



EVALUATION OF OPTICAL COHERENCE TOMOGRAPHY PROVEN CYSTOID MACULAR EDEMA IN POSTOPERATIVE CATARACT PATIENTS OPERATED BY PHACOEMULSIFICATION TECHNIQUE

Ophthalmology

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ABSTRACT

Aims: To study the proportion of Cystoid Macular Edema (CME) using Optical Coherence Tomography (OCT) in postoperative cataract patients, operated by phacoemulsification technique

Methodology: This descriptive longitudinal study was conducted on 120 patients of immature cataracts undergoing cataract surgery by phacoemulsification technique. Patients were examined for macular thickness using OCT preoperatively and at 4 weeks after surgery.

Results: 9 of the 120 (7.5%) developed OCT proven CME at 1 month. Out of these 9 cases, 5 cases were followed by complicated phaco (intraoperative complications) and 4 cases were followed by uncomplicated phaco. Incidence of subclinical CME was 5.8% and that of clinical CME was 1.7%.

Conclusion : The incidence of CME following complicated phaco surgery was significant; even uneventful phaco surgeries may lead to CME and was attributed to the conditions that lead to increased inflammation and release of pro inflammatory factors.

KEYWORDS

CME , OCT , Cataract , Phacoemulsification .

INTRODUCTION:

Cataracts are the major cause of blindness and visual impairment in developing countries and contributes to more than 90% of the total disability adjusted life years.¹ Various types of cataract surgeries have evolved over the years, of which Extra Capsular Cataract Extraction (ECCE) has gained popularity as it involves retention of posterior capsular support for Intra Ocular Lens implantation. Three types of ECCE surgeries namely Conventional ECCE, Small Incision Cataract Surgery (SICS) and Phacoemulsification are routinely performed.² Cataract surgery has changed fundamentally following the introduction of phacoemulsification which has become the standard method to remove cataract. Phacoemulsification technique utilizes a small tip to deliver ultrasound energy that emulsifies the cataractous lens and aspirates through a small port. Cystoid macular edema (CME) following cataract surgery, also known as Irvine-Gass syndrome, is an important differential diagnosis of painless suboptimal vision following cataract extraction. The introduction of modern surgical techniques including phacoemulsification and SICS has contributed to a reduction in the incidence of CME since it was initially reported by Irvine in 1953. The diagnosis of CME was previously made with fluorescein angiography after the patient became symptomatic. However, the emergence of OCT has provided a quick and noninvasive means of diagnosis.³ In this study , we have clinically evaluated cases of OCT proven cystoid macular edema in postoperative cataract patients operated by phacoemulsification technique at Pravara Rural Hospital.

MATERIAL AND METHODS:

A total of 120 eyes from 120 patients were enrolled in a descriptive longitudinal study at Pravara Rural Hospital, Loni. This study included patients undergoing cataract surgery for immature cataracts by phacoemulsification technique, patients of age above 40 years and both genders and those willing to give written informed consent for the study between September 2018 to September 2020. Patients with pre-existing CME due to any cause such as uveitides, topical prostaglandins , retinal vein occlusion, retinal dystrophies, choroidal tumours, age related macular degeneration ; patients with systemic illness causing retinal pathologies such as diabetic macular edema, hypertensive retinopathy, leukemia ,severe anaemia, chronic renal failure ; cases of traumatic cataract , developmental cataract , complicated cataract were excluded. Study was initiated after ethical approval and data was collected from all selected patients using a structured proforma meeting the objectives of the study. BCVA, Anterior Segment findings and Fundus findings of the patients preoperatively, on postoperative day 1 and at 4 weeks were noted. OCT was done preoperatively and 4 weeks post-operatively, macular thickness of the patients were noted and presence or absence of Macular Edema was established. Data was analyzed by applying appropriate statistical tests.

RESULTS:

Mean Age of patients was 58.9 ± 7.9 years and Maximum number of cases (44.2%) were in the age group of 51-60. The relevant tables regarding post-operative observations are as follows

Table 1: Status of CME according to status of Intraoperative complications

Intraoperative complication		CME on OCT		Total
		No	Yes	
Complicated Phaco	Count	9	5	14
	%	64.3%	35.7%	100.0%
Uncomplicated Phaco	Count	102	4	106
	%	96.2%	3.8%	100.0%
Total	Count	111	9	120
	%	92.5%	7.5%	100.0%

Chi-Square Tests: χ^2 value=18.19, p value<0.001.

