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Ophthalmology

PROFILE OF ANTERIOR AND POSTERIOR SEGMENT INFLAMMATION IN EYE AFTER CATARACT SURGERY IN TERTIARY CARE CENTRE

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ABSTRACT

AIM: To determine incidence of anterior and posterior segment inflammation after cataract surgery.
DESIGN: Prospective hospital based observational study.
MATERIAL AND METHOD: Patient collection in Government college Kannauj October 2018 to September 2019 .According to Helnsinki's declaration ,examination done after cataract surgery in SICS and PHACO both.
RESULT: SICS and Phacoemulsification do not differ significantly in inflammation and final BCVA outcomes. SPSS software windows (version 18, SPSS Inc) was used for stastical analysis.
CONCLUSION: SICS and PHACO both having chance of anterior and posterior segment inflammation, visual recovery in case of PHACO is earliar.

KEYWORDS : Ucva -uncorrected Visual Acuity ,bcva -best Corrected Visual Acuity,va–visual Acuity, Iop-intraocular Pressure,pod- Postoperative Day, Sics-small Incision Cataract Surgery, Phaco-phacoemulsification, Ac- Anterior Chamber

INTRODUCTION:

Despite of surgical advances, post cataract surgery inflammation is still common.

Inflammation after cataract surgery begins with tissue injury when surgical incision is made[1]. Even small degree of surgical trauma can cause breakdown of blood aqueous barrier and induce an inflammatory response and release of inflammatory mediators including prostaglandins, interleukins from arachidonic acid[2].

Controlling ocular inflammation before, during and after cataract surgery is utmost important for successful outcomes [3].

Post cataract surgical inflammation presents as protein flare and inflammatory cells in anterior chamber, corneal oedema, miosis, leucocyte migration, fibroblast proliferation along with other responses[4].

CELLS AND FLARE:

After surgery small amounts of cells and flare will always present in anterior chamber. This decreases the clarity of initial refractive outcome[5].

CORNEAL EDEMA:

Virtually all patient will present with some level of corneal oedema, commonly localized at corneal incision site but certainly can present diffusely anywhere in cornea. This can range from relatively superficial swelling to full thickness oedema with Descemet folds especially when surgery is longer in duration or cataract is dense[5].

Elevated IOP: most frequent postoperative complication that require treatment.

Statistically vary but as many as 18% to 45% of patient experience a pressure more than 28 mmHg initially but return to baseline before 24 hours either with or without treatment[6]

TOXIC ANTERIOR SEGMENT SYNDROME OR TASS:

it is an acute sterile postoperative inflammation in which a noninfectious substance enters anterior segment and induces toxic damage. It has an early onset (12-24hr) after surgery[7]

Potentially etiologic factor involved in TASS can be irrigating solution balanced salt solution, ophthalmic viscosurgical devices. The most common findings are diffuse limbus to limbus corneal oedema, anterior chamber inflammation with hypopyon with mimimal or no pain and absence of vitritis[8]

Postoperative Infectious endophthalmitis: it is defined as severe inflammation involving both anterior and posterior segment of eye after intra ocular cataract surgery. It is one of the most serious complication following cataract surgery because of its poor prognosis. It most commonly occurs due to intra ocular microbial contaminationfrom patient skin, preocular tear film and ocular adnexa. it has a late presentation, peaks between 3 -7days postoperative and presents with severe pain with lid oedema, conjunctival congestion, chemosis, hypopyon, severe reaction and exudates in anterior chamber, dull or absent fundal. The incidence of postcataract surgery endophthalmitis varies, ranging from <0.05% to >0.3%[9,10]

Postoperative uveitis: commonly occur in patient who have undergone hypermature cataract extraction, patients with past history of uveitis, presents with increased anterior chamber cellular reaction and flare, with or without presence of coagulum in anterior chamber, rarely hypopyon and bright fundal glow.

Cystoid macular oedema: it may occur in weeks or month after an otherwise uncomplicated cataract surgery. inflammatory mediators diffuse posteriorly into the vitreous and disrupt the blood–retinal barrier. This disruption results in increased permeability of the perifoveal capillaries and fluid accumulation within the macula[11].

It is important to recognise potential source of postoperative inflammation and to direct therapy to calm inflammation.

