



## To Compare The Post – Operative Endothelial Cell Count Between SICS And Phacoemulsification Cataract Surgery With IOL Implantation

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### Abstract

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### Introduction

Senile cataract forms the main cause of reversible blindness in developing countries. About 20 million individuals suffer from cataract and 80% of them are in developing countries (3). Cataract extraction is one of the most common surgical procedures performed in ophthalmology. In last few decades, choice of cataract extraction has shifted from ECCE to SICS and PHACOEMULSIFICATION (3). Although phacoemulsification is generally considered quite safe, it carries a risk of adverse events, corneal endothelial damage being one of them (Olson *et al.*, 2017). In spite of the advances in phacoemulsification techniques and the use of viscoelastic agents, central corneal endothelial cell loss after phacoemulsification has been reported to range from 4% to 15% (2); (Ho *et al.*, 2015).

The corneal endothelium is vital for corneal clarity and hence visual acuity. Healthy corneal endothelial cells are hexagonal in shape with numerical density around 3000 cells/mm<sup>2</sup> at birth. Some degree of endothelial cell loss is inevitable after any type of cataract surgery (7) and (Kruff MC *et al.*, 1980). Endothelial cell density and morphology in vivo (6) can be determined by a standard technique- Specular Microscopy.

### Aims & Objectives

To compare the post – operative endothelial cell count between SICS and phacoemulsification cataract surgery with IOL implantation.

### Material & Method

This prospective, hospital based, interventional comparative study was conducted in the upgraded department of Ophthalmology, Govt. medical college, Jammu. The study was conducted over a period of one year after due approval from the “Institutional ethics committee” of the college. The study consisted of two group; the sample size was 40 eyes in each group. Sample size was calculated based on previous studies using G power 3.1 statistical software. Using computer generated randomization patients were allocated into 2 groups.

**Group 1** – comprised of 40 patients who underwent phacoemulsification

**Group 2** – comprised of 40 patients who underwent manual small incision cataract surgery.

**Inclusion Criteria:** Patients with senile cataract, medically fit for cataract surgery under local or topical anaesthesia & with corneal endothelial cell count within normal range and morphology.

### Exclusion Criteria:

Corneal opacities, Pseudoexfoliation, Uveities, Glaucoma, Diabetes, Previous history of intraocular

surgery or trauma, Endothelial cell count of less than 1500 cells/mm<sup>2</sup>

Details regarding ophthalmic history and any relevant medical complaints was recorded. General physical examination and detailed local examination of eyes was done including visual acuity, slit lamp examination, funduscopy and tonometry. Corneal endothelial count & morphological assessment was done using Topcon clinical specular microscopy by the same observer. All the patients were advised to start moxifloxacin (0.5%) and ketorolac tromethamine (0.4%) combination drop preoperatively. A single drop formulation containing 0.8% tropicamide and 5% phenylphrine was used 60, 45 and 30 minutes prior to surgery to dilate the pupil. Peribulbar anaesthesia was given.

40 Patients underwent phacoemulsification and 40 SICS with PCIOL implantation. All surgeries were performed by single surgeon. Patients who developed vitreous loss or severe post-operative inflammation were excluded.

### Surgical Technique

#### Phacoemulsification with posterior chamber intraocular lens implantation

40 patients underwent phacoemulsification by giving 2.8mm clear corneal incision, nucleotomy was done

by stop & chop technique along with foldable PCIOL implantation. Pad and bandage was applied for 24 hours.

#### Small incision cataract surgery (SICS)

Group 2 underwent SICS by giving 5.5-6.5mm external incision, hydrodissection followed by nucleus delivery using wire vectis done. Rigid PCIOL was implanted & pad and bandage done for 24 hours.

Post operatively endothelial cell count and corneal morphological assessment was done on 1<sup>st</sup>, 3<sup>rd</sup> and 6<sup>th</sup> week. Post-operatively patients were prescribed a tapering course of moxifloxacin dexamethasone eye drops over 6 weeks time starting with 6 times a day along with topical artificial tears for 6 weeks and a course of oral antibiotic post operatively for 5 days.

Statistical analysis was done by using the statistical package for social sciences version 25.0. Comparison between the two groups for the continuous variable was made using students t-test. Chi-square test was used to analyse nominal categorical variable. Preoperative versus postoperative modification within the group were verified using mixed model ANOVA with repeated measures. All statistical tests were carried out at 5% level of significance and p<0.05 was considered statistically significant.

