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Comparison of postoperative cystoid macular edema in manual SICS vs phacoemulsification

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Abstract

Aim: To compare the macular edema occurring in patients postoperatively in uncomplicated manual SICS and uncomplicated phacoemulsification on the basis of macular thickness using optical coherence tomography (OCT).

Settings and Design: Prospective, randomized, parallel group and comparative study. 60 patients having cataract attending Eye OPD at our institute were included.

Materials and Methods: Patients were randomly assigned to one of two groups with 30 patients in each group. Group 1 consisted of patients undergoing manual SICS. Group 2 consisted of patients undergoing phacoemulsification. The total period of follow up was 12 weeks. Retinal thickness as evaluated with OCT was the parameter under study. During the study the patients visited the hospital at Day 1 and 4, 12 weeks.

Results: An increase in macular thickness after uncomplicated cataract surgery was seen in both groups. Cystoid macular oedema was not diagnosed clinically in any of the patients at any visit. However, central subfield macular thickness was more following manual SICS compared to phacoemulsication but increase was subclinical.

Conclusion: Both surgical techniques achieve excellent surgical outcomes with low complication rates.

Keywords: Manual SICS, Phacoemulsification, Postoperative cystoid macular edema

Introduction

According to the latest national survey, in India 62.6% of the blindness in the population above 50 years of age is cataract related.(1) Both phacoemulsification and MSICS are sutureless surgeries with low complication rates and satisfactory visual outcomes. Cystoid macular edema (CME) is one of the important postoperative complications of cataract surgery, which can compromise the result of a cataract surgery.(2) The detection of CME can be either through clinical examination, angiographic examination or optical coherence tomography examination. Of the three techniques, optical coherence tomography has the highest sensitivity, followed by angiography and then clinical examination.

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 specific etiology of aphakic and pseudophakic macular edema is not fully understood. Proposed etiologic factors include inflammation, vitreous traction and hypotony.(3,4) The type of cataract surgery, light toxicity, use of adrenergic drugs, vitreous loss, integrity of the posterior capsule, hypertension, and diabetes have been considered to contribute to its development.(5,6) The age of the patients is another factor that needs to be considered.

The type of cataract surgery used is associated with different outcomes and complications, such as CME. The change in procedure from large-incision intracapsular cataract extraction to small-incision extracapsular phacoemulsification was associated with a clear decrease in the incidence of this complication.(7,8-12) This has been explained by less blood-aqueous barrier damage after phacoemulsification with an intact continuous curvilinear capsulorhexis than after extracapsular cataract extraction.(7,13)

The natural history of pseudophakic CME is spontaneous resolution of edema with visual improvement in three to 12 months in 80 percent of patients.(14) Only a small proportion of patients will suffer chronic visual morbidity.

Thus the present study was conducted to compare macular edema postoperatively in manual SICS versus phacoemulsification with the help of OCT.

Materials and Methods

The study was a prospective and interventional study that was conducted on patients attending OPD, Department of Ophthalmology, of our hospital. A minimum of 60 patients having cataract and willing to undergo cataract surgery were enrolled in the study. Patients having Uncontrolled DM and hypertension or any co-existing retinal disease were excluded from the study. Patients having any intraoperative complications were also excluded from the study as management protocol was different in such patients. Patients were divided into two groups, Group 1 and Group 2 each group consisting of 30 patients. Patients of group 1 underwent manual SICS and patients of group 2 underwent phacoemulsification.

Preoperatively, Snellen visual acuity, detailed anterior segment examination under slit lamp biomicroscope and detailed posterior segment examination was done by slit lamp biomicroscopy with

+90 D or /and direct ophthalmoscopic examination or / and indirect ophthalmoscopic examination in all patients.

The subject under study underwent cataract surgery either manual Small incision cataract surgery or Phacoemulsification under local anaesthesia under sterile conditions in the operating room. Mydriasis, akinesia and anaesthesia needed for operative procedure was obtained. Topical antibiotics were instilled 2 hourly for 24 hours. Phenylepherine hydrochloride 5% and Tropicamide 1% eye drops were used for mydriasis. Flurbiprofen 0.03% was used every 15 minutes for 4 times prior to surgery.