AIMS AND OBJECTIVE:

The aims and objective are to study

1. Incidence of anterior and posterior segment inflammation after phacoemulsification
2. Incidence of anterior and posterior segment inflammation after small incision cataract surgery
3. Effect of inflammation on final visual outcome.

MATERIAL AND METHODS:

This was hospital based prospective study which included patients who underwent SICS and conventional phacoemulsification performed by same surgeon from Department of Ophthalmology Government Medical College Kannauj , Uttar Pradesh.

INCLUSION CRITERIA
- Patients of senile cataract undergoing phacoemulsification surgery and SICS.

EXCLUSION CRITERIA
- Paediatric cataract
- Traumatic cataract
- Cataract associated with glaucoma
- Cataract associated with any other ocular pathology e.g. uveitic cataract, pseudoexfoliation syndrome etc
- Retinal pathology
- Corneal pathology

MATERIALS
- The phacoemulsification system for cataract was Zeiss visalis
- Slit lamp of Carl Zeiss Meditec AG 07740 Jena, GERMANY.

METHODS
The patients were selected after taking informed consent, detailed history and examination was done with regard to following point of interest-

1 Visual acuity and best corrected visual acuity(BCVA) by Snellen's chart.
2 Complete slit lamp biomicroscopic examination is done for anterior and posterior segment
3 Fundoscopy done with 90D lens
4 Intraocular pressure by applanation tonometer
5 Axial length by A Scan (A scan biomedix India)
6 Keratometry by Autoref/keratometer (URK 700 unicos)
7 IOL Power by A scan biometry.

In each case preoperative infection of adnexa was ruled out.

NSAID antibiotic combination drops started one day prior to surgery, On the day of surgery patient's pupil were dilated.

SURGICAL PROCEDURE
All surgeries were performed by same surgeon under local anaesthesia after pupillary dilatation with tropicamide 1% and phenylephrine hydrochloride 2.5% eye drops. Proper sterile precautions were taken in each case, 5% povidone iodine was instilled in conjunctival sac and then finally flushed with RL.

A 2.8 mm metal tip knife was used in conventional phacoem ulsification group and clear corneal tunnel of 0.5 mm has created.

For SICS, 5.5mm superior incision was made 1.5-2 mm behind the limbus depending upon hardness of nucleus then sclerocorneal tunnel is made.

Side port was created at 90 degrees then capsule is stained with trypan blue dye.

The ophthalmic viscoelastic device (OVD), HPMC2% was used in both groups.

Continuous curvilinear capsulorhexis of 5mm approximately was made with the help of 26 gauze needle.

Hydrodisection with 26 gauze cannula placed on 2cc syringe filled with irrigating fluid.

After hydrodisection and hydrodelineation, phacoemulsification was performed by Zeiss Visalis machine and settings were adjusted according to nucleus density and for SICS enough viscoelastic placed between cornea and superior surface of nucleus to protect endothelium. Nucleus is rotated within capsule using sinskey hook and nucleus is prolapsed in anterior chamber[20].

Proper irrigation and aspiration of cortical matter done through main port in all cases.

Anterior chamber is formed with viscoelastic substance and then IOL is implanted in all cases. Finally, OVD was removed with irrigation aspiration and wound was hydrated for both groups and conjunctival flap was reposited back and edges were cauterized in SICS.

Any case of intraoperative complication was recorded.

Postoperative follow was done with respect to corneal oedema, cells and flare in anterior chamber, IOP, hypopyon, vitritis, CME or any other inflammatory finding and visual acuity and BCVA at 1st day, 1st week, 2nd week, 4th week and 6th week.

Postoperative Care Routine: Post-operative care included topical moxifloxacin 0.5% 6 times a day, 1% topical prednisolone acetate hourly that was tapered. Topical ketorolac tromethamine 0.4% four times a day. At each visit, UDVA/BCVA, aqueous cells and flare, and fundus details were recorded.

The inflammatory response of the anterior chamber was assessed by the same experienced examiner.

Examination of the anterior chamber involves observing with high-magnification (20x) while directing a small, intense beam obliquely (1mm×1mm) through the aqueous, following relative dark adaptation. Anterior chamber cells and/or flare are visible, owing to the Tyndall effect of the bright beam. A grading system for flare and cells is shown below.

