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A PROSPECTIVE COMPARATIVE STUDY OF VISUAL OUTCOME AND COMPLICATIONS IN SMALL INCISION CATARACT SURGERY AND PHACOEMULSIFICATION

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Abstract

Introduction: Cataract continues to be the commonest cause of bilateral curable blindness in India. While phacoemulsification is the preferred method worldwide, small incision cataract surgery is a cheaper yet safe alternative in a developing country like India.

Objective- To compare the visual outcome and complications in small incision cataract surgery (SICS) and phacoemulsification.

Materials and methods- This prospective comparative study was conducted on 130 eyes, of which 109 eyes underwent SICS and the remaining phacoemulsification. This study was done after obtaining ethical committee clearance and informed consent was obtained from all patients. All intra-operative and post-operative complications were recorded and followed up on 1st postoperative day, 2nd week and 6th week.

Results- The postoperative best corrected visual acuity (BCVA) at the end of the sixth week in the SICS group was 6/9-6/6 Snellen in 77.9% whereas in phacoemulsification 95.2% eyes had a BCVA of 6/9-6/6. Intraoperative complications were noted in 4 eyes (3.7%) in the SICS group and one eye (4.8%) in the phacoemulsification group. Postoperative complications occurred in 12 eyes with SICS (11%), hyphema being the most common. Retained cortical matter and iris prolapse were the other complications. Out of the 21 eyes in the phacoemulsification group one eye developed a small Descemet's membrane detachment and the other had retained cortical matter.

Conclusion- Phacoemulsification was superior to SICS with lower rates of surgically induced astigmatism, fewer postoperative complications and faster visual rehabilitation. Postoperatively at six weeks the best corrected visual acuity was similar in both the groups. Hence, SICS being a cost effective technique can be excellent alternative to phacoemulsification in our country.

Keywords- Cataract surgery, small incision, phacoemulsification, visual outcome, complications.

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Introduction:

Cataract is the commonest cause of bilateral blindness in India and accounts for 50-80% of the bilaterally blind in the country with the estimated number of cataract surgeries done increasing from 1.2 million per year in the 1980s to 3.9 million per year in 2003¹. As the aim of modern cataract surgery is to avoid complications and attain a high-

quality visual rehabilitation, the preferred method of removing cataracts worldwide is phacoemulsification. In a developing country like India high volume cataract surgery for the economically backward mandated the development of SICS (Small Incision Cataract Surgery) often referred to as "manual Phaco" as a quick yet safe alternative. Cataract surgery continues to evolve

with manual corneal incisions and anterior capsulorrhexis becoming automated using the femtosecond laser. The present study was undertaken to compare the results of SICS and phacoemulsification in relation to visual outcome and complications.

Material methods:

This prospective comparative study was done at MES Medical College, Perinthalmanna during the period 1st January 2013 to 31st December 2013.

All patients over the age of 40 years including those with coexisting ocular diseases like Age Related Macular Degeneration, Primary Open Angle Glaucoma or Diabetic Retinopathy were included. However those with traumatic, complicated or hypermature cataracts were excluded.

A detailed history was taken followed by meticulous clinical examination in all cases before the patient was posted for surgery. The choice of surgery was left to the patient and depended on affordability. This study was done after obtaining ethical committee clearance and informed consent was obtained from all patients.

Surgical technique: All cases were done by a single surgeon under subtenon’s block. Preoperatively, the pupils were dilated and the amount of mydriasis was recorded as poor, moderate or full dilatation. All surgery was done through a superior or superotemporal incision a superior rectus bridle suture.

In SICS, the incision size varied from 6 to 8mm while in phacoemulsification, the incision size ranged from 2.8 to 3.2 mm. Anterior continuous curvilinear capsulorrhexis was done in all cases and in mature cataract Trypan Blue was used to stain capsule before rhexis. A “stop and chop” technique was used in all cases of phacoemulsification. At the end of surgery a subconjunctival injection of Gentamycin and Dexamethasone was given in all cases. All intra-operative and post-operative complications were recorded.

