

Anterior Chamber Fluctuation and Its Effect on Macular Thickness in Uncomplicated Phacoemulsification

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Abstract: Purpose: To study the effect of intraoperative abnormal anterior chamber fluctuation on central macular thickness in uncomplicated phacoemulsification. **Methods:** Twenty eight eyes for 28 patients were included, who underwent phacoemulsification, cases with abnormal intraoperative anterior chamber fluctuation were selected, central macular thickness using optical coherence tomography was estimated preoperative and one week postoperative. **Results:** there were statistically non-significant difference in central macular thickness between preoperative and postoperative OCT measures where $P=0.295$. Only four eyes develop subclinical increase in macular thickness that represent 14.1%. There is high significant improvement of visual acuity postoperative where $P=1.58$. **Conclusion:** Abnormal anterior chamber fluctuation in uncomplicated phacoemulsification has no effect on central macular thickness early postoperative.

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1. Introduction

Macular edema is one of the main causes of unfavorable visual outcomes following uncomplicated cataract surgery and can result in permanent visual loss⁽¹⁾. At present, the incidence of postoperative complications is decreasing with development of phacoemulsification and posterior chamber intraocular lens implantation. However, anterior segment inflammation and macular edema are the most common complications of uneventful cataract surgery⁽²⁾.

Although the pathogenesis of macular edema is likely multifactorial and remains unknown, it appear to be associated with postoperative inflammation induced by prostaglandins or other inflammatory mediators⁽³⁾. Macular edema is the most common cause of sub-optimal visual outcome after cataract extraction procedures and represent today the most common cause of unexpected visual loss after uneventful cataract surgery⁽⁴⁾.

Macular edema is painless condition its effect on visual functions depends on the severity of the condition and is usually associated with blurred or distorted vision macular edema can be recognized by visual acuity reduction, characteristic appearance of the macula during funduscopy, fluorescein angiography or optical coherence tomography⁽⁵⁾.

2. Patients and Methods

This prospective study includes 28 eyes for 28 non diabetic patients, 18 females represents 64.2% of total number and 10 males represent 35.71% of total number of patients. all patients included in this study underwent preoperative ophthalmological examination includes best corrected visual acuity, snellens chart was used at preoperative visit and one

week postoperative, slit lamp-assisted biomicroscopy of anterior segment, fundus examination and optical coherence tomography, which was used to measure the central foveal thickness. OCT examination was performed by an experienced operator through dilated pupil, the maximal foveal thickness was measured at the center point of the fovea by manually placing computerized caliber at the vitreo-retinal and retina-retinal pigment epithelium interface.

Exclusion criteria include

Diabetic patients, previous intraocular surgery, patients with posterior segment lesions like age related macular degeneration. dense cataract not allow macular thickness assessment, patients with chronic uveitis, also patients with major intraoperative complications like vitrous loss, dropped fragments, iris trauma and postoperative inflammation were excluded from the study.

Technique

All cataract surgeries were performed by one surgeon using "Optocon" phacoemulsification machine, phaco chop and phacoaspiration techniques are the only two techniques were used in the study, patients with abnormal fluctuation and repeated hypotony during surgery were selected in this study, as during hydration of peripheral cortex after nuclear aspiration, cleaning of the posterior capsule from adherent cortical fibers using current of irrigating fluid, abnormal fluctuation in low scleral rigidity patients, and increased duration between surgical steps. Also total time of the procedure and effective phaco time (EPT) were calculated. In all cases acrylic hydrophilic foldable intraocular lens were implanted in the bag through 2.8 mm clear corneal incision, hydration of the corneal incision and side ports was occurred as usual. Post-operative systemic antibiotic,

topical prednisolone acetate 1%, and moxifloxacin eye drops for all patients. All patients were followed one week post-operative for "OCT" to measure central foveal thickness, and visual acuity assessment.