Grading of Flare and Cells*

Grade	Flare	Cells per field
0	Complete absence	No cells
1+	Faint flare (barely detectable)	5 to 10
2+	Moderate flare (iris and lens details clear)	10 to 20
3+	Marked flare (iris and lens details hazy)	20 to 50
4+	Intense flare (fixed, coagulated aqueous humour with considerable fibrin.	50+

* Adapted from Hogan MH, Kimura SJThygesonP[21]

Vitreous cells were graded with the classification proposed by Bloch-Michel and Nussenblatt[22]

Statistical Analysis: Statistical analysis was performed basis using SPSS software for windows (version 18, SPSS Inc). A value of <0.05 considered as statistically significant.

OBSERVATIONS
The present study was carried out on 450 patients with senile cataract who underwent cataract surgery. Among them 250 patients (Group A) underwent SICS and 200 underwent phacoemulsification (Group B).

DEMOGRAPHY
In 450 patients of our study, 288 (64%) were males and 162 (36%) were females.

In group A, who underwent SICS, out of 250 patients, 145 were males(58%) and 107 were females(42%).

Similarly, in group B who underwent phacoemulsification, 150 were males(75%)and 50 were females(25%).

TABLE-1

SEX	GROUP A SICS (250)		GROUP B PHACO (200)		TOTAL (450)	
	No.	%	No	%	No.	%
Male	145	58%	150	75%	288	64%
Female	105	42%	50	25%	162	36%

CHART-1

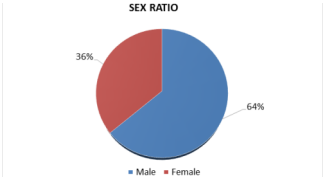
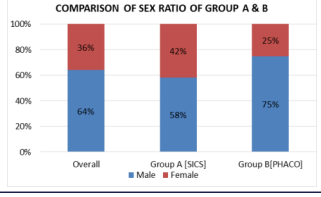


CHART-2



AGE DISTRIBUTION

In both group A (SICS) and group B (PHACO), majority of patients were of age group 51-60 years, 35% and 36% respectively.

The mean age for group A is 62±13 years and for group B is 57±9 years.

TABLE-2

AGE (years)	GROUP A SICS		GROUPB PHACO		TOTAL	
	No.	%	No.	%	No.	%
40-50	46	18%	52	26%	98	22%
51-60	90	35%	72	36%	162	37%
61-70	76	30%	58	29%	134	29%
>70	38	15%	18	9%	56	12%

CHART-3

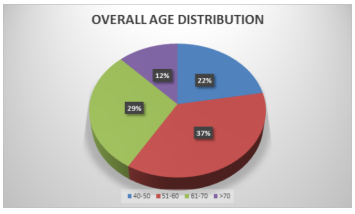
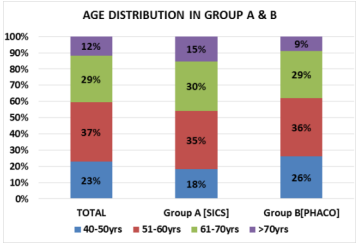


CHART-3



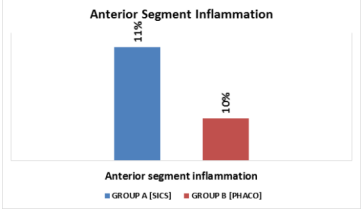
INCIDENCE OF EARLY ANTERIOR SEGMENT INFLAM MATION:

The incidence of anterior segment inflammation on 1st postoperative day in group A(SICS) is 11% and in group B(PHACO) is 10%, the difference between the two group is statistically insignificant with p value=0.6(>0.05)

TABLE-3

Anterior segment inflammation	GROUP A (SICS)250		GROUP B (PHACO)200		TOTAL 450	
	No.	%	No.	%	No.	%
	29	11%	20	10%	49	10%

CHART-5



1ST POSTOPERATIVE DAY

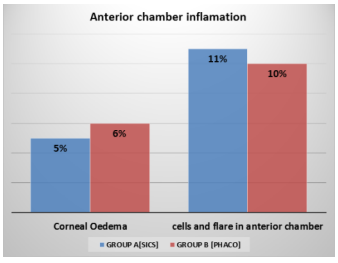
Among anterior segment, on 1st postoperative day the incidence of corneal oedema in group A(SICS) is 5% and group B(PHACO) is 6% which was statistically insignificant with p value=0.53(>0.05).