Steps of Surgery: The eye to be operated upon was cleaned and draped. Local anaesthesia was obtained by peribulbar injection of Lignocaine 2% with Adrenaline 200000 IU with hyaluronidase and Bupivacaine 0.5% given in equal ratio and topical anaesthesia was achieved by Lignocaine 2% eye drops.

In Group 1 (Manual SICS) cases, a 6 mm frown incision of 1/3 – 1/2 thickness of the sclera was made with its centre about 1 mm posterior to limbus. Continuous curvilinear capsulorhexis was performed. Hydroexpression/ viscoexpression of the nucleus was performed using lens glid. The glide was inserted through the main incision and wedged between nucleus and iris. The hardcore nucleus was delivered through the wound. Posterior chamber IOL was inserted in routine manner.

In Group 2 (Phacoemulsification) –A triplanar incision was made. A central continuous curvilinear capsulorrhexis of approximately 5 - 5.2 mm was performed.

A 2.8mm flared phaco tip was used to do nucleotomy. Nucleotomy was done by using different techniques like divide and conquer, direct chopping, stop and chop and flip and chip technique depending upon the hardness of nucleus using phacoemulsification machine. A foldable acrylic IOL was implanted using injector system.

Subconjunctival injection of a mixture of 0.5 ml of dexamethasone (2mg) and 0.5 ml of Gentamycin (20mg) was given in both groups. Postoperatively, patients were put on Tab. Ciprofloxacin 500 mg 12 hourly for 5 days, NSAID analgesics 12 hourly for 5 days, Broad spectrum antibiotic eye drops 2 hourly, Steroid eye drops 2 hourly, 2% homatropine eye drops 12 hourly.

Changes of macular thickness using OCT (Stratus OCT, Carl Zeiss Meditec) were examined postoperatively at subsequent visits. The total period of follow up was 12 weeks. Retinal thickness as evaluated with OCT was the parameter under study. The central subfield mean thickness (CSMT) will be used to evaluate macular edema which is defined as an increase of CSMT (ΔCSMT) > 30% from the baseline. During the study the patients visited the hospital at Day 1 Day 28, and Day 84. Patients were examined as per the proforma enclosed. Recorded data was compiled and analysed. Data was statistically analysed using student's 't' test and Chi square test ($\chi 2$). A difference between the treated and control group which would have arisen by chance is 'p' value. If it is less than 0.05, it is considered significant (S), 'p' value less than 0.001 is considered highly significant (HS). If it is more than 0.05, it is considered non-significant (NS).

Results

The two groups were comparable for baseline characters for age, gender, eye operated and preoperative best corrected visual acuity with $p > 0.05$. On the 1st postoperative day, central subfield mean thickness (CSMT) in MSICS group was 200.73±11.27 µm and that in phacoemulsification group was 197.37±9.65 µm with no significant difference ($p = 0.219$). After comparing the values in all subfields, significant difference was found in Superior Inner ($p=0.010$), Superior Outer ($p=0.001$), Nasal Inner ($p=0.026$), Nasal outer ($p=0.015$), Inferior Inner ($p=0.003$), Inferior Outer ($p=0.028$) subfields. On the 28th day, CSMT in MSICS group was 207.90±11.59 µm and that in phacoemulsification group was 204.60±10.04 µm with no significant difference ($p=0.243$). Significant difference was also found in superior inner ($p = 0.008$), superior outer ($p=0.002$), nasal inner ($p=0.050$), nasal outer ($p=0.019$), inferior inner ($p = 0.001$), inferior outer ($p=0.013$) and temporal outer ($p = 0.050$) subfields. On the 84th day, CSMT in MSICS group was 210.77±12.13 µm and that in phacoemulsification group was 199.77± 9.92 µm, the difference being significant ($p = 0.005$). Besides central 1 mm, significant difference was observed in superior inner ($p=0.001$), superior outer ($p=0.015$), nasal inner ($p=0.001$), nasal outer ($p=0.001$), inferior inner ($p=0.001$), inferior outer ($p=0.010$) and temporal outer ($p=0.050$) subfields. Cystoid macular oedema was not diagnosed clinically in any of the patients at any visit. In our study, patients in both groups achieved good visual acuity. Best corrected visual acuity was more than 6/12 in all patients in both groups.