3.Results

Twenty eight eyes for twenty eight patients were included in this study. Eighteen were female (64.28%) and ten male (35.71%). The mean age of the patients were 44.32 ±1.7 years, (range 27-59) as shown in the table 1.

Table 1: show the demography of the studied group.

Item	Total No.	Male	Female
NO.	28	10	18
%	100%	35.71%	64.28%
Range	27-59 years		
Mean of age	44.32		
ST.D	9.37		

The preoperative and postoperative central macular thickness are shown in table (2). There was an insignificant increase in central macular thickness (194.6 ± 2.4µm, versus 198.07± 2.1µm), respectively, P=0.29542, also there is significant difference between preoperative and postoperative visual acuity where mean acuity were 0.15 preoperative and 0.85 postoperative with significant p=1.58.

Table (2) show preoperative and postoperative visual acuity and central macular thickness.

Item	Pre-operative	ost-operative
Mean of visual acuity	0.15	0.85
±St. D	0.083	0.102
P.Value	1.58	
Mean central macular thickness	194.6	198.07
±St.D	12.832	10.87
P.Value	0.29542	

Table (3) show the incidence of clinically significant macular edema

Total number	CSME	Subclinical ME.
28	0	4
100%	0%	14.1%

Regarding central macular thickness postoperative compared to the preoperative data we

found that there is no reported case with clinically significant macular edema, but there are recorded 4 cases with subclinical macular edema which represent 14.1% of total studied cases as shown in table (3), and figures from 1A-B to 3 A-B.

