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A COMPARATIVE STUDY OF INCIDENCE OF CYSTOID MACULAR EDEMA AFTER UNCOMPLICATED PHACOEMULSIFICATION AND SMALL INCISION CATARACT SURGERY USING OPTICAL COHERENCE TOMOGRAPHY

Ophthalmology

KEYWORDS: CME, Phacoemulsification, SICS, OCT.

DR MANAN KAUSHIK JUNIOR RESIDENT OPHTHALMOLOGY

DR SANJIV KUMAR PROFESSOR

DR SANJAY SHARMA ASSISTANT PROFESSOR

ABSTRACT

Introduction : CME is a known complication after cataract surgery. Various studies show incidence between 0.2-14% .we want to study the incidence of CME in most 2 prevalent methods of cataract surgery.

Objective: A comparative study of incidence of pseudophakic cystoid macular edema after uncomplicated PHACO and SICS using OCT .

METHODS : The study comprised of 2 GROUPS of uncomplicated cases of PHACO and SICS with 30 patients in each group by OCT. Apart from routine preoperative assessment patients also underwent OCT examination preoperatively. Postoperatively CME was evaluated by OCT on day 1 , 3rd week , 6th week and 12th week . Central Macular thickness and visual acuity was recorded on each visit.

RESULT : Central macular thickness and visual acuity in both the groups were comparative except CME was present in 1 case of SICS.

CONCLUSION : Both phacoemulsification and small incision cataract surgery have been found to be equally good but if compared in terms of incidence of macular edema , phacoemulsification has been found to be better .

Introduction : A cataract is opacification of the natural crystalline lens or its capsule , which impedes the passage of light. According to the latest assessment, cataract is responsible for 51% of world blindness, which represents about 20 million people (2010) 1. Cataract remains the leading cause of blindness.

Cystoid macular edema (CME) is the formation of fluid-filled cystoid spaces between the outer plexiform and inner nuclear layers of the retina, resulting from disruption of the blood-retinal barrier. The incidence of CME measured by OCT and fluorescein angiogram after uneventful cataract surgery is 0.2% to 14% (2,3). In the past, clinical pseudophakic CME was defined as reduced visual acuity in the presence of angiographic petaloid CME following cataract extraction, and the reported incidence was 1 percent to 2 percent. OCT shows cyst like hyporeflective spaces within the retina with retinal thickening and loss of foveal depression. Normal fovea shows a thickness of 212 ±20um. Any increase in thickness 2 standard deviations above mean foveal thickness is taken as cystoid macular edema.

OCT is a relatively new method for high-resolution cross-sectional imaging of the retina that directly measures changes in the z-plane (depth of the retina) (6) with 10 µm resolution (4). Optical coherence tomography (OCT) is a quantitative imaging modality, which provides cross-sectional images of the retina, with the help of 800 nm diode laser light.Its axial resolution is approximately 5 m, and the scan speed is 26 000 A-scans per second. Hence, OCT is considered as the gold standard for diagnosing subclinical CME (6).

India is a developing country and the patients undergoing SICS is much more than phacoemulsification due to the unavailability of costly machinery in remote areas.

So with this study we compared the efficacy of phacoemulsification and SICS in patients undergoing cataract surgery and see the incidence of cystoid macular edema in uncomplicated cases.

MATERIALS AND METHODS :

A prospective study was conducted to review the incidence of cystoid macular edema in patients undergoing uncomplicated cataract surgery at Department of Ophthalmology, Netaji Subhash Chandra Bose Subharti Medical College , Meerut. The study was done in accordance to the tenets of the Declaration of Helsinki. The study was approved by the Institutional Ethics Committe. Informed consent was obtained from all the study participants.

The patients were divided into two groups:

Group A: 30 uncomplicated cases of phacoemulsification using 2.8mm incision with foldable intraocular lens. Group B: 30 uncomplicated cases of small incision cataract surgery using 6.0mm incision and PMMA intraocular lens.Data like name, age , sex, preoperative visual acuity without and with correction and post operative visual acuity without and with correction and OCT readings would be recorded at postoperative day 1, 3rd , 6th week and 12th week.

