



## POSITIVE EFFECTS OF USING RINGER LACTATE IN SMALL INCISION CATARACT SURGERY WITHOUT VISCOELASTIC

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### ABSTRACT

**Purpose:** To study the advantages of using ringer lactate instead of viscoelastic substance for implantation of intraocular lens (IOL) in small incision cataract surgery (SICS).

**Methods:** A prospective, randomized, interventional study was performed in which 100 patients of senile cataract were included. The patients were randomly divided in two groups; one in whom IOL was implanted in ringer lactate (ringer group) and other in which viscoelastic substance Hydroxypropyl Methylcellulose (visco group) was used for implantation of IOL. The outcome was evaluated on safety, efficacy, postoperative intraocular pressure (IOP), postoperative reaction, endothelial cell count and surgical time.

**Results:** The mean post operative IOP at 6, 24 and 48 hrs in ringer lactate group was 15.67, 13.07 and 12.07 mmHg and in viscoelastic group 21.93, 18.30 and 13.53 mmHg respectively. The difference between the groups was significant (p value <0.0001). The mean post operative reaction at 24 and 48 hrs in ringer group was 1.50 and 0.71 and in visco group 1.97 and 1.20 respectively (p value < 0.0001). Regarding position of IOLs, the two groups were comparable chi square value =0.218; p value >.05). The mean endothelial cell loss in visco group was 136.55 cells (5.49%), and in ringer group it was 227.03 cells (9.2%) (p>0.05). The mean surgical time in visco group was 5.86 ± 0.53 minutes and in ringer group, the same was 4.97 ± 0.34 minutes (p value < 0.0001). There was no intra-operative complication in any group.

**Conclusion:** A small modification in one step of SICS can significantly control spikes of IOP with significantly lesser post operative reaction. With some experience, implantation of IOL in the bag under a continuous irrigation of ringer lactate is safe, accurate and less time consuming method without any significant extra loss of endothelial cells.

**KEYWORDS :** small incision cataract surgery, ringer lactate, visco elastic

### INTRODUCTION

Manual small incision cataract surgery has gone through many modifications and results have been recorded in terms of improvement in surgical and visual outcome. Classically in a cataract surgery we implant posterior chamber (PC) Intra Ocular Lens (IOL) after putting viscoelastic substance (visco) in anterior chamber (AC) which inflates capsular bag. However, there are common issues with retained visco in cataract surgery like postoperative spikes of intraocular pressure (IOP), pseudo anterior uveitis, capsular bag distension syndrome, extra surgical time, and endothelial trauma due to washing out of visco. To circumvent these problems we modified only one step of the surgery. We performed small incision cataract surgery using visco before cortical wash and after cortical matter wash we implanted the PCIOL under a continuous irrigation of ringer lactate solution using simco cannula inserted from a side-port, which helped to maintain the anterior chamber and keep the capsular bag inflated. We investigated the possible advantages of using ringer lactate for 3 piece polymethyl methacrylate (PMMA) rigid PCIOL implantation over visco including surgical efficiency, postoperative reaction, postoperative IOP spike, endothelial cell count and surgical time.

### Methods

In a prospective randomized controlled interventional study done between April 2010 to May 2010, 100 eyes of 100 patients with cataract with nuclear sclerosis grade 2 - 3 were recruited. Patients with any previous ocular surgery, complicated cataract, mature and hyper mature cataract, patients with glaucoma, corneal opacity/degeneration, and non-dilating pupil were excluded. After selection of patients all required preoperative examinations were done like slit lamp examinations, keratometry by Bausch and Lomb keratometer super KMS 6 model, IOP measurement by Goldmann's applanation tonometer, IOL power calculation using SRK-II formula, endothelial cell count by Topcon SP 3000 P model and fundus examination by indirect ophthalmoscope. The patients were evaluated similarly after the surgery. The patients were randomly divided into two groups; one in whom IOL was implanted in ringer lactate (ringer group) and other in which viscoelastic substance Hydroxypropyl Methylcellulose (visco group) was used for implantation of IOL. All patients underwent small incision cataract surgery by the same operating surgeon with similar surgical steps. Surgery was performed under peribulbar anesthesia and a superior

