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Original Article

Comparative Study of Extra Capsular Cataract Extraction (ECCE) and Small Incision Cataract Surgery (SICS): Experience on Cataract Surgery in a Tertiary Center of Army Hospital, Kathmandu

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Abstract

Introduction: Cataract is a common ailment of the old age hindering daily activities leading to poor quality of life due to poor vision. It is the commonest cause of treatable blindness. In practice, extracapsular cataract excision and small incision cataract surgery are the two-common surgery for cataract these days in developing part like in Nepal. Between these two cataract surgeries, ECCE and SICS; SICS gives the better visual outcome. **Methods:** This retrospective cohort study was carried out including 286 eyes which were operated either by conventional extracapsular cataract extraction or small-incision cataract surgery. The patient's demographics, preoperative vision, postoperative parameters/variables were studied from the patient's record keeping. The postoperative visual outcome and complications were compared in both groups at the immediate post-operative period and at 8 weeks follow up period. **Result:** Among the total 286 cases, 138 underwent ECCE and 148 underwent SICS. 145 (50.6%) were right eye, 141 (49.3%) were left eye. Among total operated cases, 123 (43%) were mature cataract, 97 (33.9%) immature cataract, 66 (23.1%) hyper-mature cataract. In 172 cases (60.1%) there was a good vision, in 104 cases (36.4%) it was borderline while in rest 10 (3.5%) cases it was poor on the 60th postoperative day.
There was the better visual outcome (≥6/18) with SICS (78.3%) than ECCE (40.5%) ($p<0.001$) on the 60th post-operative day. Among cases undergoing SICS the complications were less than ECCE. ($p<0.001$, OR=5.72 (2.10-15.51)).
Conclusion: This study supports that SICS is safer than ECCE with less complication rate and better visual outcome in short term observation.

Key words: Nepal, cataract extraction, intraocular lenses, visual acuity

Introduction

Among the global population, there were 36·0 million blind people in 2015, with the leading causes being cataract (12·6 million) followed by an uncorrected refractive error and glaucoma. By 2020, the data suggests that among the global population with moderate or severe vision impairment (237·1 million), the number of people affected by cataract is

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anticipated to rise to 57·1 million followed by refractive error (Flaxman et al, 2017.

Epidemiology of Blindness in Nepal (Sapkota, 2012) showed that cataract is the major cause of bilateral severe visual impairment and blindness presenting visual acuity (PVA) < 6/60 in the better eye) which is estimated to be 67.7% for in Nepal, higher than in blindness alone 52.8%.

Cataract surgery advanced from method of couching to the microincision cataract surgical (MICS), phacoemulsification and femto- laser technique. SICS is an appropriate technique to tackle the cataract in the developing countries (Smith, 2003). Hence, it is termed as the "cataract surgery for the 21st century" (Gogate, 2003). So, in practice ECCE and SICS are the two-common surgery for cataract these days in developing countries like Nepal (Tabin, 2008; Jaggernath, 2014). Among two cataract surgeries, Extra- Capsular Cataract Extraction (ECCE) and Small-Incision Cataract Surgery (SICS); SICS gives better visual outcome in short term postoperative period and is also cheaper than ECCE. (Gogate, 2003; Karki, 2009) Poor visual outcomes were influenced by several factors like older age, female gender and ocular comorbidities. (Mohammadi, 2015)

Although a treatable condition, the burden of cataract for blindness is still high (Tabin, 2008). With the problem of cataract related blindness increasing in Nepal as well as globally, tackling blindness due to this condition remains a major challenge (Sapkota, 2012, Sherchan et al 2010) This study was carried out with an objective to compare the surgical outcome of ECCE versus SICS at Shree Birendra Hospital, Chhauni, where such study has not been done in past.

Methods

Selection and Description of Participants

The study was conducted by retrieving the data of 286 eyes with cataract, which had underwent cataract surgery with either conventional ECCE or SICS technique at Shree Birendra Hospital, Chhauni, Kathmandu. All of the cases were operated from April 2010 to March 2012 AD. During this period, 1625 cases of cataract surgeries were done. Only the patients who had cataract without any local or systemic diseases were included in the study. All enrolled cases were selected using systematic randomization sampling technique for their division into two groups: ECCE with PCIOL and SICS by a single surgeon (Principal Investigator) so that there was no bias regarding the surgical techniques.