The instrument used was OPTOVUE SD-OCT.

Exclusion criteria :Pre-existing retinal pathologies,Amblyopia,Previous intraocular surgery or laser treatment, Diabetes, hypertension ,Use of topical medication or systemic therapy with known interference on retinal thickness such as steroids and diuretics.

Ophthalmological Examination :

- Visual acuity assessment with snellen's chart
- Anterior segment examination with slit lamp biomicroscope.
- Posterior segment examination with slit lamp biomicroscope with 90D lens.

Macular thickness was measured using Optovue RTVue 100 Three Dimensional Fourier Domain OCT, using EMM5 (Enhanced Macular Map 5) protocol. It consists of a dense grid scan in a 6mm x 6mm area of central macula. A 38 scan grid pattern is used to render a mapped area of 5mm x 5mm. This was used to obtain foveal (centre 1mm) preoperatively and post operatively at day one, 3rd week, 6th week and 3 months.

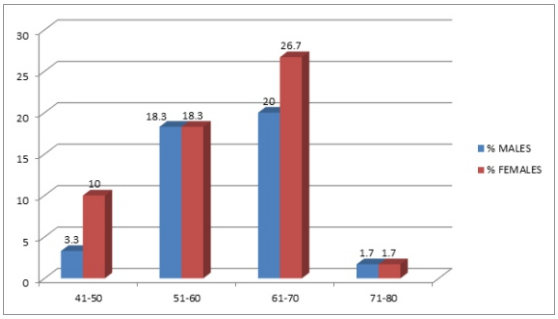
Interpretation and analysis of obtained results was carried out by using student t-test(paired and unpaired) and SPSS software.

RESULTS :

A total of 60 eyes were operated . In GROUP A ,30 eyes underwent phaco and in GROUP B 30 eyes underwent SICS.

TABLE 1 : AGE-SEX RATIO

AGE (YEARS)	MALES	Percentage(%)	FEMALES	Percentage(%)
41-50	2	3.3	6	10
51-60	11	18.3	11	18.3
61-70	12	20.0	16	26.7
71-80	1	1.7	1	1.7
TOTAL	26		34	

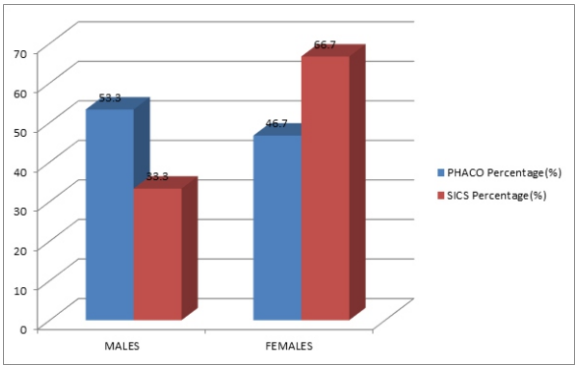


This table shows the distritbution of males and females into various age groups from 41 to 80 years. Maximum patients were in the 51-70 years of age group i.e 50 patients out of 60.

DROP OUTS : 1 female , 3 males

TABLE 2: PATIENTS UNDER GOING PHACO AND SICS

	PHACO	Percentage(%)	SICS	Percentage(%)	P VALUE
MALES	16	53.3	10	33.3	.118
FEMALES	14	46.7	20	66.7	
TOTAL	30	100	30	100	

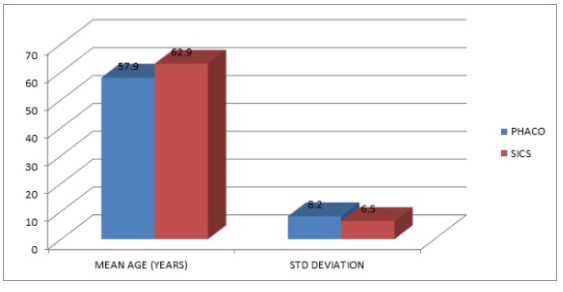


This table shows the total number of males and females undergoing phacoemulsification and SICS.

Out of total 60 patients , 26 male (43.3%) and 34 female (56.7%) patients underwent cataract surgery.