Postoperatively patients were followed up on 1st postoperative day, 2nd week and 6th week. Visual acuity, slit-lamp examination, refraction and fundus examination were done at each visit. Findings were recorded, tabulated and analysed using Epi-info

software and Pearson Chi-Square test of significance.

Results:

130 eyes of 130 patients underwent cataract surgery with IOL implantation during the period of this study. Of these SICS was done in 109 eyes and phacoemulsification in 21 eyes.

Table 1: Postoperative BCVA in SICS at 6weeks

BCVA	6 TH WEEK	PERCENTAGE
>6/60	0	0
6/60-6/24	7	6.42%
6/18-6/12	17	15.59%
6/9-6/6	85	77.98%
Total	109	100%

At the end of the sixth week, most of the eyes that underwent SICS (n=85, 77.98%) had a BCVA of 6/9-6/6, 17 eyes had a BCVA of 6/18-6/12 and 7 eyes had a BCVA of 6/60-6/24 (Table-1). None of the eyes had a vision <6/60.

Table 2: Postoperative BCVA in phacoemulsification at six weeks

BCVA	6 TH WEEK	PERCENTAGE
>6/60	0	0
6/60-6/24	0	0
6/18-6/12	1	4.76%
6/9-6/6	20	95.2%
Total	21	100%

Most of the eyes in phacoemulsification (n=20, 95.2%) had a postoperative BCVA of 6/9-6/6 at the end of six weeks. Only one eye had a vision of 6/18(Table-2).

Table 3: Intra operative complications in SICS

Intra operative complication	SICS	
	No.	Percent
Posterior capsular rent, ACIOL	1	0.9
Poor mydriasis, sphincterotomy	1	0.9
Severe posterior pressure, wound gaping	1	0.9
Pre mature entry	1	0.9
Total	4	3.7%

Intraoperative complications were noted in 4 eyes (3.7%) in SICS group (Table-3) of which one eye had a posterior capsular rent for which an anterior chamber IOL was implanted after anterior vitrectomy. Poor mydriasis was noted in 2 eyes in the group SICS and one eye of these needed a sphincterotomy with no further complications. In the other eye with poor mydriasis intracameral adrenaline was used. Severe posterior pressure and wound gaping was seen in one eye where sutures were put to close the wound. Suturing was also done in another eye with premature entry and iris prolapse.

The only intraoperative complication noted in the phacoemulsification group was hard nucleus and this needed conversion to SICS. Postoperative complications occurred in 12 eyes with SICS (11%)(Figure-1). Of these, 10 eyes had hyphema. Retained cortical matter was seen in one eye which needed cortical wash and iris prolapsed occurred in one eye at the second follow up, which was managed by repositing the iris and a single suture. Postoperative complications occurred in just two of the 21 eyes in the phacoemulsification group-one eye developed a small Descemet's membrane detachment and the other had retained cortical matter.

Postoperative Astigmatism: It was found that in SICS 10.09% (11 eyes) did not have any astigmatism (Figure -2). 8.25% (9 eyes) had astigmatism >2D, 13.76% (15 eyes) had values between 1.6-2D. While 33.94% (37 eyes) had values between 1-1.5D and the rest 33.94% (37 eyes) had <1D astigmatism. The mean postoperative astigmatism was 1.2D. Most of the eyes (n=11, 52.38%) in phacoemulsification had a postoperative astigmatism of <1D. 4 eyes had astigmatism between 1-1.5D (Figure 3) and none had astigmatism more than 2 D.

