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Comparative Analysis of Macular Thickness Using Optical Coherence Tomography in Diabetic and Non-Diabetic Patients after Cataract Surgery

Dr. Sonakshi[1], Dr. Anshu Sharma[2]

[1]PG Resident, Department of Ophthalmology, Rama Medical College and Hospital, Hapur, Uttar Pradesh – 245304, India
Email: *babbar.sonakshi96[at]gmail.com*

[2]Professor and Head of Department of Ophthalmology, Rama Medical College and Hospital, Hapur, Uttar Pradesh – 245304, India
Email: *dranshu.eye[at]gmail.com*

Abstract: ***Diabetes mellitus (DM) is chronic metabolic disorder which is globally prevalent and fast growing disorder, commonly leads to complications like – neuropathy, nephropathy, retinopathy, keratopathy, cardiovascular diseases, and diabetic foot. Methods: The study was conducted on 100 patients which were equally divided into Group I consisting of 50 diabetic patients without diabetic retinopathy and macular edema and Group II consisting of 50 non - diabetic patients who underwent uncomplicated cataract surgery with PCIOL implantation in Department of Ophthalmology, Rama Medical College, Hospital and Research Centre, Hapur. In all study patients CMT using Nidek ® Retina Scan Duo RS - 330 (SD - OCT) OCT and best Corrected Visual Acuity (BCVA) was recorded preoperatively and postoperatively on 1st month to see changes in macular thickness. Conclusion: The Central Macular thickness and the visual Outcomes in diabetic patients without retinopathy and macular edema undergoing uncomplicated cataract surgery with posterior chamber intraocular lens were statistically significant at postoperative 1 month as compared to the non - diabetic patients who underwent uncomplicated cataract surgery with posterior chamber intraocular lens. Therefore, the short-term post cataract surgery increase in Central Macular Thickness (CMT) and visual recovery in diabetic patients without diabetic retinopathy and macular edema is different than the non - diabetic groups.***

Keywords: Diabetes mellitus, central macular edema, diabetic retinopathy.

List of Abbreviations

CMT	Central Macular Thickness
CSME	Clinically Significant Macular Edema
DM	Diabetes Mellitus
DME	Diabetic Macular Edema
DR	Diabetic Retinopathy
ETDRS	Early Treatment Diabetic Retinopathy Study
FBS	Blood Sugars (Fasting)
ME	Macular Edema
OCT	Optical Coherence Tomography
RBS	Blood Sugars (Random)
SD - OCT	Spectral - Domain OCT
T2DM	Diabetes Mellitus, Type - II

1. Introduction

Diabetes mellitus (DM) is a major global health concern. Since diabetes mellitus naturally strikes people at their most productive years, it can lead to long - term systemic consequences that have a significant impact on both the patient and society. Diabetic retinopathy, corneal abnormalities, glaucoma, iris neovascularization (NVI), cataracts, and neuropathies are some of the ocular consequences of diabetes mellitus. The well - known disorder known as cystoid macular edema (CME) is typified by the development of fluid - filled cystoid gaps that arise from the retinal barrier between the inner nuclear layers and outer plexiform layers of the retina breaking down. [1] This breakdown leads to a significant increase in foveolar thickness, which is a primary cause of reduced vision following surgery.

Patients with diabetes mellitus, cystoid macular edema (CME), and exacerbated diabetic macular edema (DME) present unique challenges when it comes to visual outcomes after cataract surgery. [2 - 5]

As a cutting - edge, non - invasive, and contactless technology, SD - OCT was used to measure the CMT in healthy adults, which was found to be around 241.75 ± 17.3 μm. The baseline CMT is an important reference point for detecting variations from the norm and determining the severity of pathogenic disorders.

Need for the study

Moreover, by investigating this comparative aspect, this study seeks to fill a critical gap in ophthalmic literature. Findings from this research could inform clinical guidelines, prompting earlier detection, intervention, and potentially preventive measures specifically for diabetic patients undergoing cataract surgery [(19).] Additionally, after cataract surgery, this research is required to determine the degree of changes in macular thickness in diabetes vs non - diabetic individuals.

2. Material & Methods

The patients included in this study were recruited from Rama Medical College Hospital & Research Centre, Hapur.