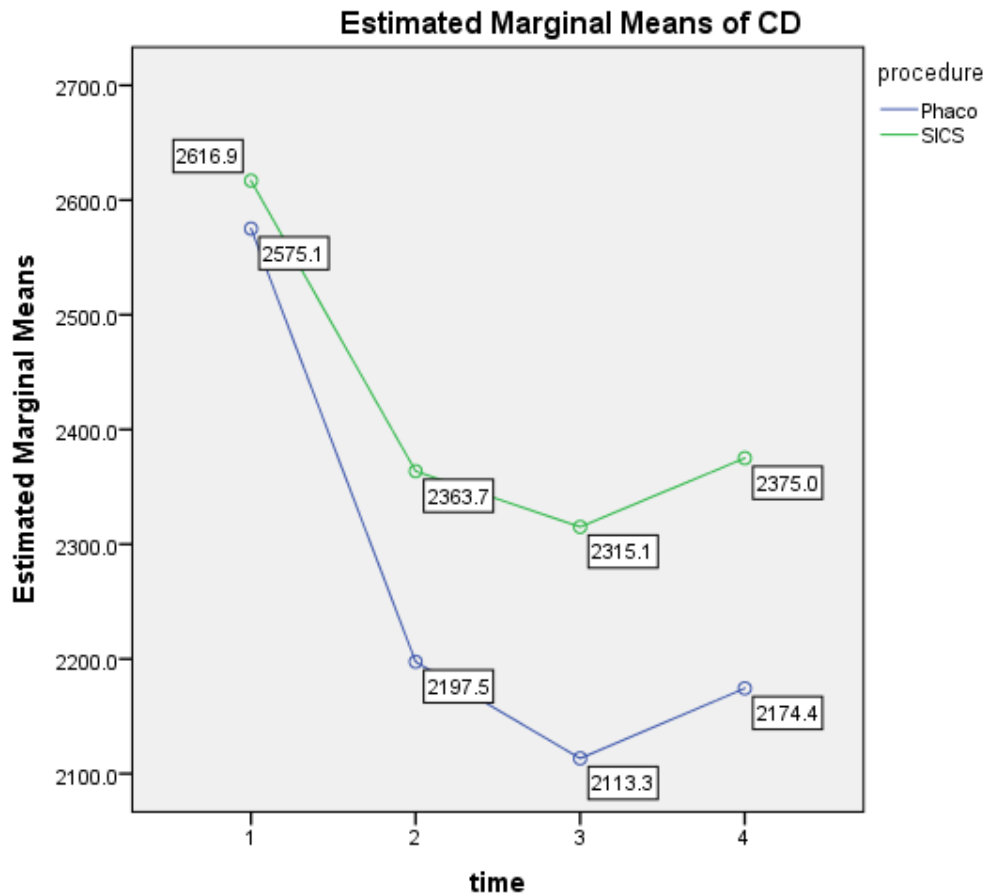
### Result

**Table 1: Comparison of Pre-operative & Post-operative ECD Between the Two Groups.**

Group Statistics						
	Procedure	N	Mean	Std. Deviation	Std. Error Mean	p value
CD0	Phaco	40	2575.1	361.3033	57.1271	0.584
	SICS	40	2616.9	317.4744	50.1971	
CD1	Phaco	40	2197.5	443.3856	70.1054	
	SICS	40	2363.7	344.4753	54.4663	0.065
CD3	Phaco	40	2113.3	501.9504	79.3653	
	SICS	40	2315.1	364.3477	57.6084	0.043
CD6	Phaco	40	2174.4	437.239	69.1336	
	SICS	40	2375	315.3954	49.8684	0.021

Difference between pre-op and post-op value at 6 weeks	PHACO	SICS	P value
		400.725±75.9357	241.9±2.079

The difference in ECD between the phaco and SICS group was statistically significant at 3 and 6 weeks.



Present study was conducted on 80 patients, divided in two groups of 40 patients each. Group 1 underwent Phacoemulsification & Group 2 underwent SICS. In the present study, the mean age was  $61.275 \pm 9.77$  years in Group 1 and  $67.650 \pm 10.80$  years in Group 2.

In the present study, preoperatively the mean ECD in Group 1 was  $2575.075 \pm 361.30$  cells/mm<sup>2</sup> and of group 2 was  $2616.90 \pm 317.47$  cells/mm<sup>2</sup>. No significant difference was observed in the preoperative ECD between the 2 groups ( $p=0.584$ ). At 1week followup, the mean ECD decreased in both the groups; in Group 1 was  $2197.52 \pm 443.38$  cells/mm<sup>2</sup> and of Group 2 was  $2363.65 \pm 344.47$  cells/mm<sup>2</sup>, the

difference at 1week was also not significant ( $p=0.065$ ). At 3week followup, the mean ECD in Group 1 was  $2113.300 \pm 501.95$  cells/mm<sup>2</sup> and of Group 2 was  $2315.100 \pm 364.34$  cells/mm<sup>2</sup>. At 6week followup, the mean ECD of Group 1 was  $2174.35 \pm 437.23$  cells/mm<sup>2</sup> and of Group 2 was  $2375.00 \pm 315.39$  cells/mm<sup>2</sup>. The difference in ECD between Phaco & SICS group was statistically significant at 3week and 6week ( $p=0.043$  and  $p=0.021$  respectively).

**Discussion**

Cataract surgery is the most commonly performed ocular surgery, and is associated with damage to the corneal endothelium. In our study we have compared

endothelial safety of phacoemulsification and manual SICS in terms of changes in endothelial cell density which was assessed using specular microscopy. In present study, we observed that over 6 weeks there was a decrease in cell density of  $400.725 \pm 75.935$  cells/mm<sup>2</sup> for group 1 and  $241.9 \pm 2.079$  cells/mm<sup>2</sup> for group 2. This depicts that ECD decreased in both the groups but in group 1, the mean ECD preoperatively and at 6 week was reduced significantly and in group 2, the mean ECD improved with time. Our study correlates well with the study conducted by **Baltrame et al.**, comparing endothelial cell damage between scleral tunnel incision and clear corneal tunnel incision for phacoemulsification. they concluded that scleral tunnel led to less post-operative endothelial cell damage than clear corneal incision. Another study conducted by **Gogate et al.**, comparing endothelial cell loss between phacoemulsification and MSICS in 200 patients showed significant cell loss at 6 week postoperatively in both groups but no statistically significant difference was found between 2 groups. In a study conducted by **Kaur T et al.**, comparing endothelial cell loss in SICS Versus Phacoemulsification, they observed 17.17% endothelial cell loss in SICS group and 19.53% cell loss in PHACO group at the end of 6 weeks but the difference was not statistically significant.

The shortcoming of our study was that patients were kept on short term follow – up Of 6 weeks.

**Conclusion** – In our study, we observed more decrease in endothelial cell density in group 1 (PHACO) when compared with group 2 (SICS) and the difference was statistically significant. Although, the qualitative aspects of endothelial cells were similar in both groups with no significant difference.

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