Table 1: Comparison at day 1 between group 1 and group 2

1st Day		Group 1 (in µm)	Group 2 (in µm)	t-test	p value	Sig.
Central 1 mm	Mean	200.73	197.37	1.24	0.219	NS
	SD	11.27	9.65			
Superior Inner	Mean	264.37	259.33	2.66	0.010	S
	SD	7.49	7.14			
Superior Outer	Mean	237.30	242.47	3.65	0.001	HS
	SD	6.09	4.81			
Nasal Inner	Mean	264.73	260.70	2.29	0.026	S
	SD	6.13	7.44			
Nasal Outer	Mean	254.97	251.17	2.52	0.015	S
	SD	6.01	5.66			
Inferior Inner	Mean	266.73	260.80	3.15	0.003	S
	SD	7.74	6.84			
Inferior Outer	Mean	238.60	234.73	2.25	0.028	S
	SD	7.82	5.23			
Temporal Inner	Mean	257.00	256.40	0.31	0.759	NS
	SD	7.06	7.96			
Temporal Outer	Mean	228.67	226.40	1.63	0.107	NS
	SD	4.98	5.73			

Table 2: Comparison at day 28th between group 1 and group 2

28th Day		Group 1 (in µm)	Group 2 (in µm)	t-test	p value	Sig.
Central 1 mm	Mean	207.90	204.60	1.18	0.243	NS
	SD	11.59	10.04			
Superior Inner	Mean	271.03	265.80	2.73	0.008	S
	SD	7.73	7.08			
Superior Outer	Mean	243.50	248.10	3.26	0.002	S
	SD	5.60	5.34			
Nasal Inner	Mean	269.90	266.87	1.96	0.050	S
	SD	6.26	7.56			
Nasal Outer	Mean	260.60	256.57	2.41	0.019	S
	SD	6.94	6.01			
Inferior Inner	Mean	273.20	266.43	3.62	0.001	HS
	SD	7.58	6.88			
Inferior Outer	Mean	244.43	240.00	2.56	0.013	S
	SD	7.92	5.25			
Temporal Inner	Mean	263.60	262.23	0.69	0.494	NS
	SD	7.63	7.76			
Temporal Outer	Mean	235.40	232.80	1.98	0.050	S
	SD	5.10	5.77			

Table 3: Comparison at day 84th between group 1 and group 2

84th Day		Group 1 (in µm)	Group 2 (in µm)	t-test	p value	Sig.
Central 1 mm	Mean	210.77	199.77	2.921	0.005	S
	SD	12.13	9.92			
Superior Inner	Mean	267.80	260.80	3.50	0.001	HS
	SD	7.99	7.49			
Superior Outer	Mean	240.67	244.20	2.50	0.015	S
	SD	5.27	5.65			
Nasal Inner	Mean	270.77	262.57	4.39	0.001	HS
	SD	6.76	7.66			
Nasal Outer	Mean	258.97	252.63	3.74	0.001	HS

	SD	7.32	5.68			
Inferior Inner	Mean	275.43	262.57	6.94	0.001	HS
	SD	7.61	6.73			
Inferior Outer	Mean	240.97	236.27	2.68	0.010	S
	SD	7.97	5.35			
Temporal Inner	Mean	259.50	258.17	0.64	0.523	NS
	SD	7.82	8.24			
Temporal Outer	Mean	231.07	228.17	1.99	0.050	S
	SD	5.34	6.18			

Discussion

Pseudophakic cystoid macular edema is the most common complication of cataract surgery. Because of the heterogeneity of definitions and diagnostic criteria, its incidence has been reported to be between 1% and 30%. However, an incidence of 1%–2% of clinically significant PCME has been reported in patients with no risk factors. An increase in macular thickness after uncomplicated cataract surgery was seen in our study. It was concluded the increase in macular thickness was sub-clinical and did not affect final visual outcome in any patient. There was no evidence of cystoid macular oedema, either clinically or on OCT. However, sub-clinical increase in CSMT was more following Manual SICS as compared to phacoemulsification. The results obtained were comparable to studies conducted by Ghosh et al[(15)] and Chaudhary et al.[(16)] These studies also compared postoperative increase in macular thickness following manual SICS and phacoemulsification. Cystoid macular oedema was not diagnosed clinically in any of the patients at any visit in our study. However, Chaudhary et al[(94)] found overall incidence of clinical CME 1.5 % in their study.