Prior to the surgery, informed consent was obtained from all cases. The 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. All cases were kept under follow up and data were kept on subsequent post-operative visits. Based on data record the comparative study done among two cohort undergoing ECCE and SICS. During the study, decleration of Helsinki followed, and human right was not violated.

Preoperative evaluation

Pre-operative assessment of the cataract patients included visual acuity measurement done by Snellen visual acuity chart, extraocular motility evaluation, examination with slit lamp, fundus evaluation, intraocular pressure measurements, biometry and general physical examination. Macular function tests, syringing of the lacrimal passage, blood sugar and blood pressure measurement were also performed pre-operatively. The two planned treatments were ECCE and SICS. In both techniques, a posterior chamber IOL was implanted. All surgeries were performed under peribulbar anesthesia.

Surgical technique

In ECCE, a 12–14 mm posterior limbal incision was made after raising a conjunctival flap. The anterior capsulotomy done with can opener technique followed by hydrodissection. The lens nucleus was prolapsed and expressed gently using pressure- counter pressure technique. The manual irrigation aspiration system was then used to remove the remaining cortical matter and three-piece optical diameter of a 6.5 mm PMMA intraocular lens was inserted into the capsular bag, and the incision closed with 3-5 interrupted sutures with 10-0 nylon. The flap of conjunctival peritomy was placed over the wound. Subconjunctival gentamycin and dexamethasone injection was given at the end of surgery.

In SICS, a 6.5–7.5 mm scleral tunnel was created with a straight or a frown incision. A side port was created to facilitate intraocular manipulations. The capsule was opened with can opener technique and the nucleus was dislocated into the anterior chamber. Viscoelastic was injected around the nucleus and an irrigating vectis was used to deliver the nucleus through the scleral tunnel. The remaining cortex was removed with manual irrigation-aspiration and a 6.5 mm three-piece PMMA lens implanted in the bag. The side port was hydrated to facilitate the port closure. Subconjunctival gentamycin and dexamethasone injection were given and conjunctival flap mobilized to cover the tunnel.

Follow up

Visual acuity was measured, and a detailed examination was done under slit-lamp on the next day. The patients were discharged with steroid and antibiotic combination eye drops. The patients were followed up on the 2nd post-operative day, 1 week and 4 weeks and 8 weeks postoperatively. Postoperative medications were tapered according to the anterior chamber reaction.

Statistics

The data were exported to SPSS version 22 and analyzed. Chi-square test and odds ratio were calculated to see an association between important factors of cataract and cataract surgery with the help of p value based on 95% confidence interval and 5% standard error.

Result

Among total 286 cases, 138 underwent ECCE and 148 underwent SICS. Among them, 159 (55.6%) were females while 127 (44.4%) were males. 145 (50.6%) of the surgeries were performed in the right eye and, 141 (49.3%) were performed in the left eye. Among the total operated cases, 123 (43%) were mature, 97 (33.9%) immature, 66 (23.1%) hyper-mature cataract. (Table 1).

In ECCE and SICS, in majority (79.71% Vs 58.78%) vision was poor on the 1st postoperative day and the difference was significant (p=0.001) (Table 2.). Poor visual acuity was mostly due to corneal edema which cleared up subsequently during follow up period.

On 60th postoperative day, visual acuity of 56 (40.5%) cases had good; 74 (53.6%) had borderline and 8 (5.7%) had poor vision in ECCE group,, whereas 116 (78.3%) had good; 30 (20.2%) had borderline and 2 (1.3%) had poor vision in SICS group. In total 172, (60.1%) were having good vision on 60th post operative day, 104 (36.4%) had vision was borderline while in 10 (3.5%) cases had poor vision. At the same time better visual outcome was there with SICS than ECCE (40.5% vs 78.3% with good vision) (p<0.001) (Table 3.). Among cases undergone SICS, the rate of having complications like vitreous loss or remnant of lens component were less than ECCE. (p<0.001, OR=5.72 (2.10-15.51)) (Table 1). Thus, SICS is better than ECCE from both visual outcome and complications perspectives.

