



EVALUATION OF CYSTOID MACULAR OEDEMA WITH OPTICAL COMPUTED TOMOGRAPHY FOLLOWING UNEVENTFUL PHACOEMULSIFICATION

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KEYWORDS :

INTRODUCTION

In spite of advancements in cataract surgery techniques, cystoid macular edema (CME), which is brought on by ocular inflammation, continues to be one of the most important reasons of suboptimal visual acuity following cataract surgery, even when the procedure goes without a hitch. CME can occur in healthy eyes following an uncomplicated cataract surgery or a complicated surgical treatment. It can also occur in people suffering from diseases such as uveitis, retinal vein occlusion, and diabetic retinopathy.^{1,2} The characteristics of the patient who is undergoing surgery, the choice of surgical technique, the integrity of the posterior capsule, the intraoperative drugs that are used, and the implantation of the intraocular lens are some of the factors that have been suggested as possible contributors to the development of macular edema.^{1,3}

The rate of postoperative macular oedema was approximately 2–20% with intra capsular cataract surgery (ICCE), but it decreased to 1–2% with the widespread use of extra capsular cataract extraction (ECCE) with intact posterior capsule. Intra capsular cataract surgery (ICCE) was the method that was used. It would appear that modern cataract surgery, which includes phacoemulsification, self-sealing corneal incision, and implant of foldable intraocular lens (IOL) in the capsular sac, has significantly reduced the occurrence of both angiographic and clinical CME.^{1,2} Although angiography with fluorescein is typically used to confirm a diagnosis of CME, it is a very uncomfortable technique that has a risk of serious consequences, and there is no guarantee that there will be a correlation between the degree of hyperfluorescence and the amount of vision loss.^{3,4} Because optical coherence tomography (OCT) is a non-invasive and comfortable method, it has enabled clinicians to reliably detect and measure small changes in macular thickness in cases of clinical and sub-clinical pseudo-phakic CME as well as to quantitatively evaluate the efficacy of various therapeutic modalities. This has been made possible by the introduction of the technology. This may be relevant in the process of developing medicines to prevent the loss of vision that occurs after surgery.⁵⁻⁸

Hence we conducted this prospective study to evaluate the clinical incidence of cystoid macular edema following uneventful phacoemulsification measured by means of optical coherence tomography (OCT) in a hospital.

METHODS AND MATERIALS

This was a prospective observational study conducted in the Department of Ophthalmology, Shridevi Institute of medical sciences, Tumkur. All patients above the age of 50 attending the OPD with cataract undergoing phacoemulsification were included in the study. 50 eyes of patients fulfilling the inclusion criteria were included in the study.

Based on outcome variables with 90% statistical power and 5% level of significance, the sample size of 50 was considered adequate for the study. The study was conducted between September 2022 to March 2023, for a duration of 6 months. Women of childbearing age, Patients with allergies to fluorescein dye, dense cataract grade IV and V, pre-existing macular disease, history of any ocular surgery (i.e., Refractive surgery, Vitreous surgery), previous or current use of topical pilocarpine or prostaglandin analogues, previous history of significant

eye trauma, history of Optic nerve diseases, pre-existing diabetic retinopathy or macular edema in diabetic patients or any other retinopathy or coexisting ocular pathology affecting visual acuity or macular thickness (corneal opacity, age-related macular degeneration, glaucoma) were excluded from the study.

Our study was started after obtaining Ethics Committee approval. The Best Corrected Distance Visual Acuity (BCVA) (after retinoscopy and subjective testing) was measured using Snellen's chart. Slit Lamp Examination was done to assess anterior segment, lids, and adnexa. Goldman applanation tonometry was done to record intraocular pressure. Dilated fundus examination with +90D Slit lamp biomicroscopy and by indirect ophthalmoscope with a +20D condensing lens was done. Preoperative OCT imaging was obtained from each eye following pupil dilation using the spectral domain OCT (macular cube 512 x 128) - Cirrus HD-OCT, model 5000 by a trained person.

OT technique

The patient was dressed in pre sterilized disposable OT dress along with a cap and Operation theater stockings.

The eye to be operated was dilated using one drop of 0.8% tropicamide and 5% phenylephrine hydrochloride 1 hour before surgery and repeated up to four times as needed. The eye was painted with 5% povidone iodine.