TABLE 3 : AGE

SURGERY	MEAN AGE (YEARS)	STD DEVIATION	P VALUE
PHACO	57.9	8.2	.674
SICS	62.9	6.5	



Mean age of the patients in phaco group A was 57.9 ±8.2 years and in SICS group B was 62.9±6.5 years. p value is insignificant i.e 0.674 which means that there was no age bias.

TABLE 4 : POST-OPERATIVE MEAN FOVEAL THICKNESS (um)

GROUP A (PHACO)

	MACULAR THICKNESS(um) MEAN ±STD DEVIATION	P VALUE	
PREOPERATIVE	212.5±5.7		
POSTOPERATIVE			
DAY 1		213.6±5.7	0.456
3RD WEEK		219.7±4.7	<0.001
6TH WEEK		225.7±4.9	<0.001
3 MONTHS		220.5±4.7	<0.001

This table shows the minimum , maximum foveal thickness and the mean of the foveal thickness in the phaco group .

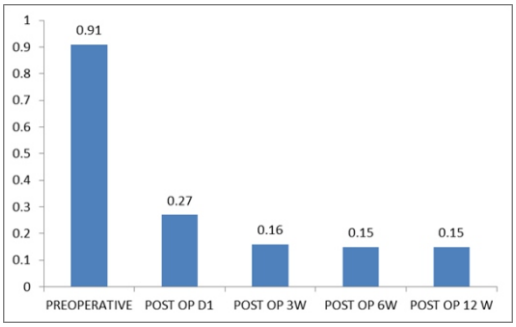
TABLE 5 : POST-OPERATIVE MEAN FOVEAL THICKNESS (um)

GROUP B (SICS)	MACULAR THICKNESS(um) MEAN ±STD DEVIATION	P VALUE	
PREOPERATIVE	215.1 ± 6.3		
POSTOPERATIVE			
DAY 1		216.1±6.3	0.553
3RD WEEK		222.9±12.2	<0.001
6TH WEEK		230.4±21.4	<0.001
3 MONTHS		225.1±15.6	<0.001

This table shows the minimum , maximum foveal thickness and the mean of the foveal thickness in the SICS group . In both group mean foveal thickness increases upto 6 weeks and then it gradually decreases and returns to base value.

TABLE 6 : GROUP A BCVA (PHACO)

	PREOPERATIVE	POSTOPERATIVE (logMAR)(MEAN)			
		DAY 1	3RD WEEK	6TH WEEK	3 MONTHS
MEAN± STANDARD DEVIATION	0.91±0.26	0.27±0.14	0.16±0.09	0.15±0.09	0.15±0.09
p-VALUE		<0.001	<0.001	<0.001	<0.001



This table shows the mean preoperative visual acuity and the mean postoperative visual acuity in the phaco group on day1 , 3rd week , 6th week and 3 months in logMAR.

TABLE 7 : GROUP B BCVA (SICS)

	PREOPERATIVE	POSTOPERATIVE (logMAR)(MEAN)			
		DAY 1	3RD WEEK	6TH WEEK	3 MONTHS
MEAN± STANDARD DEVIATION	1.34±0.38	0.32±0.13	0.23±0.13	0.24±0.17	0.23±0.17
p-VALUE		<0.001	<0.001	<0.001	<0.001

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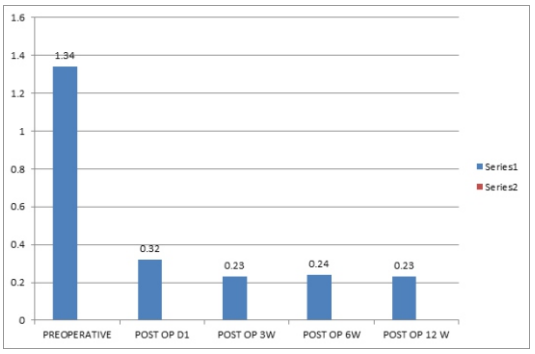

This table shows the mean preoperative visual acuity and the mean postoperative visual acuity in the SICS group B on day1 , 3rd week , 6th week and 3 months in logMAR.