Table 1: Demographic variables and clinical profile of operated cases

Variables	SICS	ECCE	Total	OR
Gender				
Female (F)	86	73	159	
Male (M)	62	65	127	
Age	67.44±10.22	67.38±9.57	67.42±9.90	-
Surgery site				
Right Eye (RE)	74	71	145	
Left Eye (LE)	74	67	141	
Type of Cataract				
Immature cataract	54	43	97	
Mature Cataract	61	62	123	
Hyper-mature cataract	33	33	66	-
Visual status of same eye (Pre-op)				
Visual Impairment	25	18	43	
Severe Visual Impairment	45	43	88	
Blind	78	77	155	-
Visual status of next eye (Pre-op)				
Good	39	45	84	
Visual Impairment	76	68	144	
Severe Visual Impairment	33	25	58	-
Complications				
No	143	115	258	5.72(2.10-15.51)
Yes	5	23	28	

Table 2: Visual acuity on 1st postoperative day following ECCE and SICS

Visual Acuity	Surgery		Total	p-value
	ECCE	SICS		
Poor (<6/60)	110 (79.71%)	87 (58.78%)	197	0.001
Borderline (6/24-6/60)	25 (18.11%)	54 (36.48%)	79	
Good (6/6-6/18)	3 (2.17%)	7 (4.72%)	10	

Table 3: Unaided visual acuity at 60th day following ECCE and SICS

Visual Acuity	Surgery		Total	p-value
	ECCE	SICS		
Poor (<6/60)	8 (5.7%)	2 (1.3%)	10	<0.001
Borderline (6/24-6/60)	74 (53.6%)	30 (20.2%)	104	
Good (6/6-6/18)	56 (40.5%)	116 (78.3%)	172	

Discussion

The inclusion of a higher number of female patients (55.5%) in our study was similar to the study done by Gurung et al (2009), (52.3% versus 47.7%) and R Venkatesh et al (2005) (54% vs 46%). The study done by Karki P et al had higher incidence of female patients (70.6%) than our study. The higher number of female patients (70.6%) in our study contrasted with the one study done by Sapkota et al (2006)

in Nepal which shows a higher cataract surgical coverage among men (68.1%).

In our study 116 (78.3%) eyes in SICS group had good, 30 (20.2%) had borderline and 2 (1.3%) had poor vision in 60th postoperative day while in ECCE group, 56 (40.5%) had good, 74 (53.6%) had borderline and 8 (5.7%) had poor vision. At the same time better visual outcome was seen in SICS than in ECCE (78.3% vs 40.5% with good vision) ($p<0.001$). Gurung et al (2009) study with 100 patients showed unaided visual acuity ≥ 6/18 at 6-8 weeks in 44% cases in ECCE and ≤ 6/18 in 56% in SICS group. The study of Gogate et al (2003) with 706 eyes reported uncorrected visual acuity of 6/18 or better at 6 weeks in 37.3% and 47.9% in conventional ECCE and SICS respectively which is better than our study. In a study of 90 patients done by Sood et al (2002), the uncorrected visual acuity was 6/6 in 36.6% in conventional ECCE with PCIOL and 40% in SICS. Similarly, in the study of Balent et al (2001) reported corrected visual acuity of 6/6 to 6/18 in 38% in conventional ECCE with PCIOL, whereas 60.10% attained visual acuity of 6/24 or better in SICS. Karki P et al (2009) study showed best corrected visual outcome on the 6th post operative week 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 same study, SICS group best corrected visual acuity was good in 95.1% and borderline in 4.9%, while none had poor outcome

The study done by Hennig et al (2003) showed better results than our study, with unaided visual acuity of >/ 6/18 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 6/18 as compared to 79.5% in the ECCE group. The study done by Gogate et al (2003) also had better result than our study with 86.7% in the ECCE group with the visual acuity of 6/18 or better and 89.8% in the SICS group.

Most of comparative studies showed better outcome with SICS than ECCE as shown by our study. This study was conducted over small number of Nepalese population, so large study population is required for better comparison.

Conclusion

The uncorrected visual acuity is better after SICS at 8 weeks, showing that the visual recovery is faster in SICS than in conventional ECCE implantation. Thus, this study supports SICS safer than ECCE with less complication rate and better visual outcome. To explore better other larger prospective randomized studies may be needed.

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