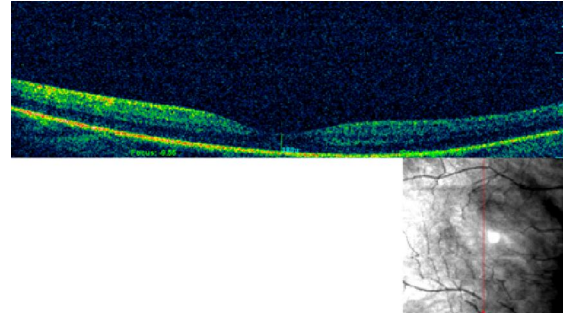


Fig. (1 a) preoperative (OCT) show macular thickness 180 µm

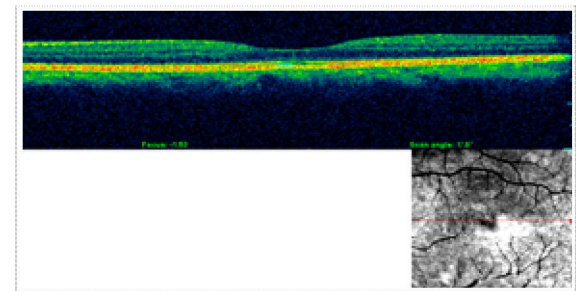


Fig. (1 b) postoperative (OCT) show macular thickness 190 µm

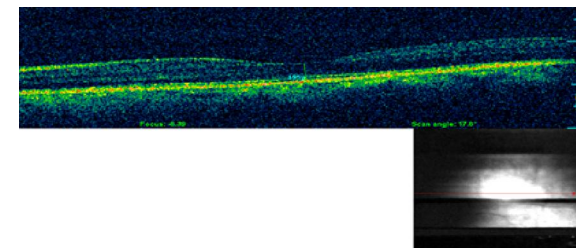


Fig (2 a) preoperative (OCT) show macular thickness 185 µm

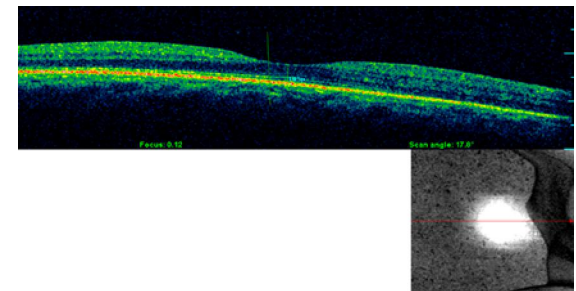


Fig (2 b) One week postoperative (OCT) show macular thickness 195 µm

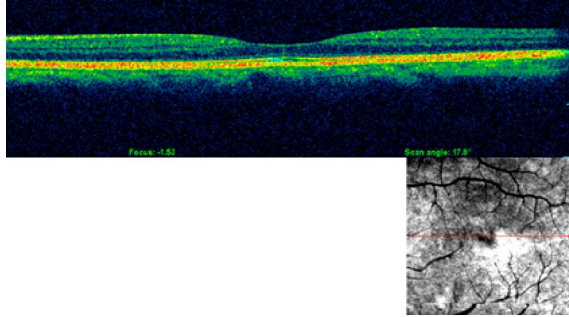


Fig. (3 a) preoperative (OCT) show macular thickness 170 μm

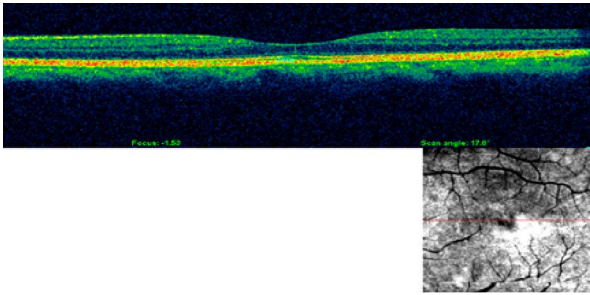


Fig. (3 b) postoperative (OCT) show macular thickness 190 μm

Table (4): Duration of surgery and effective phaco time (EPT)

Item	Duration of surgery	Effective phaco time
Range	7-20min	0.2-0.5sec..
Mean	12.5min.	0.3sec.
\pm St .D	3.55	0.099
\pm Standard errors	0.67	0.01

As shown in table (4) regarding mean duration of surgical techniques were 12.5 min. and mean effective phaco time were 0.3 sec. this help to exclude the effect of light toxicity and ultrasound on central macular thickness

4. Discussion

Optical coherence tomography is a diagnostic tool which is noninvasive, non-contact, and capable of displaying slices of tissue with high resolution. It operates on the principle of coherence interferometry using infrared light with high reliability and high validity (6).

OCT is a diagnostic tool for the tissue layer of the macula and retina with more than 87% sensitivity and more than 98% specificity (6)

Cystoid macular edema is the most common cause of unexpected loss of vision after

uncomplicated cataract extraction, has been reported to develop in more than 50% of patients as detected by fluorescein angiography. Analysis of ongoing clinical trials at Wilmer Institute indicates that CSME develops in a lower percentage of cases (2% and 0.3% persistent cystoid macular edema (7).

Cystoid macular edema following cataract surgery, there are three mechanisms attributing to the etiology of CME, the effect of vitreoretinal traction, light damage, and production of prostaglandins(8) of macular edema with a decreased visual acuity following modern cataract surgery has been reported at a rate from 0.2% to 14% (8)

In the present study cases included those had abnormal fluctuation or repeated hypotony intraoperative, statistical analysis of preoperative and postoperative central macular thickness show non-significant increase in central macular thickness only 14.1% develop increase in macular thickness (subclinical macular edema) 85.9% had no increase in central macular thickness postoperative.

The incidence of clinical macular edema following uncomplicated phacoemulsification cataract surgery range from 0.1% to 2.35 %.(9)

The different rates may be caused by several factors, such as the type of cataract, surgical technique, time of phacoemulsification and rate of complications.

Best corrected visual acuity postoperative improves significantly after phacoemulsification. The results of the numerical analysis support the successful outcome of surgery and also support the safety of posterior segment with anterior chamber fluctuation.

As regard effective phaco time in present study support that, ultrasound delivered from phaco hand piece it has no effect on retinal structures.

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