In our study, patients in both groups achieved good visual acuity. Best corrected visual acuity was more than 6/12 in all patients in both groups. Ruit et al[(17)] also showed that both surgical techniques achieved excellent surgical outcomes with low complication rates.

Thus, our study concluded that both surgical techniques achieved excellent surgical outcomes with low complication rates. Cystoid macular edema was not detected in any patient clinically in any group. But chances of sub-clinical increase in CSMT was more following MSICS compared to phacoemulsification.

But the present study was conducted for a period of 12 weeks and hence it was unable to report on the long term effects on macular thickness and visual acuity gains. Other weakness of our study was the absence of preoperative thickness value because of the presence of significant media opacity in many patients which interfered with good quality OCT scan. Macular thickness on the first postoperative day was taken as baseline value in our study.

References

1. Jose R. Present status of the national programme for control of blindness in India. Commun Eye Health J 2008;21(65):103-4.
2. The Miami Study Group. Cystoid macular edema in aphakic and pseudophakic eyes. Am J Ophthalmol 1979;88:45-48.
3. Reese AB, Jones IS, Cooper WC. Macular changes secondary to vitreous traction. Trans Am Ophthalmol Soc 1966;64:123-34.
4. Wolter JR. The histopathology of cystoid macular edema. Albrecht Von Graefe's Arch Klin Exp Ophthalmol 1981;216(2):85-101.
5. Ursell PG, Spalton DJ, Whitcup SM, Nussenblat RB. Cystoid macular edema after phacoemulsification: relationship to blood-aqueous barrier damage and visual acuity. J Cataract Refract Surg 1999;25(1):1492–497.
6. Rosetti L and Autelitano A. Cystoid macular edema following cataract surgery. Curr Opin Ophthalmol 2000;11(1):65–72.
7. Kim SJ, Belair ML, Bressler NM, Dunn JP, Thorne JE, Kedhar SR et al. A method of reporting macular edema after cataract surgery using optical coherence tomography. Retina 2008;28(6):870-76.
8. Augustin A, Loewenstein A, Kuppermann BD. General pathophysiology; in Coscas G (eds.) Macular Edema. Dev Ophthalmol. Basel, Karger 2010;47:10–26.
9. Jaffe NS, Clayman HM, Jaffe MS. Cystoid macular edema after intracapsular and extracapsular extraction with and without an intraocular lens. Ophthalmology 1982;89(1):25–29.
10. Koch PS. Anterior vitrectomy. In: Nordan LT, Maxwell WA, Davidson JA (eds) Surgical Rehabilitation of Vision:An Integrated Approach to Anterior Segment Surgery. London, Gower, 1992;17.
11. Powe NR, Schein OD, Gieser SC, Tielsch JM Luthra R, Javitt J et al. Synthesis of the literature on visual acuity and complications following cataract extraction with intraocular lens implantation. Cataract Patient Outcome Research Team. Arch Ophthalmol 1994;112:239–52.
12. Oshika T, Yoshimura K, Miyata N. Postsurgical inflammation after phacoemulsification and extracapsular extraction with soft or conventional intraocular lens implantation. J Cataract Refact Surg 1992;18(4):356–61.
13. Pande MV, Spalton DJ, Kerr-Muir MG, Marshall J. Postoperative inflammatory response to phacoemulsification and extracapsular cataract surgery: aqueous flare and cells. J Cataract Refract Surg 1996; (22 Suppl):770– 774.
14. Bradford JD, Wilkinson CP Bradford RH. Cystoid macular edema following extracapsular cataract extraction and posterior chamber intraocular lens implantation. Retina 1988;8(3):161-64.
15. Ghosh S, Roy I, Biswas PN, Maji D, Mondal LK, Mukhopadhyay S et al. Prospective randomized comparative study of macular thickness following

phacoemulsification and manual small incision cataract surgery. Acta Ophthalmol. 2010;88(4):e102–e106.

16. Chaudhary C, Bahadhur H, Gupta N. Study of cystoid macular edema by optical coherent tomography following uneventful cataract surgery. Int Ophthalmol 2015;35(5):685-91.
17. Ruit S, Tabin G, Chang D, Bajracharya L, Kline DC, Richheimer W et al. A prospective randomized clinical trial of phacoemulsification vs manual sutureless small-incision extracapsular cataract surgery in Nepal. Am J Ophthalmol. 2007;143(1):32-38.