal
SNIT SD	SNIT Standard Deviation
CC	Variable Corneal Compensator
H	ircle of Zinn-Haller

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INTRODUCTION

Glaucoma is a slowly progressive optic neuropathy that result in irreversible damage to the ganglion cell layer, retinal nerve fiber layer (RNFL), death of optic nerve axons and collapse of the lamina cribrosa leading to excavation of optic nerve head (ONH) and visual field loss(**Swiderski et al.,2000**).

Since glaucoma damage is irreversible, we need to diagnose it early and follow it up accurately. Investigations are trying to find better techniques for early detection of glaucoma(**Alm A.,2000**).

Both the diagnosis and assessment of progression of glaucoma are often based on a method of ophthalmic testing to identify and quantify the pattern of visual defects (i.e., functional defects) or structural defects(**Weinreb & Kaufman,2009**).

Because structural changes of optic disc often precede the development of visual field loss in glaucoma, detection of optic disc damage plays a vital role in diagnosis of glaucoma, especially in its early stages. Although ophthalmoscope and fundus photography are still used for assessing glaucomatous optic disc damage, they are limited by their subjective and qualitative nature(**Zangwill et al.,2005).**

Several imaging technologies have become available to evaluate objectively the optic disc and RNFL. One of these technologies, scanning laser polarimetry (SLP), provides quantitative estimates of RNFL thickness. Another, confocal scanning laser ophthalmoscopy (CSLO), evaluates the topography of the optic disc, although it also can provide indirect estimates of RNFL integrity(***Medeiro et al.,2004).***

The Heidelberg Retina Tomograph (HRT) confocal scanning laser opthamoscopy, with its new version of software, called Advanced

Glaucoma Analysis 3.0 (HRT3), provides larger, ethnic selectable normative databases and includes new data analysis tools(***Coops et al ., 2006).***

Optical coherence tomography (OCT) has become an important tool which has contributed to earlier and more accurate diagnosis of glaucoma over the past decade. Although OCT has been used, for the most part, to evaluate RNFL thickness, recent improvement in software also have made possible evaluation of ONH topography for glaucoma diagnosis and follow up(***Ferreras et al ., 2007).***

There are few studies involving the role of imaging in human glaucoma progression detection, hampered in part by rapidly evolving changes in technology that disrupt longitudinal studies. Progressive RNFL thinning measured with OCT and optic nerve cupping measured with CSLO, have been reported in experimental models involving non-human primates. At present there is limited evidence to support that imaging may assist the clinician in identifying progression of established glaucoma(***Shimazawa et al., 2013)***

Yet, many unanswered questions exist regarding how to integrate such measurements in glaucoma clinical practice and clinical trials. It is time to assess critically what we know as well as we still need to learn, about imaging in glaucoma clinical care and research(***Medeiro et al., 2005).***

AIM OF THE STUDY

The purpose of this study is to discuss different new techniques concerning optic nerve head and nerve fiber layer evaluation for early detection and follow up of glaucoma.

ANATOMY OF OPTIC NERVE HEAD AND NERVE FIBER LAYER