

# Comparative Analysis between Manual Small Incision Cataract Surgery and Conventional Extra Capsular Cataract Extraction

MUNIR AMJAD BAIG<sup>1</sup>, M. IJAZ ANWAR<sup>2</sup>, RABEEYA MUNIR<sup>3</sup>

## ABSTRACT

**Background:** People with cataracts living in developing countries, have limited facilities to cope with high demands of cataract surgery. These countries share the largest backlog of cataract surgeries, which are intumescent, mature and hyper-mature lenses (white cataracts).

**Aim:** To compare both surgical procedures for the rehabilitation of cataract patients in high volume eye hospital setting.

**Methods:** In a single masked randomised controlled clinical trial, 360 willing patients, aged 40–80 years, with operable cataract were assigned to receive either MSICS (group1) or ECCE (group11) in Federal Government Services Hospital Islamabad during jan.2012-dec2012 by a single surgeon after approval from hospital Ethical committee. Intraoperative and postoperative complications were graded and scored according to the Oxford Cataract Treatment and Evaluation Team (OCTET) recommendations. In all comparisons, a  $p < 0.05$  was considered statistically significant.

**Results:** Among 360 first operated eyes, 184 patients of equal gender underwent MSICS while 176 patients had ECCE with PCIOL implantation. Mean age at surgery was 64 years with male predominance of 51.1%. The complications based on OCTET definitions showed that 69 (19.1%) patients had Grade I, 15 (4.1%) had Grade II and 4 (1.1%) had Grade III complications. Follow-up rates were comparable between both groups. Both groups achieved good visual results with minimal complications but group 1 had better initial visual recovery.

**Conclusion:** A huge backlog of cataract blindness exists in the developing world. Manual small incision cataract surgery (MSICS) and extra capsular cataract extraction (ECCE) with intra ocular lens implantation (IOL) can deal with this situation.

**Keywords:** Cataract, small incision, extra capsular cataract extraction

---

## INTRODUCTION

Cataract comes from the Greek word  $\kappa\alpha\tau\alpha\rho\acute{\alpha}\kappa\tau\eta\varsigma$  (kataraktēs) meaning the fall of water<sup>1</sup>. Worldwide, 285 million people are visually impaired 39 million are blind while 18 million are due to cataract. Cataract affects more than 22 million Americans over the age 40. About 70 percent of people have cataracts at the age 75 and as the U.S. population ages more than 30.1 million Americans are going to get cataracts by the year 2020<sup>2</sup>. There are about 9-12 million blind in India, half of which can be attributed to cataract<sup>3</sup>. About 570 000 adults are blind ( $< 3/60$ ) due to cataract in Pakistan, and 3 560 000 eyes have a visual acuity of  $< 6/60$  because of cataract<sup>4</sup>.

Globally about 15 million cataract operations are performed annually, an increase of 5 million in 5 years<sup>5</sup>. The prevalence of bilateral cataract blindness (VA  $< 3/60$ ) among people aged  $\geq 50$  years was 4.8%

(95% CI: 3.8% to 5.9%), which is highest reported in Pakistan as well as elsewhere<sup>7</sup>.

A huge backlog of cataract blindness exists in the developing world. Various cataract surgeries dealing with this backlog should be affordable<sup>8</sup>. Pakistan, being the sixth populous developing country in the world, is situated in the World Health Organization's (WHO) Eastern Mediterranean Region<sup>9</sup>. It has declining growth in gross domestic product (GDP) and near doubling of its population living below the poverty line<sup>10</sup>.

82% of all blind above the age of 50 years live in developing countries<sup>5</sup>. Both MSICS and ECCE are appropriate surgical techniques employed in the developing country<sup>11</sup>. The idea was to provide latest micro surgical facilities to indigent patients who need good visual and cosmetic results. The present study compares the safety profile and acceptability for these patients.

## MATERIALS & METHODS

In a single masked randomised controlled clinical trial, 360 patients, aged 40–80 years, with operable cataract were assigned to receive either MSICS (group1) or ECCE (group II) in Federal Government Services Hospital Islamabad during jan.2012-

---

<sup>1</sup>Associate Professor Ophthalmology, AJK Medical College, Muzaffarabad.

<sup>2</sup>Associate Professor of Physiology, AJ&K Medical College, Muzaffarabad.

<sup>3</sup>Demonstrator Rawal Medical & Health Sciences, Islamabad.