The incidence of cells and flare in anterior chamber in group A(SICS) is 11% and group B(PHACO) is 10% which was statistically insignificant with p value=0.6(>0.05)

TABLE-4

ANTERIOR SEGMENT INFLAMMATION parameters		GROUP A [SICS]		GROUP B[PHACO]	
		No.	%	No.	%
1	Corneal Oedema	12	5%	12	6%
2	Cells and flare in Ant. Chamber	29	11%	20	10%
3	Increased IOP	0		0	
4	Hypopyon	0		0	
5	Pupillary Fibrinous Membrane	0		0	

CHART - 4



Anterior chamber reaction at 1st postoperative day

TABLE-5

Cells and flare in anterior chamber	GROUP A[SICS]	GROUP B[PHACO]
Grade 1-2	24 (9%)	17 (8%)
Grade 3	5 (2%)	3 (1.5%)
Grade 4	0	0

1ST POSTOPERATIVE WEEK

Among anterior segment on 1st postoperative week the incidence of corneal oedema in group A(SICS) and group B(PHACO) is decreased to 0.8% and 0.5% respectively which is statistically insignificant, p value=1(>0.05).

The incidence of cells and flare in anterior chamber in group A(SICS) is 3% and group B(PHACO) is 3% which is statistically insignificant.

TABLE-6

ANTERIOR SEGMENT INFLAMMATION		GROUP A (306)		GROUP B (174	
		No.	%	No.	%
1	Corneal Oedema	2	0.8%	1	0.5%
2	Cells and flare in Anterior Chamber	9	3%	5	3%
3	Raised IOP	0		0	
4	Hypopyon	0		0	
5	Pupillary membrane	0		0	

Anterior chamber reaction at 1st week

TABLE-7

Cells and flare in anterior chamber	GROUP A[SICS]	GROUP B[PHACO]
Grade 1-2	9 (3%)	5 (3%)
Grade 3	0	0
Grade 4	0	0

2NP POSTOPERATIVE WEEK

On 2nd, 4th and 6th postoperative week, the incidence of corneal oedema, andcells and flare, raised IOP, hypopyon, pupillary fibrinous membrane reduced to zero in both groups.

INCIDENCE OF EARLY POSTERIOR SEGMENT INFLAM MATION-

There was no incidence of posterior segment inflammation at any follow up periodin both groups.

UCVA AT DIFFERENT FOLLOW UP PERIOD (SNELLEN'S CHART)

TABLE-8

Follow Up	Group A [sics]			Group B [phaco]		
	6/6 - 6/12	6/18 - 6/24	≤6/36	6/6 - 6/12	6/18 - 6/24	≤6/36
1ST POD	6 (23%)	4 (13%)	19 (64%)	3 (15%)	12 (60%)	5 (25%)
1ST Week	8(28%)	11 (38%)	10 (34%)	10 (50%)	7 (35%)	3 (15%)
6TH Week	22(76%)	5 (20%)	2 (4%)	17 (88%)	3 (12%)	0 (0%)

At first postoperative day, majority of patients in group A, 64% attained uncorrected visual acuity ≤6/36, and majority of patients in group B, 60% attained uncorrected visual acuity between 6/18 to 6/24. In group A, 13% patients attained UCVA between 6/18 to 6/24 and 23% patients got UCVA between 6/6 to 6/12 at first postoperative day.

At first postoperative week, majority of patients in group A, 38% attained uncorrected visual acuity 6/18 to 6/24, and majority of patients in group B, 50% attained uncorrected visual acuity 6/6 to 6/12. In group A, 34% patient attained ≤6/36 and 28% got UCVA between 6/6 to 6/12. While in group B, 35% patient attained UCVA 6/18 to 6/24, and 15% patient attained UCVA ≤6/36, at first postoperative week.

