بسم الله الرحمن الرحيم

"قالوا سبحانك لا علم لنا إلا ما علمتنا إنك

أنت العليم الحكيم"

صدق الله العظيم

Absract

Cataract surgery is known to elicit postoperative macular oedema. Although the exact pathomechanism is not known, the role of surgical trauma and release of prostaglandinis suspected. The aim of the study was to measure the mean foveal thickness MFT after uneventful phacoemulsification and posterior chamber intraocular lens (PC IOL) implantation using Optical coherence tomography (OCT).OCT is a fundamentally new type of medical diagnostic imaging modality.

Our study included 50 eyes of 48 patients divided into 2 groups; Group 1 (Diabetes mellitus group) consisted of 25eyes (25 diabetic patients) and Group 2(Control group) consisted of 25 eyes (23non-diabetic patients). All patients were admitted for Phacoemulsification and PC IOL implantation. MFT was evaluated preoperative and 7,30, and 60 postoperative.

There is no correlation between MFT and age, but there is a highly significant correlation between MFT and staging of diabetic retinopathy , duration of DM.Statistically significant moderate correlation was detected between BCVA and MFT after one and two months postoperative.

Key words:

Optical coherence tomography

Pseudophakic macular oedema

Diabetic macular oedema

Phacoemulsification

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List of abbreviation

BCVA	Best corrected visual acuity
BRB	Blood-Retina Barrier
BS	Beam splitter
CME	Cystoid macular edema
COX	Cyclooxygenase
DME	Diabetic macular edema
ECCE	Extracapsular cataract extraction
ETDRS	Early treatment diabetic retinopathy study
FA	Fluorescein angiography
FAZ	Foveal avascular zone
IOP	Intraocular pressure
LECs	Lens epithelial cells
LogMAR	Logarithm minimal angle of resolution
ME	Macular edema
MFT	Mean foveal thickness
mm	millimeter
µm	Micrometer
MMFT	Minimal mean foveal thickness
NSAID	Nonsteroidal anti-inflammatory drug
OCT	Optical coherence tomography
PC IOL	Posterior chamber intraocular lens
RNFL	Retinal nerve fiber layer
SNR	Signal/noise ratio
ttt	Treatment
VEGF	Vascular endothelial growth factor

List of abbreviation

PMMA	Polymethyl methacrylate
CC	Choriocapillaris
DC	Dispersion
DG	Diffraction grating
ELM	External limiting membrane
ERM	Epiretinal membrane
GCL	Ganglion cell layer
ICCE	Intracapsular cataract extraction
ILM	Internal limiting membrane
INL	Inner nuclear layer
IPL	Inner plexiform layer
IS/OS	Inner and outer segment
M	Mirror
NFL	Nerve fiber layer
ONL	Outer nuclear layer
OPL	Outer plexiform layer
P	P value
PRP	Pan retinal photocoagulation
r	Correlation coefficient
RLA	Retinal leakage analyzer
RPE	Retinal pigment epithelium
SD-OCT	Spectral domain-OCT
SLD	Superluminescent diode
TD-OCT	Time domain-OCT

List of abbreviation

DM	Diabetes mellitus
DR	diabetic retinopathy
HS	Highly significant
NS	Non-significant
PCO	Posterior capsular opacification
PSC	Posterior subcapsular cataract
S	Significant
SD	Standard deviation
SPSS	Statistical Package of Social Science Software program
3-D	Three-dimension
SS	Signal strength

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Evaluation of macular changes after uneventful phacoemulsification surgery in diabetic patients using optical coherence tomography.

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Rationale and background

Diabetic patients pose a particular challenge due to their early formation of cataracts and propensity to develop macular edema after cataract surgery, [1], [2].

Macular edema (ME) is a major cause of vision loss after cataract surgery in patients with diabetes, [1], [2].

Identifying predisposing risk characteristics to stratify diabetic patients would aid in early detection, treatment and prophylaxis, [3].