rectus bridge suture was taken. Firstly 1.5 mm size side port was made at 8 o'clock position at limbus and anterior capsule stained with trypan blue dye under air bubble. The anterior chamber was filled with viscoelastic substance. After creating a limbal based conjunctival flap, a 5.5 mm frown shaped partial thickness scleral groove was made 1.5mm posterior to sclera and sclerocorneal tunnel dissected. The AC entry was made 1.5 mm inside the limbus by 3.2mm keratome and a 5 mm size anterior central curvilinear capsulorhexis (CCC) made. After hydro dissection the nucleus was dialed in AC with hydro dissection cannula itself and brought out by irrigating vectis. The cortical matter was aspirated with simcoe cannula and after thorough cortical matter wash surgical steps were different in both the groups.

In visco group AC was filled with visco and IOL implanted and after that the visco was aspirated from AC as well as from the bag. In ringer group, after through cortical matter wash instead of visco we implanted the IOL under a continuous irrigation of ringer lactate using simco cannula (22G) inserted from a side-port which helped to maintain the anterior chamber and keep the capsular bag inflated. The outcome was evaluated on safety (in terms of complications rate), efficacy (in terms of percentage of in bag-fixation of IOL – complete/partial), post-operative IOP (6-8 hrs, 20-24 hrs and 48hrs), post-operative anterior chamber cells, endothelial cell count and surgical time. Data analysis was done by using SPSS statistical software version 17 with calculation of mean and standard deviation; student test (paired) was utilized to look for statistical significance and odd's ratio calculated

### Results

There were 50 (50%) patients in each group [Table 1]. The mean age of the patients in both the groups was comparable (p=0.10) [Table 2]. There was no intra operative complication in any group

### Position of IOL

Although the number of cases in which one haptic was in sulcus were more in ringer group, the difference between the groups was not statistically significant (odds ratio: 0.32; p>0.05) [Table 3].

### Intra ocular pressure change

The mean IOP in visco group was 22.24 ± 8.42 mmHg at 6 hrs. which normalized after that. In ringer group it was in normal range throughout. The difference was significant at 6 hr and 24 hr (p value

<0.0001).It was not significant at 48 hr. (p=0.11) [Table 4]

**AC Reaction**

The mean post operative anterior chamber cells (Hogan et al slit lamp grading) were more in visco group as compare to ringer group. The difference was significant (p value < 0.0001) at 24 hr and 48 hrs.[Table 5].

**Mean endothelial cell loss**

The mean endothelial cell loss in visco group was 6.08% (143.56 cells) and in ringer group it was 8.9% (210.68 cells) at 48 hrs.Though the cell loss was more in ringer group, the difference was not statistically significant (p value 0.055) [Table 6].

**Surgical time**

In ringer group the mean surgical time was 5.08 ± 0.76 min and in visco group it was 6.01 ± 0.93min. The time difference between the groups was 11.8% and statistically significant (p value < 0.0001).

**Discussion**

Small incision cataract surgery is a popular technique of performing cataract surgery and various modifications of the technique have been described.<sup>1</sup> However, there are no published studies on hydro-implantation of IOL in SICS. Hydro-implantation of IOL has been tried in Phacoemulsification.<sup>2,3</sup>Dada VK et al <sup>4</sup>in their study have reported. Postoperative evaluation was performed for intraocular pressure (IOP), corneal thickness, and anterior chamber reaction at 6, 24, 48, 72 hours, and 10 days. In our study IOP in visco group was high at 6 hours and gradually became normal at 48 hours but in ringer group there were lesser spikes of IOP. Sohail Zia et al<sup>5</sup> have reported insignificant rise in IOP in phaco during hydroimplantation of foldable IOL.