The patient's periocular skin was again prepared thoroughly with 5% povidone-iodine and one drop of povidone-iodine was instilled into the conjunctiva before draping.

A disposable drape was put on the patient having an 8 x 8 adhesive area and a side pouch for fluid collection.

Surgical steps

Intra operative:

A Barraquer's universal wire speculum was inserted taking care the eyelashes were under the drape and not in the operative field; conjunctiva was washed with a balanced salt solution.

The clear corneal incision was created with a 3.0 mm wide slit knife on the steep axis and one side port was created 60 degrees from the main incision with an MVR knife.

Hydroxypropyl methylcellulose and Sodium hyaluronate were used as the ophthalmic viscosurgical devices (OVD).

An OVD was injected into the anterior chamber and a 5.00 mm diameter continuous curvilinear capsulorrhexis (CCC) was created with 26 gauge- needle.

After hydro dissection, standard phacoemulsification was performed using phaco-chop nuclear fracturing techniques.

After residual cortex material was irrigated and aspirated, a hydrophobic or hydrophilic monofocal foldable intraocular lens was implanted in the capsular bag using the injector.

The OVD was removed from the anterior chamber after IOL

Implantation.

At the end of the surgery, 0.1 ml of intra cameral antibiotic Moxifloxacin 0.5% is given.

Post-operative:

The patient was shifted to the Post-operative care ward.

Patients were started on Gatifloxacin 0.3 % + loteprednol etabonate 5 mg eye drops initially at 6 times/day frequency which was slowly tapered off every week.

Nepafenac 0.1% eye drops was given twice a day for 2 month.

Follow up examinations were scheduled at 1 week, 1 and 3 months with following investigations.

Visual acuity using the Snellen's chart

- Detailed anterior segment examination
- Detailed Fundus examination with slit lamp bio-microscopy with +90 D lens
- Optical coherence tomography with cirrus HD OCT. Intraocular pressure by Goldman applanation tonometry.

STATISTICAL ANALYSIS

The data is reported as the mean \pm 1.96*SE (95% confidence interval for mean) or the median, depending on their distribution. Comparison between groups was made by the non-parametric Mann-Whitney test. ANOVA was used to assess the quantitative variables and paired t test for quantitative variables. Pearson's coefficient of correlation was used to assess the relationship between the variables. P value of <0.05 using a two-tailed test was taken as significant for all statistical test. All data were analyzed with a statistical software package (SPSS, version 20.0 for Windows).

RESULTS

The age of the study participants ranged from 55 years to 75 years with a mean of 63.95 years. The age for male patients varied from a minimum of 55 years to a maximum of 75 years whereas the minimum age for female patients was 58 years and the maximum was 75 years. The p value >0.05, so the association between age and gender is not significant.

The right eye was operated in 26 cases, left eye in 22 case and bilateral in 1 case.

Preoperatively out of 50, 22 (44%) had BCVA between 6/24 – 6/36 (measured using Snellen's chart), followed by 23 patients (46%) with BCVA 6/12-6/18, 5 patients (10%) with BCVA between \leq 6/60 and none were between 6/6-6/9. However, show that postoperatively at 3 months follow up vision improved and maximum patients had BCVA between 6/6-6/9 (99%), followed by 1 patient (1%) between 6/12-6/18 and none were between 6/24-6/36 and \leq 6/60.

Our observations show that 55.2% showed \geq 4 line gain in visual acuity at postoperative 3 months measured by Snellen's chart while 38.8% showed a 3-line gain in visual acuity.

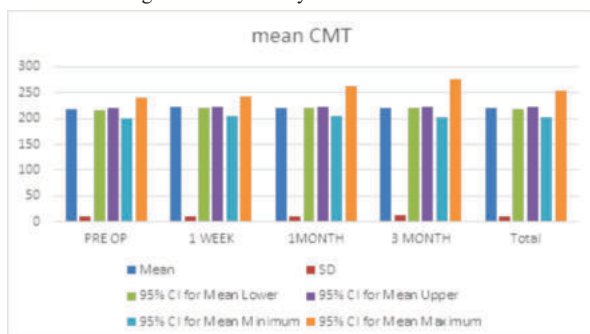


FIGURE 1:- MEAN CMT PRE AND POST OPERATIVELY

We see that at the end of 3 months, there was only one patient with visual acuity decline. This difference was not statistically significant. (p value - 0.931). Our study showed that preoperatively only 1 patient (2%) had CMT between 240-249µm and maximum patients, i.e., 20 (40%) had CMT between 220- 229µm. However, it was observed that

that postoperatively at 3 months 21 patients (42%) had CMT between 220-229 µm and only 1 patient(1%) had CMT >250µm.