Out of total 14 complicated cases, 5 cases (35.7%) developed CME on OCT while out of total 106 uncomplicated cases only 4 cases (3.8%) developed CME on OCT. There was statistically very highly significant ($p < 0.001$) association of CME on OCT with intraoperative complication status in phacoemulsification surgery.

Table 2 : Frequency of Subclinical and Clinical CME in Postoperative Phaco patients

	Subclinical PCME		Clinical PCME	
	Frequency	Percent	Frequency	Percent
No	113	94.2	118	98.3
Yes	7	5.8	2	1.7
Total	120	100.0	120	100.0

Out of total 120 cataract cases who underwent phacoemulsification surgery, 7 cases (5.8%) had subclinical CME while only 2 cases (1.7%) had clinical CME.

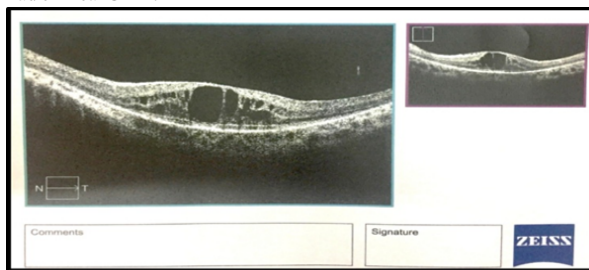


Figure 1 : OCT of Pseudophakic CME on Post-operative Day 30 ; Detected on Fundoscopy

DISCUSSION:

Most patients (44.2%) operated were amongst the group with preoperative visual acuity of 6/24. Average Visual acuity preoperatively was 0.58 ± 0.13 which was 0.23 ± 0.15 on day 1 and 0.01 ± 0.08 at 1 month. There was statistically very highly significant ($p < 0.001$) difference of visual acuity so that improved visual acuity was noted from preoperative day to day 1 to the duration of 1 month. As per the study conducted by Cargo cagini et al⁴, the differences between visual acuity are statistically significant ($p < 0.005$) for each postoperative follow up visit with respect to preoperative value and this showed resemblance to our study. In the study conducted by C. Chaudhary et al⁵, 99 % cases with subclinical increase in macular thickness had no effect on BCVA but 1 % cases with clinical CME had decreased BCVA and this finding is in accordance with our study. 11.7% patients had Intraoperative Complications. Iris trauma was the most common Intraoperative Complication present in 3.3% of cases. Mean preoperative macular thickness was $201.02 \pm 15.74 \mu\text{m}$ which was $205.52 \pm 21.71 \mu\text{m}$ after 1 month of phaco surgery. There was statistically significant ($p < 0.001$) difference of macular thickness on OCT after 1 month of phaco surgery. According to the study conducted by Degenring and Nicholas, there is postoperative increase in the macular thickness on OCT in patients followed up, respectively, for 4 and 6 weeks.^{6,7} Using OCT, Lobo found postoperative increase in retinal thickness that peaked at 6 weeks.⁸ In our study, out of total 120 cases 9 cases (7.5%) developed OCT diagnosed cystoid macular edema. Out of these 9 cases (7.5%) of OCT diagnosed CME, 5 cases were followed by complicated phaco and 4 cases were followed by uneventful phaco. There was statistically very highly significant ($p < 0.001$) association of CME on OCT with intraoperative complication status in phacoemulsification surgery. In our study, incidence of subclinical CME was 5.8% and that of clinical CME was 1.7%. Incidence of subclinical CME was 3% according to the Vukicevic et al.⁹ and 10.9% as reported by Perente et al.¹⁰ while in our study it is 5.8%. The incidence of clinical CME seen in the study conducted by C. Chaudhary et al⁵ was 1% and by Emery et al¹¹ was 2% and this is in accordance with our study whereas Ghosh et al.¹² did not found any evidence of clinical CME in their study. Incidence of subclinical CME in complicated cases was 28.57% and in uncomplicated cases was 2.8%. On fundus examination at 1 month, incidence of clinically significant CME was 7.1% in complicated phacoemulsification cases and 0.94% in uncomplicated phacoemulsification cases. There was statistically no significant ($p > 0.05$) difference of macular edema development at 1 month in between uncomplicated and complicated phacoemulsification cases. From these findings we infer that the rate of clinical CME is substantially low. But using OCT as a quantitative non-invasive diagnostic tool to detect CME prematurely may warrant early initiation of medical therapy for CME. Delay in the same leads to Chronic CME, characterized by change in retinal architecture, precipitating permanent diminution of vision and which proves arduous to treat medically.