Finally, at sixth postoperative week, majority of patient in group A, 76% attained uncorrected visual acuity 6/6 to 6/12, and majority of patients in group B, 88% attained uncorrected visual acuity between 6/6 to 6/12. In group A, 20% patient attained UCVA 6/18 to 6/24 and 4% patients got UCVA between ≤6/36. While in group B, 12% patients attained UCVA 6/18 to 6/24, and 0% patients got UCVA≤ 6/36, at 6th week postoperative week.

CHART-6

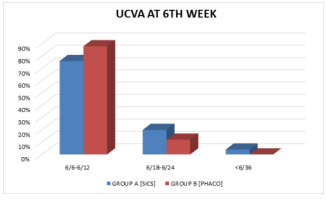


CHART-7

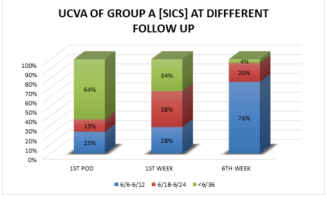
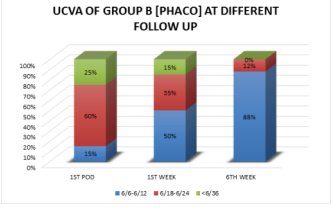


CHART- 8



MEAN UCVA AT DIFFERENT FOLLOW UP PERIOD

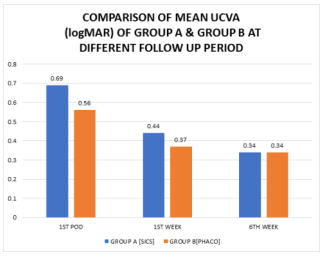
The mean UCVA of group A (SICS) at 1st postoperative day, at 1st week, 6th week were 0.69 ± 0.20,0.44 ± 0.20 and0.34 ± 0.23 respectively. Similarly, the mean UCVA of group B (PHACO) at 1st postoperative day, at 1st week, 6th week were 0.56 ±0.18, 0.37± 0.20 and 0.34± 0.20 respectively.

By using independent t-test, the two tailed significance p value=0.04(<0.05) between the two groups at 1st postoperative daywhich was statistically significant. At 1st week and 6th week follow up periods, the difference between the two groups is statistically insignificant (p>0.05).

TABLE-9

Mean UCVA (LogMAR)±SD at Different follow up Periods			
Follow Up Period	**Group A [SICS]**	**Group B [PHACO]**	**P Value**
1st post op Day	0.69 ± 0.20	0.56 ±0.18	0.04 (< 0.05)
1st Week post op	0.44 ± 0.20	0.37± 0.20	0.12 (> 0.05)
6th Week post op	0.34 ± 0.23	0.34± 0.20	Notsignificant

CHART-9



BCVA AT DIFFERENT FOLLOW UP PERIOD

TABLE-10

Follow Up	GROUP A [SICS]			GROUP B [PHACO]		
	6/6 - 6/12	6/18 - 6/24	≤6/36	6/6 - 6/12	6/18 - 6/24	≤6/36
1ST POD	9 (32%)	12 (41%)	8 (27%)	7 (36%)	9 (48%)	3(16%)
1ST Week	13 (44%)	9 (32%)	7 (24%)	11 (54%)	6 (30%)	3(16%)
6TH Week	25 (88%)	2 (6%)	2 (6%)	18 (92%)	2 (10%)	0(0%)

At first postoperative day, majority of patients in group A, 41% attained best corrected visual acuity6/18 to 6/24, and majority of patients in group B, 48% attained best corrected visual acuity between 6/18 to 6/24. In group A, 27% patients attained BCVA ≤6/36 and 32% patients got BCVA between 6/6 to 6/12. And in group B 36% patient attained BCVA 6/12 to 6/6 and16 % got BCVA ≤6/36 at first postoperative day.

At first postoperative week, majority of patients in group A, 44% attained best corrected visual acuity 6/6 to 6/12, and majority of patients in group B, 54% attained best corrected visual acuity 6/6 to 6/12. In group A, 24% patient attained ≤6/36 and 32% got BCVA between 6/18 to 6/24. While in group B, 30% patient attained BCVA 6/18 to 6/24, and 16% patient attained BCVA ≤6/36, at first postoperative week.