The mean preoperative central macular thickness was 218.76 \pm 10.795µm (range: 200 to 240 µm) and the mean postoperative central macular thickness at 3 months was 221.33 \pm 11.466 µm (range: 202 to 276 µm).

DISCUSSION

Cystoid macular edema is one of the known complications following cataract surgery and has been postulated due to the release of inflammatory mediators that affect the blood retinal barrier and results in increased permeability of the para-foveal and peri-foveal capillaries with an accumulation of fluid in the retina. If the surgery is uneventful there are fewer chances of a release of inflammatory mediators and thus lesser chances of developing CME. The clinical CME with visual loss has been reported to be between 1 and 6 % following cataract surgery⁸.

The macular thickness measurements might be affected by surgical parameters such as phacoemulsification time, and phacoemulsification energy. Von Jagow et al. reported that surgical and biometric parameters such as phacoemulsification time and energy and axial length did not correlate to the degree of macular thickening. However, on average 40–50% phacoemulsification energy was used in all of the cases⁵. These parameters were not evaluated in our study.

It is known that postsurgical CME develops at 6–8 weeks after cataract surgery⁶. In our study, an increase in macular thickness measured by OCT started at the postoperative first week and continued until postoperative 3 months.

In a study conducted by Charu Chaudhary et al.¹⁰ the mean age reported was from 61.27 \pm 8.32 years⁵⁷. Burkhard von Jagow et al reported a mean age of 64.8 \pm 8.9 years (range 53–78)⁸.

M Gharbiya et al. also reported that the average BCVA postoperatively was significantly improved (p<0.0001)¹¹. Charu Chaudhary et al. also reported that BCVA postoperatively was significantly improved (p = 0.05)¹⁰. Burkhard von Jagow et al. also reported that BCVA was significantly improved at 1 week postoperatively and maintained till 6 weeks postoperatively (p<0.05)⁸. Meri Vukicevic et al. also reported that BCVA was significantly improved at the postoperative 1st week and maintained till 6 months postoperatively (p<0.001)¹².

The mean preoperative central macular thickness was 218.76 \pm 10.795 µm (range: 200 to 240 µm) and the mean postoperative central macular thickness at 3 months was 221.60 \pm 11.466 µm (range: 202 to 276 µm) which were significantly less than the mean preoperative CMT (p<0.0001). Charu Chaudhary et al reported a significant increase in mean CMT from 234.84 \pm 27.25 to 238.41 \pm 26.93 µm at postoperative 3 months (p \leq 0.05)⁵⁷. Tuncay Kusbeci et al reported mean preoperative central macular thickness was 255.68 \pm 23.04 µm and postoperatively at 3 months was 268.52 \pm 40.14 µm (p = 0.028)⁹. Burkhard von Jagow et al. reported mean preoperative CMT of 210.5 \pm 21.0 µm, increased to 222.4 \pm 24.7 µm (p=0.03) one day postoperatively, 227.5 \pm 22.6 µm (p<0.001) at 1 week postoperatively and to 230.4 \pm 23.2 µm (p<0.001) at postoperative 6 weeks⁸.

In our study, Clinical CME was not detected in any eye in any postoperative visit and incidence of CME based on OCT was found to be 0.8%. Ching et al reported 3.05% incidence of CME after phacoemulsification both clinically and tomographically¹⁴

CONCLUSION

In our study, we evaluated 50 patients who underwent uneventful phacoemulsification and incidence of cystoid macular edema following the procedure was noted using OCT. We found no significant correlation between preoperative vision and preoperative CMT; postoperative vision and postoperative CMT; preoperative CMT and postoperative vision. There were no intraoperative complications in our study as only uneventful surgeries were taken into the study. Postoperatively no clinical CME was noted. However, post-operatively, 0.8% of the patients showed CME by OCT consequently resulting in poorer visual acuity. OCT is found as an efficient method for identifying the presence of postsurgical CME. It provides an objective and quantitative measurement of macular thickness and allows us to quantitatively assess the progression of postsurgical CME and effect of therapy.

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