CONCLUSION:

Cystoid Macular Edema following Cataract Surgery was attributed to the conditions that lead to increased inflammation and release of pro inflammatory factors such as iris trauma, posterior capsular rent with vitreous loss, posterior capsular rent without vitreous loss. The incidence of Macular Edema following complicated phaco surgery was significant; even uneventful phaco surgeries may lead to Cystoid Macular Edema. OCT was a useful, non-invasive diagnostic tool in determining subclinical CME following phacoemulsification surgery and detected the presence of retinal thickening and intra-retinal cysts very soon after surgery, thereby facilitating earlier diagnosis and treatment of postoperative CME. Our study confirmed that after both complicated and uncomplicated phacoemulsification surgery there was an increase in macular retinal thickness with respect to preoperative values and this probably reflected blood retinal barrier rupture. CME may or may not be associated with reduced visual acuity.

REFERENCES:

1. Rao GN, Khanna R, Payal A. The global burden of cataract. Current opinion in ophthalmology. 2011 Jan 1;22(1):4-9.
2. Basti S, Vasavada AR, Thomas R, Padhmanabhan P. Extracapsular cataract extraction: Surgical techniques. Indian Journal of Ophthalmology. 1993 Dec 1;41(4):195.
3. Shields MK, Adler PA, Fuzzard DR, Chalasani R, Teong JM. A case of acute bilateral irvine-gass syndrome following uncomplicated phacoemulsification, demonstrated with optical coherence tomography. Case reports in ophthalmology. 2015;6(1):143-8.
4. Cagini C, Fiore T, Iaccheri B, Piccinelli F, Ricci MA, Fruttini D. Macular thickness measured by optical coherence tomography in a healthy population before and after uncomplicated cataract phacoemulsification surgery. Current eye research. 2009 Dec 1;34(12):1036-41.

5. Chaudhary C, Bahadur H, Gupta N. Study of cystoid macular edema by optical coherence tomography following uneventful cataract surgery. International Ophthalmology. 2014;35(5):685-691.
6. Nicholas S, Riley A, Patel H, Nevelson B, Purdie G, Wells AP. Correlations between optical coherence tomography measurement of macular thickness and visual acuity after cataract extraction. Clinical & Experimental Ophthalmology. 2006 Mar;34(2):124-9.
7. Degenring RF, Vey S, Kamppeier B, Budde WM, Jonas JB, Sauder G. Effect of uncomplicated phacoemulsification on the central retina in diabetic and non-diabetic subjects. Graefes Archive for Clinical and Experimental Ophthalmology. 2007 Jan 1;245(1):18-23.
8. Lobo CL, Faria PM, Soares MA, Bernardes RC, Cunha-Vaz JG. Macular alterations after small-incision cataract surgery. Journal of Cataract & Refractive Surgery. 2004 Apr 1;30(4):752-60.
9. Vukicevic M, Gin T, Al-Qureshi S. Prevalence of optical coherence tomography-diagnosed postoperative cystoid macular oedema in patients following uncomplicated phaco-emulsification cataract surgery. Clinical & Experimental Ophthalmology. 2011;40(3):282-287.
10. Perente I, Utine C, Ozturker C et al. Evaluation of macular changes after uncomplicated phacoemulsification surgery by optical coherence tomography. Curr Eye Res 2007; 32: 241-7.
11. Emery JM, Wilhelmus KA, Rosenberg S. Complications of phacoemulsification. Ophthalmology. 1978 Feb 1;85(2):141-50.
12. Ghosh S, Roy I, Biswas PN, Maji D, Mondal LK, Mukhopadhyay S et al (2010) Prospective randomized comparative study of macular thickness following phacoemulsification and manual small incision cataract surgery. Acta Ophthalmol 88:102-106