

Original Research Article

A comparative study of conventional extra-capsular and small incision cataract surgery

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Abstract

Introduction: The small-incision cataract surgery is gaining popularity among the ophthalmic surgeons. **Aim:** To compare the visual outcome of conventional extra-capsular cataract extraction (ECCE) and small-incision cataract surgery (SICS). **Materials and methods:** A prospective interventional study without randomization was carried out including the patients undergoing cataract surgery by either conventional ECCE or manual SICS. They were followed up for 6 weeks postoperatively. The visual outcomes were compared between the two groups. **Results:** Of 85 patients, 44 (M: F=10:34) underwent ECCE and 41 (M: F=15:26) SICS (RR= 0.71, 95% CI=0.42-1.2, p value=0.16). Unaided visual acuity on the 1st postoperative day in the ECCE group was e⁶/18 in 22.7%, <6/18-6/60 in 63.6 %, < 6/60 in 13.7%, whereas in the SICS group, the same was e⁶/18 in 70.7%, <6/18-6/60 in 22 %, < 6/60 in 7.3% (95% CI = 0.23 – 0.48, p=0.001). Best corrected visual acuity on the 6th week follow-up in the ECCE group was e⁶/18 in 79.5%, <6/18-6/60 in 18.2 %, < 6/60 in 2.3% and in the SICS group the same was 6/18 in 90.5% and <6/18-6/60 in 4.9% (95% CI=0.44 – 0.73; p=0.0012). **Conclusion:** Both ECCE and SICS are good procedures for hospital based cataract surgery but within the 6 weeks postoperative period SICS gives better visual outcome. Remarkably higher number of female patients can be provided service in a hospital based cataract programme as compared to males.

Keywords: cataract, small incision, extra-capsular.

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Introduction

Cataract is the most common cause of blindness and visual impairment globally. According to a recent study by Sapkota et al prevalence of blindness due to cataract was found to be 60.5%. With the problem of cataract related blindness increasing in India as well as globally, tackling blindness due to this condition remains a major challenge. Visual rehabilitation following phacoemulsification cataract surgery combined with foldable intraocular lens is remarkable. However, despite such improvements in surgical results, this method of surgery requires expensive equipment and lenses. The majority of the needy population requiring cataract surgery in our part of the world is not able to afford it. Conventional extra-capsular cataract extraction and small-incision cataract surgery are both very good techniques for cataract extraction practiced in hospitals in all developing countries. Both methods are used, though the SICS is gaining popularity amongst the ophthalmic surgeons (Hennig et al 2003 & Ruit et al 1999). Our study was done to compare the visual outcomes of these two procedures in hospital based-community cataract surgery, where the patients were selected for surgery in a OPD and were admitted to the hospital for surgery.

Materials and methods

This Prospective was conducted at department of ophthalmology, Sri

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Krishna Medical College & Hospital, Muzaffarpur. The study was conducted over a period of 12 months time from April 2020 to March 2021. The study was approved by the institutional ethical and research committee. A total of 85 subjects were included in the study comprising of equal number of Males and Females. An informed and written consent was obtained by all the participating subjects.

All patients with age-related cataract who underwent cataract surgery with either conventional ECCE or SICS technique at our institute. All surgeries were performed in OT of our Hospital. The patients of age less than 40 years were excluded. The other criteria for exclusion were pterygium, corneal opacities, uveitis, secondary cataracts, sub-luxated lens, uncontrolled systemic hypertension, diabetes mellitus, high myopia, amblyopia, retinitis pigmentosa, age-related macular degeneration, glaucoma, optic atrophy and other posterior segment diseases. This was a prospective interventional study without randomization.

Preoperative evaluation

Basic eye examination was done using a torch and slit-lamp to assess eyelids and adnexa, lacrimal apparatus, conjunctiva, globe, cornea, anterior chamber, pupil, and lens. The cataract and the posterior segment were evaluated, where possible, after pupillary dilatation. Intraocular pressure was measured using air-puff for screening and Goldman applanation tonometry when required. Lacrimal syringing was done to check for patency of the lacrimal apparatus. Biometry was done to assess power of the intraocular lens required. B-scan was done in all cases to assess posterior segment. Blood pressure and urine sugar were checked to screen for hypertension and diabetes.

Surgical technique

All surgeries were performed under peri-bulbar anesthesia.

ECCE

A posterior limbal incision was made after making a conjunctival flap from 10 O'clock to 2 O'clock positions. Anterior capsulotomy and hydro-procedures were followed by nucleus removal by gentle expression using pressure-counter pressure technique. The cortex was aspirated with Simcoe irrigating and aspirating cannula. Posterior chamber intra-ocular lens (PCIOL) was implanted into the capsular bag. Continuous sutures were applied using 10/0 nylon to close the wound. Subconjunctival gentamycin and dexamethasone injection was given at the end of the surgery. The flap of conjunctival peritomy was positioned over the wound.

SICS

A scleral frown incision 6.5 to 7.0 mm long was made superiorly 2.0-3.0 mm away from the limbus. Tunnel construction was done using a crescent knife extending to 1-1.5 mm into the clear cornea. Internal corneal incision was made using a 3.2 mm keratome. The nucleus was prolapsed into the anterior chamber and removed with irrigating vectis under viscoelastic or directly extracted from the bag using a fishhook after hydro-procedures and nuclear rotation. The cortex was aspirated with Simcoe cannula and the PCIOL was implanted in the capsular bag. Subconjunctival gentamycin and dexamethasone injection was given and conjunctival flap mobilized to cover the tunnel.