Optical coherence tomography (OCT) is a method for high-resolution cross-sectional imaging that directly measures retinal thickness. It uses light to detect relative changes in reflection at optical interfaces and has a theoretical axial resolution of 10 to 14 μm, [4].

OCT has been shown to be highly reproducible in measuring macular thickness in normal individuals and diabetic patients, [5], [6].

Recent publications by ***Browning et al*** [7] ***and Brown et al*** [8] have suggested that OCT is superior to contact lens biomicroscopy for detecting diabetic macular edema (DME) especially in mild cases.

In diabetics, ME can be cystoid or not, but when associated with clinical macular thickening of specified parameters, it is defined as clinically significant macular edema (CSME), [9].

CSME is an important risk factor for decreased vision after cataract surgery. Thus, after cataract surgery, angiographic ME in diabetics may be from pseudophakic cystoid macular edema (CME) or from diabetic ME and by itself may not be clinically useful in predicting visual acuity; however, macular thickening may be clinically important, [9].

Pseudophakic macular edema may be predisposed by one or more conditions (other than diabetes) including retinal vascular occlusions, age-related macular degeneration, uveitis, and cataract surgery, etc, [10].

Pseudophakic DME may be chronic and resistant to treatment, [11] although recent reports by ***Cardillo et al*** [12] ***and Larsson et al*** [13] suggest that delayed treatment of ME after cataract surgery in diabetic patients, though still effective in decreasing center point thickness, is not associated with marked visual improvement; hence the need of early detection of predisposed patients.

Controversy exists regarding the effects of phacoemulsification on retina whether in diabetic or non diabetic patients, with some studies as ***Mentes et al*** [14] who reported an incidence of 9.1% ME after uncomplicated phacoemulsification in healthy (non diabetic) subjects, with other suggesting that diabetic patients may be more prone to develop postoperative subclinical retinal swelling or clinical CME, [10].

Kodama and Coworkers [15] found a higher incidence of postoperative CME in diabetics than in nondiabetics after extracapsular cataract extraction (ECCE).

El-Ashry et al [16] reported that lens opacities may affect the image quality of OCT scans used to measure retinal nerve fiber layer (RNFL) thickness as indicated by preoperative Low signal/noise ratio (SNR), so cataract extraction results in an apparent increase of the RNFL thickness.

Some documented that macular edema in non diabetic patients after cataract surgery was associated with the presence of leaking sites involving the vascular areas of the macula, [17].

ME may be related to impairment of the blood–retinal barrier in diabetics and an increased susceptibility to surgical trauma. Other factors

that may contribute to the progression of diabetic retinopathy and possibly to an increased incidence of CME after phacoemulsification in diabetics may include chronic inflammatory mechanisms, as recently suggested by ***Joussen and coworkers*** [18].

Also, Kim et al [3] published reports that level of diabetic retinopathy is a risk factor for thickening of the retina after cataract surgery.

Subjects and methods:

Twenty five eyes of diabetic patients and twenty five eyes of non diabetic patients (as a control group) with cataract who are candidates for phacoemulsification and posterior chamber intraocular lens (IOL) implantation are enrolled.

Preoperative evaluation for surgical eyes and non surgical fellow eyes will be performed including best corrected visual acuity (BCVA), biomicroscopy, indirect ophthalmoscopy, intraocular pressure (IOP) measurement, biometry to calculate IOL power, fundus photography, and fluorescein angiography if possible with the opacity of the media and measurement of macular thickness using OCT.

Postoperative examinations are to be performed one week, one month, and two months after surgery. All of the patients will be subjected to ophthalmological examination including BCVA, biomicroscopy, IOP measurement, indirect ophthalmoscopy, fundus photography, fluorescein angiography and measurement of macular thickness using OCT.

Exclusion criteria are subjects who have dense cataract or subjects with prior intraocular surgery of any type, history of uveitis, or the presence of any retinal or choroidal disease, other than diabetes, that could affect retinal thickness.