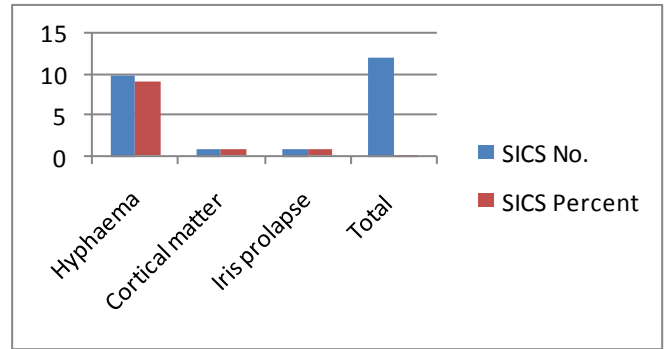


Figure 1: Postoperative complication in SICS

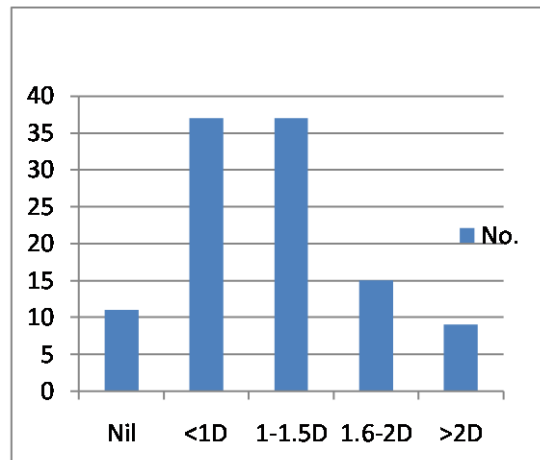


Figure 2: Postoperative astigmatism in SICS

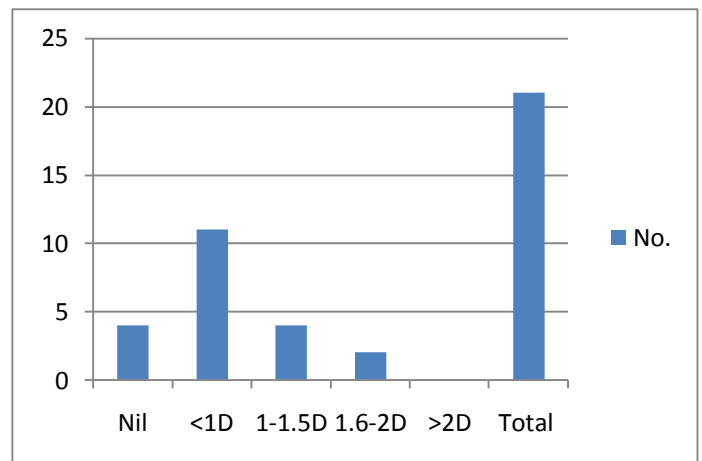


Figure 3: Postoperative astigmatism in phacoemulsification

Discussion

This study was on 130 eyes of 130 patients of which 109 eyes underwent small incision cataract surgery (SICS) and 21 eyes underwent phacoemulsification. There were more women (n=73) when compared to men (n=57) in the study. The average age for those operated by SICS was 65.1 years and for phacoemulsification 63.8 years.

In the present study, the postoperative best corrected visual acuity at the end of the sixth week in the SICS group was 6/9-6/6 in 85 eyes (77.9%), 6/18-6/12 in 17 eyes (15.6%) and 6/60-6/24 in 7 eyes (6.4%). None had a vision less than 6/60. Whereas in phacoemulsification out of the 21 eyes, 20 eyes (95.2%) had BCVA of 6/9-6/6 and the remaining eye had a BCVA of 6/18.

Of the 7 eyes with vision less than 6/18 in the SICS group, 4 eyes had pre-existing causes such as diabetic maculopathy (2 eyes), proliferative diabetic retinopathy with branch retinal vein occlusion (1 eye) and age related macular degeneration (1 eye). The remaining 3 eyes had marked astigmatism. This was pre-existing in two eyes as the preoperative keratometric readings showed astigmatism of 1.5D and 4D.

A six week randomized controlled clinical trial comparing the safety and efficacy of both phacoemulsification and SICS found that the visual acuity improved to $\geq 6/18$ with best correction in 182 of 185 patients (98.4%) in phacoemulsification and 184 of 187 (98.4%) patients in SICS.² Poor outcome (postoperative visual acuity $< 6/60$) was noted in 1 of 185 (0.5%) in the phacoemulsification group and none in the small-incision group. However, unlike in the present study, the two groups were comparable in terms of preoperative visual acuity.

