



Optical Coherence Tomography Study of Peripapillary Nerve Fibre layer Thickness in Thyroid Associated Ophthalmopathy

Thesis

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

سببنا أنك لا تعلم لنا
إلا ما علمتنا إنك أنت
العليم العظيم

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List of Abbreviations

Abb.	Full term
<i>BCVA</i>	<i>Best corrected visual acuity</i>
<i>CAS</i>	<i>Clinical activity score</i>
<i>CFT</i>	<i>Central foveal thickness</i>
<i>CT</i>	<i>Computed tomography</i>
<i>DON</i>	<i>Dysthyroid Optic Neuropathy</i>
<i>GAG</i>	<i>Glycosaminglycans</i>
<i>GD</i>	<i>Graves' disease</i>
<i>GO</i>	<i>Graves' Ophthalmopathy</i>
<i>HLA</i>	<i>Human leukocyte antigen</i>
<i>IOP</i>	<i>Intra ocular pressure</i>
<i>Log.MAR</i>	<i>Logarithm of minimum angle of resolution</i>
<i>MD</i>	<i>Mean deviation</i>
<i>MHC</i>	<i>Major histocompatibility complex</i>
<i>MRI</i>	<i>Magnetic resonance imaging</i>
<i>OCT</i>	<i>Optical Coherence Tomography</i>
<i>OS</i>	<i>Orbital septum</i>
<i>pRNFL</i>	<i>Peripapillary nerve fiber layer</i>
<i>PSD</i>	<i>Pattern Standard deviation</i>
<i>RAIU</i>	<i>Radioiodine uptake</i>
<i>SD</i>	<i>Standard deviation</i>
<i>SLK</i>	<i>Superior limbic keratoconjunctivitis</i>
<i>STI</i>	<i>Thyroid stimulating immunoglobulin</i>
<i>TAO</i>	<i>Thyroid-Associated Ophthalmopathy</i>
<i>TBII</i>	<i>TSH-binding inhibitor immunoglobulin</i>
<i>TED</i>	<i>Thyroid eye disease</i>
<i>VA</i>	<i>Visual acuity</i>
<i>VF</i>	<i>Visual field</i>

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INTRODUCTION

Thyroid eye disease (TED), also known as Graves' Ophthalmopathy (GO) or Thyroid-Associated Ophthalmopathy (TAO), is the most common extrathyroidal manifestation of autoimmune hyperthyroidism which affects 3%-5% of patients ⁽¹⁾.

The key pathological features of TAO within the orbit are inflammation, excess production of glycosaminoglycans (GAG) and adipogenesis and these processes are thought to be driven at least in part by the local release of inflammatory cytokines ⁽²⁾.

The hallmark of GO are increased size of extraocular muscles and retrobulbar fat which have been associated with inflammatory cytokines and excessive secretion GAG, which lead to increase the volume of orbital contents and intraorbital pressure may be elevated ⁽³⁾.

The clinical signs include widening of the palpebral fissure, eyelid retraction, lid lag, conjunctival congestion, chemosis, proptosis, corneal exposure, restrictive myopathy and Dysthyroid Optic Neuropathy (DON) ⁽⁴⁾.

DON occurs in about 4–8% of patients, which is the most serious complication of GO, it occurs due to ischemia and inflammation of the optic nerve, also compression of the optic nerve due to enlargement of extraocular muscles at the apex of orbit ⁽⁵⁻⁻⁷⁾.

Symptoms and signs of DON depends on clinical features, which include decrease in the visual acuity (VA), more in eyes with DON than those with Graves' alone, impaired perception of the bright color is the early sign, abnormal visual fields (VF), visual evoked potential is delayed and more sensitive than kinetic perimetry, edema or atrophy of the optic nerve and afferent pupillary defects are highly specific⁽⁶⁾.

By testing the VF with DON patient may developed a central or paracentral scotoma, increased blind spot, inferior altitudinal and many develop inferior arcuate defects, nerve bundle defect, generalized field constriction and inferolateral defects⁽⁸⁾.

Optical Coherence Tomography (OCT) is a non-invasive high-resolution imaging modality that uses non ionizing optical radiation, OCT is derived from low-coherence interferometry. This is an absolute measurement technique which was developed for high-resolution ranging and characterization of optoelectronic components⁽⁹⁾.

Kumari et al., 2016⁽¹⁰⁾ evaluated retinal nerve fiber layer (RNFL) thickness in GO with no clinical signs of optic nerve dysfunction showed that the average RNFL thickness in GO is lower than the control groups in the first visit, the thickness of inferior quadrant decreased after 6 months of follow up.

Forte et al., 2011⁽¹¹⁾ found that no significant reduction in RNFL thickness in patients with ocular hypertension > 23 mmHg and patients with GO, and reported a low correlation between VF abnormalities and RNFL thickness.