بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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Measurement of Sub-Foveal Choroidal Thickness in Hyperthyroid Patients with Thyroid Associated Ophthalmopathy, using Spectral Domain OCT

Thesis

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List of Abbreviations

Abb.	Full Name
Abs	Autoantibodies
anti-TG	Anti-thyroglobulin
anti-TPO	Anti-thyroid peroxidase
BM	Bruch´s membrane
CBZ	Carbimazole
CC	Choriocapillaris
CFD	Color flow Doppler
CT	Choroidal thickness
CST	Central subfield thickness
DON	Dysthyroid optic neuropathy
EDI	Enhanced depth imaging
EDI-OCT	Enhanced depth imaging optical coherence tomography
EUGOGO	European Group on Graves' Orbitopathy
FT4	Free T4
GAG	Glycosaminoglycan
GC	Glucocorticoids
HS	Highly significant
IGF-1	Insulin like growth factor
IOP	Intraocular pressure
IQR	Inter-quartile range
IVGC	Intravenous glucocorticoid
IVMP	Intravenous MP
mAb	Monoclonal antibody
MMI	Methimazole
MP	Methylprednisolone
NIDE	National Institute of Diabetes and Endocrinology
NS	Non significant
OCT	Optical Coherence Tomography
PCA	Posterior ciliary arteries
PTU	Propylthiouracil
RAI	Radioactive iodine

List of Abbreviations cont...

Abb.	Full term
RAIU	Radioiodine uptake
VA	Visual Acuity
RPE	Retinal pigment epithelium
S	Significant
SCS	Suprachoroidal space
SD-OCT	Spectral Domain Optical Coherence Tomography
SLO	Scanning laser ophthalmoscope
SPSS	Statistical Package for Social Science
SS-OCT	Swept source optical coherence tomography
T3	Free T3
TAO	Thyroid associated ophthalmopathy
TD	Time- domain
Tg	Antithyroglobulin
TPO	Thyroid peroxidase
TRAbs	Antibodies against the TSH receptor
TSH	Thyroid stimulating hormone
TSH-R	Thyroid-stimulating hormone receptor
VISA	Vision, Inflammation, Strabismus, Appearance

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INTRODUCTION

Thyroid associated ophthalmopathy (TAO), also known as Graves' ophthalmopathy or dysthyroid ophthalmopathy, is the most frequent extra-ocular manifestation of thyroid dysfunction, most commonly associated with Graves' disease (GD), yet it can also occur with euthyroid or hypothyroid status ***(Huang et al., 2019)***.

GD is characterized by hyperthyroidism, diffuse goiter, ophthalmopathy, and in rare cases, dermopathy ***(Şahlı & Gündüz, 2017).***

GD, is an autoimmune condition in which autoantibodies target the thyroid-stimulating hormone receptor (TSH-R) present on thyrocytes, resulting in the production of excess thyroid hormone ***(Fröhlich & Wahl, 2017)***

In addition to elevated free thyroid hormone levels and suppressed thyroid stimulating hormone (TSH) levels, the levels of serum anti-thyroglobulin (anti-TG) antibodies, anti-thyroid peroxidase (anti-TPO), and TSH receptor antibodies levels may be elevated in GD. ***(Molnár et al., 2019).***

The risk and severity of ophthalmopathy in patients with GD may be increased by many factors including tobacco smoking, genetics, the type of treatment for hyperthyroidism, TSH receptor antibody levels, advanced age, and stress. For example, patients who smoke have a 5 times higher risk of

developing TAO than those who do not. The pathogenesis of TAO include glycosaminoglycan (GAG) deposition (accompanied by swelling resulting from their hydrophilic property), fibrosis affecting the extra-ocular muscles, and adipogenesis in the orbit. this leads to muscle dysfunction due to failure of relaxation and limitation of movement resulting in diplopia ***(Bartalena et al., 2020).***

This results in an inflammatory ocular condition, characterized by increased volume of the orbital tissues, fat and extra-ocular muscles, manifested in exophthalmos, lid retraction and strabismus ***(Cagiltay et al., 2018).***

In addition, the orbital swelling at the apex results in compression of the orbital structures including the optic nerve (resulting in dysthyroid optic neuropathy), retinal and choroidal microstructures ***(Saeed et al., 2018).***

In order to assess the disease activity clinically, the VISA score is used, assessing the Vision, Inflammation, Strabismus and Appearance, with vision being the first priority, followed by inflammation as the second priority ***(Winn and Kersten, 2021).***

The choroid provides the blood supply to the outer retinal layers, and thus any changes in the choroidal microvasculature from the orbital compression will subsequently affect the retinal function ***(Özkan et al., 2016).***

Few studies have measured the choroidal thickness (CT) in TAO using Spectral Domain Optical Coherence Tomography (SD-OCT), and Enhanced Depth Imaging OCT (EDI-OCT) and reported an increase in the central sub-foveal, mean and temporal CT ***(Zhu et al., 2018; Çalışkan et al., 2017; Özkan et al., 2016).***

One study suggested that the CT increase could be an early indicator of venous congestion, that develops before the elevation of the intraocular pressure (IOP) and thus can be used in monitoring the activity of the disease and allow timely intervention to avoid serious ocular complications ***(Cagiltay et al., 2018).***