DISCUSSION: Mean age of the patients in our study was 57.8±8.2 years in group A and 62.9±6.5 years in group B. In our hospital we also noted that there were more females undergoing cataract surgery as compared to males and there was a clear female preponderance . A similar age range was also seen in study done by Gulkilik et al(9) . Gulkilik et al (9) in their study determined the incidence and risk factors for cystoid macular edema (CME) after phacoemulsification surgery and its effect on visual acuity in a prospective study evaluated 98 eyes of 98 patients (43 women) with a mean (SD) age of 61.8 (11.3) years.

Our study did not co-relate with the study of Gulkilik et al(9) as it shows a male preponderance (55 males and 43 females) while our study shows a female preponderance (34 females and 26 males).

Increase in macular thickness was detected by OCT after uncomplicated small incision cataract surgery and phacoemulsification . Starting from the postoperative day one and reaching peak around 3rd- 6th week post operatively. The foveal thickness started returning towards preoperative values by three months. Lobo et al (8) detected that Increases in retinal thickness (i.e, over the mean +/- 2 SD in the control group) reached a maximum at 6 weeks in 13 of 32 eyes (41%), after which recovery was progressive . At 30 weeks, all eyes had good visual acuity, but 7 eyes still had macular edema. Our study did not match with the study of Lobo et al as we had less incidence of CME.

Similar finding was also observed in the study done by Vukicevi et al (10) . They detected that the Cystoid macular oedema was present in 5% of eyes. Macular thickness increased after surgery and central foveal thickness increased by almost 7% but returned to preoperative levels by 6 months. In our study also we found that the thickness increased between 6.1 – 8 % and started returning to preoperative values around 3 months after surgery.No significant increase in macular thickness was detected in our study on day 1 but increased by 3rd week and started returning to almost pre-operative values by 3 months . Similar findings were noted in the study done by Biro et al(5). They concluded that mild subclinical perifoveal oedema following cataract surgery was detected using OCT at postoperative day 7 to 6 months.

Ghosh S et al(11) found that on the first postoperative day, central subfield mean thickness(CSMT)(central foveal thickness) in MSICS group was 192.8 ± 17.9 um and that in phacoemulsificationgroup was 192.1 ± 27.4 um, with no significant difference (p = 0.12).On the 7th day, CSMT in MSICS group (198.9 ± 21.4 um) was significantly (p = 0.04) more than that in phacoemulsification group (193.1 ± 19.3 um). On the 42nd day, CSMT in MSICS group was 207.8 ± 26.3 um and that in phacoemulsification group was 198.3 ± 23 um, the difference being significant (p = 0.007). Clinically macular oedema was not diagnosed in any of the patients at any visit. The increase in macular thickness was sub-clinical and did not affect final visual outcome in any patient. But in our study we found macular edema in 1 patient of SICS.

In our study we did not find cystoid macular edema in any case of group A undergoing phacoemulsification even though increase in macular thickness was noted post operatively but foveal thickness increase was less than 40 percent which were not clinically significant and did not cause visual disturbance. Similar findings were noted by Mentes et al(7) in their study. Mentes et al(7) revealed that clinical CME was not detected in any eye at postoperative visits. In both the groups there was no correlation found between BCVA and macular thickness showed. Hence, in this study, the increase in macular thickness was not significant and did not affect final visual acuity in any patient. This was in accordance with the studies done Ghosh S et al(11) and Biro et al(5).

Conclusion: The central macular thickness increased postoperatively after both phacoemulsification and SICS was statistically significant when compared to the preoperative central macular thickness. It reached the maximum values around 6 weeks and returned towards almost pre-operative values around 3 months .Subclinical CME had no impact on BCVA while clinical CME was associated with decreased BCVA as we noted in 1case of SICS. In our study incidence of clinical CME following SICS, was 1.66% and after phacoemulsification was 0 %. Phacoemulsification and SICS are equally good in terms of post-operative outcomes when compared in terms of BCVA . Although the UCVA was slightly better of phacoemulsification group A in comparison to group B.

Conlfict of interests: none

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