Study Period: 18 months

Study Design: Prospective Observational non randomised study

Study Population: 100 operated eyes of 100 post - cataract

surgery patients

Inclusion Criteria:

- Group 1: Diabetic patients after cataract surgery (n = 50)
- PP ≥200 mg/dl / FBS ≥126 mg/dl / HbA1c ≥6.5%
- Group 2: Non - diabetic patients after cataract surgery (n = 50)

The present cross - sectional study was carried out on 100 patients in Rama Medical College Hospital & Research Centre, Hapur. Total 100 patients (50 suffering from DM II, 50 non - diabetics) of either gender attending the Ophthalmology Out - Patient Department, Rama Medical College Hospital & Research Centre, Hapur, was enrolled in this Prospective Observational non randomised study. The study has been approved by the Institutional Ethics Committee of our Institute. A detailedl history was recorded in each case. All patients should have proper pupillary dilation and should cooperate sufficiently for adequate OCT photographs before and after cataract surgery at 1 month to see the variation in CMT.

Method of Study

Each subject will provide written, informed permission in their native tongue before the study begins. A piloted proforma will be used to gather data from the patients, therefore fulfilling the study's goals through in - person interviews with the patients. Patients who meet the inclusion criteria will be the only ones enrolled in the research after being screened out based on the data supplied. A thorough clinical history will be gathered of the patient when they are chosen for the research. Foveal thickness will be recorded using Nidek® Retina Scan Duo RS - 330.

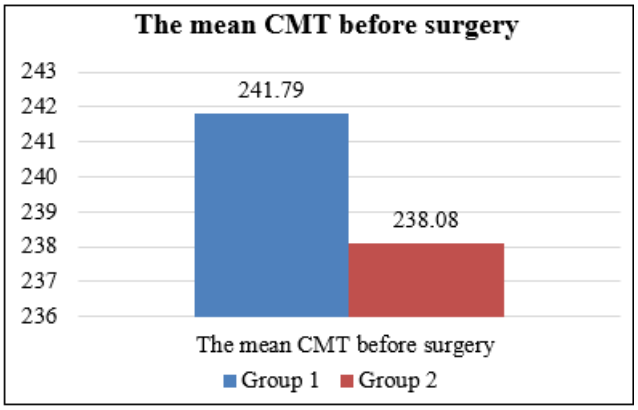
Post Operative Treatment

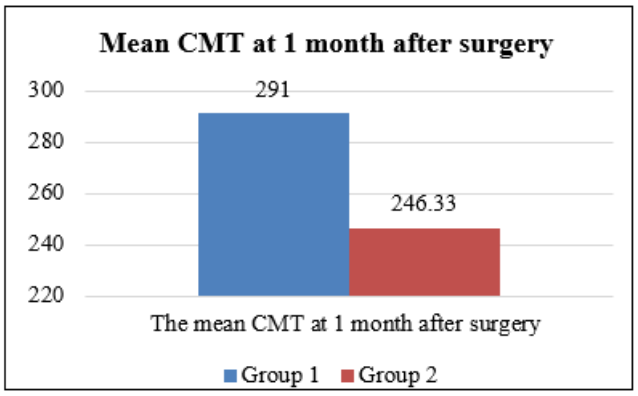
- Tablet Ciplox 500 mg twice daily x 5 days
- Tablet Combiflam as required
- Topical antibiotic eye drops (Moxifloxacin 0.5%) 2 hourly
- Topical steroid eye drops (Prednisolone acetate 1 %) 1 hourly
- Topical homatropine 2 % eye drops once a day x 1 week

3. Data Entry and Statistical Analysis

After being coded and converted into variables, the gathered data was input into Microsoft Excel. SPSS - PC 20 version was used to analyze and statistically assess the data.

P - values below 0.05 are regarded as statistically significant.





The work included history and detailed ocular examination of all patients:

- Visual Acuity (UCVA, BCVA) using Snellen's Chart
- Slit - lamp examination to rule out pre - existing ocular pathology
- Pupillary dilation with eye drops Tropicamide 1%
- Fundus examination using indirect ophthalmoscopy with +20D lens and slitlamp biomicroscopy using +90D lens
- Optical Coherence Tomography using Macula Map scan on Nidek Retina

Scan Duo RS - 330 (Spectral - domain OCT) OCT

- FBS/RBS/HbA1c

4. Conclusion

The Central Macular thickness and the visual Outcomes in diabetic patients without retinopathy and macular edema undergoing uncomplicated cataract surgery with posterior chamber intraocular lens were statistically significant at postoperative day 1 month as compared to the non - diabetic patients who underwent uncomplicated cataract surgery with posterior chamber intraocular lens.

Therefore, the short term post cataract surgery increase in Central Macular Thickness (CMT) and visual recovery in diabetic patients without diabetic retinopathy and macular edema is different than the non - diabetic groups.

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