Finally, at sixth postoperative week, majority of patient in group A, 88% attained best corrected visual acuity 6/6 to 6/12, and majority of patients in group B, 92% attained best corrected visual acuity between 6/6 to 6/12. In group A, 6% patient attained BCVA 6/18 to 6/24 and 6% patients got BCVA between ≤6/36. While in group B, 10% patients attained BCVA 6/18 to 6/24, and 0% patients got BCVA ≤ 6/36, at 6th week postoperative week.

CHART-10

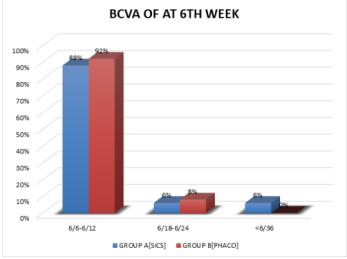


CHART-11

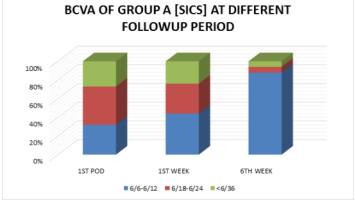
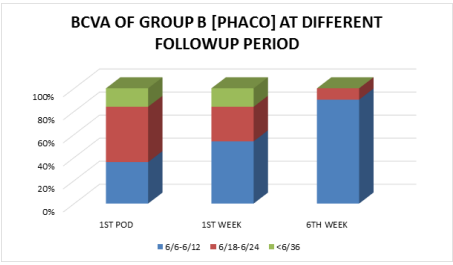


CHART-12



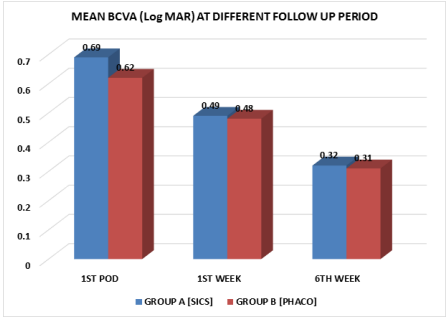
MEAN BCVA (log MAR) AT DIFFERENT FOLLOW UP PERIODS
The mean BCVA of group A (SICS) at 1st postoperative day, at 1st week, 6th week were 0.69 ± 0.22, 0.49± 0.19 and0.32± 0.20 respectively. Similarly, the mean BCVA of group B (PHACO) at 1st postoperative day, at 1st week, 6th week were 0.62±0.23, 0.48± 0.19 and 0.31± 0.14 respectively.

By using independent t-test, the two tailed significance p value=0.001 statistically significant(<0.05) between the two groups at 1st postoperative day. And at 1st week and 6th week follow up periods it was 0.57 and 0.59 respectively (> 0.05), which indicate that the difference between the two groups is statistically insignificant.

TABLE-11

Mean BCVA (log MAR) ± SD at Different follow up Periods			
Follow Up Period	Group A [SICS]	Group B [PHACO]	P Value
1st post op Day	0.69 ± 0.22	0.62 ±0.23	0.0015 (<0.05)
1st Week	0.49 ± 0.19	0.48± 0.19	0.57 (> 0.05)
6th Week	0.32 ± 0.2	0.31± 0.14	0.56 (>0.05)

CHART-12



DISCUSSION:

The present study was based on 450 patients who underwent cataract surgery in department of ophthalmology, Government Medical College and Kannauj between October 2018 to September 2019.

SEX DISTRIBUTION

In the present study, males were predominantly involved, forming 64% of all cases while percentage of female reporting were 36%.

In group A who underwent SICS out of 250 patients 145 were male (58%) and 105 were female (42%). Similarly, in group B, who underwent phacoemulsification among 200 patients, 150 were male (75%) and 50 were female (25%). Our study is similar to Nirmalan PK et al (2003) who has done a cross sectional assessment of cataract blindness and surgical outcomes in three districts of south India to determine sex inequalities in cataract blindness and surgical services in south India and found that females were less likely to be operated on for cataract although the cataract blindness burden was higher for females (p<0.001)[13].