1st postoperative day and follow up

All the patients were examined on the next day. Visual acuity was measured and detailed examination done under slit-lamp. The patients were discharged with steroid and antibiotic combination eye drops. The patients were followed up 1 week and 6 weeks postoperatively. On the 6th week follow up, refraction and

keratometry were done. Postoperative medications were tapered according to the anterior chamber reaction.

Results

Of the patients eligible to participate in the study, 85 completed the 6 weeks follow up.

44 of them underwent conventional ECCE and 41 underwent SICS. The majority of patients in the study were female (70.6%), while only 29.4% were male. The mean age of the patients was 62.82±11.33 years. The range was from 40 to 90 years.

Comparison of the demographic profile of the patients undergoing conventional ECCE and SICS groups showed no statistically significant difference (Table 1). Most of the cataracts operated were immature (62.3%), 36.5% mature and 1.2% hypermature.

Of the total 85 eyes operated, the majority (64.7%) was blind, 15.3% had severe visual impairment and 20% had visual impairment (Table 1).

On the first postoperative day the unaided visual status in the operated eye was 6/6-6/18 in 22.7%, <6/18-6/60 in 63.6%, <6/60-3/60 in 4.6% and <3/60 in 9.1% in the ECCE group. While in the SICS group, unaided visual acuity on the first postoperative day was 6/6-6/18 in 70.7%, <6/18-6/60 in 22%, <6/60-3/60 in 4.9%, and <3/60 in 2.4%. Visual outcome on the 6th week of follow-up by taking the best corrected visual acuity in the ECCE group was good (6/6-6/18) in 79.5%, borderline (<6/18-6/60) in 18.2% and poor (<6/60-3/60) in 2.3%. In the SICS group visual outcome taking best corrected visual acuity was good in 95.1% and borderline in 4.9%, while none had poor outcome (Table 3).

Table 1: Demography and clinical profile

Description	ECCE	SICS
Sex		
Male	10	15
Female	34	26
Relative risk (RR) = 0.71, 95% CI = 0.42-1.2, p value = 0.16		
Mean age (years)	63.14 ±12.3	62.59±10.3
Operated eye		
Right	21	21
Left	23	20
Type of cataract		
Mature	18	13
Immature	26	27
Hyper-mature	0	1
RR= 1.5, 95% CI=0.76-1.73, p value=0.5		
Pre-operative visual status		
Blind (<3/60)	31	24
Severe visual impairment (<6/60-3/60)	7	6
Visual impairment (<6/18 - 6/60)	6	11
RR= 1.5, 95% CI=0.8-3.12, p value=0.12		
IOL power	+21.43±3.7D	+21.74±2.3D

Table 2: Unaided visual acuity on 1st postoperative day

Visual acuity	ECCE	SICS	RR	95%CI	p value
6/6-6/18	22.7%	70.7%	0.33	0.23-0.48	0.001
6/24-6/60	63.6%	22%			
<6/60	13.7%	7.3%			

Table 3: Comparison of outcomes between SICS and ECCE on 6th week postoperatively

Visual acuity	ECCE	SICS	RR	95%CI	p value
Good(6/6-6/18)	79.5%	95.1%	0.57	0.44 -0.73	0.0012
Borderline (6/24-6/60)	18.2%	4.9%			
Poor (<6/60)	2.3%	0%			

Discussion

Cataract surgery remains a big challenge for all developing countries. The objective to tackle the problem of cataract-related blindness, where surgery remains the only treatment, seems to be just out of our reach, despite our best efforts. The answer to the problem may lie somewhere between searching for a method to provide cost-effective surgical care with good outcome and the one with less complications. The geographical makeup of our surrounding rural area remains another barrier where we are almost relying on a single-contact surgical care and where follow-up of the patients is extremely poor.

The inclusion of a higher number of female patients (70.6%) in our study was in contrast to the one by Sapkota et al (2006) in Nepal which shows a higher cataract surgical coverage among men (68.1%). The study done by R Venkatesh et al (2005) also had more female patients (54%) compared to males (46%).

The mean age in our study (62.82±11.3 years) was similar to 63.4 years in the study by Ruit *et al* (1999).

The SICS group in our study showed significantly better visual rehabilitation on the first post-operative day with the majority, 70.7% having unaided vision of e⁶/18, while most patients in the ECCE group had the unaided vision of < 6/18 in 63.6%. The study done by Hennig et al (2003) showed similar results with unaided visual acuity of e⁶/18 in 76.8% of the SICS group. In the 6th week of follow-up best corrected visual acuity was also significantly better in the SICS group as compared to the ECCE group, with 95.1% having vision of e⁶/18 as compared to 79.5% in the ECCE group. The study done by Gogate et al (2003) had 86.7% in the ECCE group with the visual acuity of 6/18 or better and 89.8% in the SICS group showing similar results in both groups as compared to our study (Gogate et al 2003).

A study done by Venkatesh et al (2005) showed 94% best corrected visual acuity of e⁶/18 in the SICS group which is comparable to our results. Gurung A et al (2009) have also reported consistent findings that a more rapid recovery of good vision can be achieved with manual SICS than with conventional ECCE in the immediate postoperative period. The study done by Shrestha et al (2001) assessing outcome of ECCE in surgical camps showed best corrected visual acuity of e⁶/18 in 59.5%, which was less than the outcomes of both the ECCE and SICS in our study, thus stressing the advantage of hospital-based cataract surgery.

Conclusion

Visual rehabilitation is quicker and better with SICS with significantly better unaided first postoperative day vision. Best-

corrected visual acuity after 6 weeks is also much better with SICS. Both conventional ECCE and SICS remain cost-effective methods of cataract surgery which can be done. Hospital-based cataract surgery provides better opportunity to serve the female patients.

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