Effect of myopia on optical coherence tomography parameters

THESIS

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List of abbreviations:

AL----------axial length

CpRNFL--------- circumpapillary retinal nerve fiber

SE----------spherical equivalent

FLV ---------- focal loss volume

GCC ----------ganglion cell complex

GLV---------- global loss volume

GON----------glucomatous optic neuropathy

IOP----------intraocular pressure

CNV----------choroidal neovasular membrane

POAG----------primary open angle glaucoma

OCT---------- optical coherence tomography/gram

ONH---------- optic nerve head

PPA----------peri papillary chorioretinal atrophy

PVD----------post vitreous detachment

RD----------retinal detachment

RGC_S----------retinal ganglion cells

pRNFL---------- peripapillary retinal nerve fibre layer

RPE---------- retinal pigment epithelium

RE---------- refractive error

TSNIT----------temporal-superior-nasal-inferior-temporal

SAP---------- standard automated perimetry

VF---------- visual field

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INTRODUCTION

Introduction

Glaucoma is a progressive optic neuropathy that damages retinal ganglion cells and their axons. The progressive loss of retinal ganglion cells axons results in thinning of the retinal nerve fiber layers (RNFL).[1]

Optical coherence tomography (OCT) was developed to obtain in vivo measurements and thus can be used to determine the peripapillary RNFL. The RNFL thickness of circular path around the disc is measured using OCT, and the results can be compared with the normative group database. [2]

Although individual RNFL profiles are highly reproducible when scans are repeated and RNFL profile from the two eyes of an individual are very similar, a variety of factors influence the amplitude and waveform components of the RNFL profile. The overall amplitude decreases with age, poor signal strength, but increases with disc size. The

RNFL profile shape is affected by refractive errors. Tilted disc syndromes can also affect the RNFL profile.[1]

The risk of glaucoma in myopic eyes is higher than in non-myopic ones. However, myopic disc structure may vary widely making images difficult to interpret; myopic discs may mask early glaucomatous damage.[3]

Recently, optical coherence tomography (OCT) has enabled automatic measurements of macular ganglion cell complex (GCC) thickness. This includes the thickness of the retinal nerve fibre, ganglion cell and inner plexiform layers.[3]

Previous researches have focused on measurements of the optic disc and peripapillary RNFL. However, conditions like circumpapillary atrophy and optic disc tilt, which are quite common in highly myopic eyes (refractive error over -6), greatly reduce the clinical value of these measurements. Based on this idea, Zeimer et al in 1998 proposed to measure macular thickness as an indicator for

monitoring glaucoma. [6] Subsequently, Ishikawa et al in 2005 and Tan et al in 2008 developed corresponding OCT based measurement software and found that the influence of glaucoma on the retina was limited to the inner layer. [7,8] Among other instruments The recent development of RTVue, (Software version 6.1, model RT 100; Optovue, Fremont, California , USA) has allowed definition and measurement of the thickness of the ganglion cell complex (GCC), and studies have confirmed that the GCC has the same diagnostic capability as the RNFL in the diagnosis of glaucoma.[4]

A modern OCT system provides a high frame-transfer rate and fast Fourier transform algorithm, and can perform up to 26,000 A-scans per second, with a depth resolution of approximately 5 μm.[5]

Waveforms may very owing to measurement errors. Therefore, healthy eyes not affected by ocular diseases may generate abnormal color codes in OCT maps.[1]

Aim of the work

The aim of this work is to evaluate the changes in OCT of myopic eyes. Through quantitative topographical measurements and abnormal color coding of pRNFL, GCC and ONH.