Male preponderance in our society could be due to more awareness towards health related problems among males than females. This could be due to those male encountered problems at workplace like office, shop, business, agriculture etc. and most of the females usually do household work and does not seek medical attention until and unless vision dropped to blindness.

In our study the age distribution is as follows, In group A (SICS) majority of patients were of age group 51-60 years and in group B (phacoemulsification) majority of patients were of age 51-60 years and the mean age group for group A was 62.72±13 years and group B was 57.47±9 years.

Purushottam K (2001) Done a pilot study on 139 patients admitted for cataract surgery. The mean age of the patients under study was 58.19 years. the incidence of cataract in patient above 40 years was 92.08%. amongst the total population under study, 54.67% of patients were from 40-60 years age group and 37.41% were aged above 60 years.

In our study the incidence of anterior segment inflammation in Group A [SICS] and Group B [PHACO] was 11% and 10% respectively on 1st postoperative day which was statistically insignificant (p value>0.05), and also on subsequent follow ups at 1st, 2nd 4th and 6th week it was statistically insignificant and on last visit i.e. at 6th week follow up no case of inflammation was in both groups Group A[SICS] Group B [PHACO].

Among anterior segment inflammation, the incidence of corneal oedema on 1st postoperative day in Group A was 5% and in Group B was 6% which was statistically insignificant, similarly the anterior chamber reaction was 11% and 10% which was statistically insignificant and on subsequent visits also it was not significant.

In our study there is no incidence of posterior segment inflammation at 1st postoperative day, 1st week, 2nd week or at 6th week follow up period.

In our study the visual acuity the mean UCVA (log MAR) and mean BCVA of phacoemulsification group was better than that of SICS group for initial 1st postoperative day which was statistically significant but at 1st week and 6th week it was similar to SICS group and was statistically insignificant

Our results were consistent with those of Hesham A Enany et al 2017[12] according to this study the incidence of early anterior segment inflammation is 32% and 27% in SICS and phacoemulsification which was statistically insignificant, no incidence of posterior segment inflammation.The percentage of anterior segment inflammation was higher than our study because this study is done in hard nuclear cataract only.Similarly, 1st day postoperatively, the corrected distance visual acuity was at least 6/18 in 52.5%patients in SICS group and 22.5% patients in the phacoemulsification group. The difference was statistically significant (p value=0.01). But at 6th week both phacoemulsification and SICS achieved comparable and excellent visual outcomes.

In the same manner Semanyenzi et al 2014[14]found There was no statistically significant difference in the inflammation between both types of surgery (p value=0.28). Incidence of corneal oedema in group A was 9% and in group B was 6% in early postoperative period which was not significant and at 6th week it was 0% in both groups, similarly the incidence of anterior chamber cells and flare in group A was 6% and in group B was 5% and 6 weeks was 0.5% and 1% both of which are not significant. And have comparable UCVA and BCVA at 6 weeks follow up.

Similarly, in study done by Cook et al 2012[15] there is no significant difference in anterior segment inflammation and visual acuity both UCVA and BCVA at 6th week follow up in SICS and phacoemulsification.

Similarly, according to the study done by Venkatesh R[16] et al 2010,SICS group had less corneal oedema (10.2%) than the phacoemulsification group (18.7%) but there was statistically no significant difference.On the first postoperative day, the UDVA was comparable in the 2 groups and theat 6 weeks, there is no significant difference between UCVA and BCVA of both SICS and phacoemulsification.

Gogate et al. (2007) reported that visual results of Phacoemulsification and SICS surgeries was the same as uncorrected VA at six weeks had little difference[16]. VA of 6/18 was obtained by 81% of Phacoem ulsification patients compared to 71% of SICS patients.

LIMITATIONS:

- Short duration follow up of 6 weeks.

- Slit lamp technique to evaluate inflammation is subjective method and has limitations.

CONCLUSION

- SICS and Phacoemulsification do not differ significantly in inflammation and final BCVA outcomes.
- Phacoemulsification has quicker visual rehabilitation as compared to SICS but final visual outcome is statistically comparable to each other.
- However, SICS is less technology dependent; hence, it is less expensive and more appropriate for treatment of advanced cataracts prevalent in the developing world. It may be the preferred technique in settings where surgical volume is high and access to phacoemulsification is limited, such as in eye camps.

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