Another study done at Aravind eye Hospital comparing the safety and efficacy of phacoemulsification and SICS to treat white cataracts in southern India found that on the first postoperative day, the UCVA was comparable in the 2 groups. At 6 weeks, the UCVA was better in (87.6%) in the phacoemulsification group than the (82.0%) SICS group. But BCVA was almost similar in both the groups.^{1,3}

In the present study, more patients underwent SICS compared to phacoemulsification and eyes in the SICS group had pre-existing causes of decreased vision which contributed to the decreased postoperative BCVA $< 6/18$ (7 eyes).

In the present study, intraoperative complications were noted in 4 eyes (3.7%) in the SICS group and one eye (4.8%) in the phacoemulsification group. Posterior capsular rent occurred in one eye with SICS (0.9%). This was managed by thorough anterior vitrectomy and placement of IOL in the anterior chamber. No posterior capsular rent was noted in the phacoemulsification group.

Gogate et al⁴ in their study also found a higher incidence of posterior capsular rent in SICS (n=12, 6.28%) than phacoemulsification (n=7, 3.64%).

Retained cortical matter needing cortical wash occurred in one patient each of both groups in this study. In the SICS group, poor mydriasis despite intracameral adrenaline was the cause. In the phacoemulsification group this occurred in an eye where a planned phacoemulsification was converted to SICS due to the difficulty in emulsifying the nucleus.

Intraoperative wound gape with iris prolapse occurred in two patients in the SICS group. Of these one was due to premature entry and the other due to severe positive pressure. Both these patients were managed by wound suturing.

The only intraoperative complication noticed in the phacoemulsification group was conversion to SICS because of nuclear hardness.

A study conducted by David et al mentioned that there was a significant trend toward complications as the grade of nuclear sclerosis increased⁵. The Pune study had the mode of astigmatism of 0.5 D for phacoemulsification and 1.5 D for MSICS, though the average was 1.1 and 1.2 D, respectively.⁴ The major complications with increasing grades of nuclear sclerosis were posterior capsule tears with vitreous loss (1.4%), isolated posterior capsule tears (0.7%), and zonulysis (0.1%).^{6,7}

In the present study the most common immediate postoperative complication noted in SICS was hyphema in 10 eyes (10%). Retained cortical matter and iris prolapse were the other complications. Of the ten patients who developed hyphema, two had

been on anticoagulants and hyphema occurred despite discontinuing medication five days prior to the surgery. Hyphaema was noted on day one in 9 eyes and persisted beyond the second week in only one eye. Active intervention was not required in any of these eyes as all the hyphemas resolved on their own. A pre-existing proliferative diabetic retinopathy with branch retinal vein occlusion was seen in one patient where the hyphema persisted.

Out of the 2 eyes with postoperative complication in phacoemulsification, one eye had a Descemet's detachment. But at the end of sixth week, that eye had a BCVA of 6/9. There were no eyes in SICS with descemet's detachment.^{8,9}

However, another study comparing phacoemulsification and SICS performed by ophthalmology trainees found a higher incidence of descemet's detachment in SICS (n=7, 1.34%) with no incidence in phacoemulsification.^{7,10} In the Nepal study the average astigmatism induced postoperatively was 0.7 diopter (D) in the phacoemulsification and 0.88 D in the SICS.^{8,11}

The amount of postoperative astigmatism was analysed among both the groups. It was found that majority of the eyes (37 eyes each) in SICS had postoperative astigmatism of <1D and between 1-1.5D. In the phacoemulsification group 52.38% had <1D astigmatism. But in SICS 8.25% (9 eyes) had >2D astigmatism. However, none of the eyes in phacoemulsification had an astigmatism of more than 2D. The mean astigmatism in SICS was 1.2D and in phacoemulsification was 0.9D. This suggest that the surgically induced astigmatism was more in SICS than phacoemulsification.

In the present study, an against the rule astigmatism was noted in 86 eyes (78.9%) in SICS and 14 eyes (66.7%) in phacoemulsification.

Conclusion:

Phacoemulsification was found to be superior to SICS because the surgically induced astigmatism was less with fewer postoperative complications and shorter time taken for visual rehabilitation. SICS has the advantage of being cost effective as it does not involve the use of sophisticated instrumentation. Postoperatively at six weeks the

best corrected visual acuity was similar in both the groups. Hence, SICS can be excellent alternative to phacoemulsification in our country.

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