Shah et al<sup>6</sup> in their study observed on day one after cataract surgery using visco high anterior chamber reaction. In our study the number of anterior chamber cells on day one was more than day two in both groups, but cells in visco group were significantly more than ringer group. TefvikOğurelet al<sup>7</sup>. Time required for implantation of the lens was significantly less in hydroimplantation group (40 to 60s) than viscoimplantation group (2.4 to 4min). A similar outcome was noted in our study. Studeny Pet al<sup>8</sup> have reported that hydroimplantation of IOL is easy and safe. In our study there were no complications during IOL implantation in any group. Gogate et al<sup>9</sup> in their study reported 6.5% endothelial cell loss in SICS using visco. Another study by Malik et al<sup>1</sup> has reported 5.5% endothelial cell loss in Blumenthal technique at three months. In our study we observed an endothelial cell loss of 6.08% in visco group and 8.9% endothelial cell loss in ringer group at 48 hrs. The weaknesses of our study were AC reaction calculation by slit lamp biomicroscope and absence of follow up data regarding endothelial cells and IOP. A long term follow up study may be planned comparing ringer lactate, BSS and BSS Plus for the same. We conclude that a small modification in one step of small incision cataract surgery can significantly control spikes of IOP with significantly lesser post-operative reaction. With some experience, implantation of IOL in the bag under a continuous

irrigation of ringer lactate is safe, accurate and less time consuming method without any significant extra loss of endothelial cells.

**Table :1**

			group		Total
			Ringer Group	Visco Group	
gender	Male	Count	15	11	26
		% within group	50.0%	36.7%	43.3%
	Female	Count	15	19	34
		% within group	50.0%	63.3%	56.7%
Total		Count	30	30	60
		% within group	100.0%	100.0%	100.0%

Pearson Chi-Square=1.086 p=0.297

**Table :2**

Independent Samples Test						
	group	N	Mean	Std. Deviation	Std. Error Mean	t value
age	Ringer Group	30	63.1333	5.88237	1.07397	0.092#
	Visco Group	30	63.0000	5.31751	.97084	

**Table :3**

Crosstab					
			group		Total
			Ringer Group	Visco Group	
position_of_IOL	Bag	Count	27	28	55
		% within group	90.0%	93.3%	91.7%
	Bag N Sulcus	Count	3	2	5
		% within group	10.0%	6.7%	8.3%
Total		Count	30	30	60
		% within group	100.0%	100.0%	100.0%

Pearson Chi-Square=0.218 p=0.640

#p>0.05

**table – 4 :Two way Repeated Measures of ANOVA**

group	Period	Mean	Std. Error	95%Confidence Interval		F value for Period	F value for Group
				Lower Bound	Upper Bound		
Ringer Group	Pre op	14.633	.776	13.079	16.188	30.046**	9.853**
	6 Hrs	15.667	.816	14.033	17.300		
	24 Hrs	13.067	.511	12.044	14.089		
	48 Hrs	12.067	.342	11.382	12.751		
Visco Group	Pre op	15.000	.776	13.446	16.554		
	6 Hrs	21.933	.816	20.300	23.567		
	24 Hrs	18.300	.511	17.277	19.323		
	48 Hrs	13.533	.342	12.849	14.218		

**Table – 5**

Independent Samples Test							
	group	N	Mean	Std. Deviation	Std. Error Mean	t value	p value
ac_reaction_24_hrs	Ringer Group	30	1.4957	.46447	.08480	2.640*	0.011
	Visco Group	30	1.9680	.86282	.15753		
ac_reaction_48_hrs	Ringer Group	30	.7107	.14716	.02687	9.380**	p<0.0001
	Visco Group	30	1.1997	.24470	.04468		

**TABLE 6:**

	pre operative	post operative	Loss
Ringer Group	2456.2	2229.17	227.03(9.24%)
Visco Group	2489.18	2352.63	136.55(5.49%)

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