Correspondence to Dr. Munir Amjad Baig,

Email: drmuneeeramjad@yahoo.com, Cell: 03315485595

dec2012 by a single surgeon. Two equal half of sample was taken to avoid gender bias. Informed consent from each patient and permission from Ethical committee was obtained. Intraoperative and postoperative complications were graded and scored according to the Oxford Cataract Treatment and Evaluation Team (OCTET) recommendations. The patients were followed up at day1, 7 at 6 weeks, 6 months and 1 year after surgery. Complications, astigmatism and visual rehabilitation were assessed and compared.

**RESULTS**

One hundred and eighty four patients underwent MSICS and 176 patients had planned ECCE. Both groups had 100% follow-up on postoperative day 1 and better than 98% follow-up at day 7 and weeks 3, 6, and 12. The 6-month follow-up rate was lower but similar in both groups at 96% and 97%.

Both groups achieved good visual results. 85 % of the eyes had a 6 week-post-operative best corrected visual acuity of 6/12 or more in group1 while it was 83% in group11(table-1). The common

refractive error was myopia with against the rule astigmatism seen in 71(19.7%). Against the rule astigmatism ATR was common in MSICS group cases with mean of 1.5 D on first day. In conventional ECCE, with the rule astigmatism WTR was in 26% of cases. Early visual recovery was better in MSICS group (table-2). The complications based on OCTET definitions showed that 69(19.1%) patients had Grade 1, 15(4.1%) had Grade II and 4(1.1%) had Grade III complications. The most common first post-operative day complication was mild iridocyclitis. The induced astigmatism was less in MSICS group compared to ECCE group at first day but after six weeks there was no difference. All corneas in both groups were clear by three weeks time. At 6 month follow-up, 22(12.5%) patients in group1 and 27(14.6%) patients in group11 had PCO.

Among all patients 49% housewives and 27% farmers (Table-iii) were much happy and did not want glasses. 15% teachers and industrial workers required corrective glasses, 7% were not satisfied either and 2% lost the follow-up or reported dead.

Table1: Best corrected visual acuity

Type of Surgery	Visual Acuity	1 <sup>ST</sup> Day		3 Weeks		6 Weeks	
		UCVA	BCVA	UCVA	BCVA	UCVA	BCVA
MSICS	>6/9	02	19	03	33	04	41
	6/12-6/18	13	14	22	09	31	10
	6/24-6/60	25	11	17	03	10	01
	<6/60	07	02	02	01	01	00
ECCE	6/12-6/18	02	17	13	14	21	11
	6/24-6/60	16	19	28	08	14	02
	<6/60	28	08	06	02	02	03

Table 2: Surgery induced astigmatism.

Type Astigmatism	MSICS			ECCE		
	1 <sup>st</sup> day	3 weeks	6 weeks	1 <sup>st</sup> day	3 weeks	6 weeks
ATR 0.0-1.0	31	26	20	4	6	9
1.0-2.0	7	13	17	3	2	4
>2.0	2	3	5	4	4	5
WTR 0.0-1	6	6	4	3	7	9
1.0-2.0	1	1	0	8	6	9
>2.0	2	2	1	12	14	13

Table 3: Comparison of post-operative complications in two groups

Complications	(MSIC)	(ECCE)
Uveitis	03	07
PCO	26	29
Cystoids macular oedema	01	03
Secondary glaucoma	03	06
Ocular watering	10	45
Wound leak	0	02
Unaided visual acuity< 6/18	27	39
Astigmatism> 1.5D	41	71

Table 4: Comparison of intra operative complications in two groups

Complications	(MSIC)	(ECCE)
Difficulty in delivery of nucleus	12	09
PC rent	02	07
Iridodialysis	02	0
Iris prolapsed	02	05
Hyphaema	08	02
Premature AC entry	02	03
Constricted pupil	10	19
Scleral flap button hole	02	00
Vitreous loss	02	04
Descemet's membrane stripping	03	04

## DISCUSSION

SICS was developed in the United States and Israel and was made popular in India where large proportion of surgeries were performed<sup>12</sup>.

SICS is an appropriate surgical procedure for the treatment of cataracts in developing countries<sup>13</sup>. This technique is effective for any type of cataract. It is faster, less expensive and less technologically dependent. Manual small incision cataract surgery (MSICS) achieves excellent visual outcomes with low complications rate.

Common postoperative complications were minimal corneal edema and hyphaema which improved within 1 week without intervention.<sup>14</sup> 3% patients had corneal oedema and 2% patients had folds in Descemet's membrane.

The surgical results obtained in our study compare favourably with those mentioned in the literature for MSICS.<sup>15</sup> A study from Mumbai, India showed temporal tunnels to induce less astigmatism compared with superior tunnels for MSICS<sup>16</sup>. Posterior capsular opacification occurred in 12.5% of patients, is consistent with other studies.<sup>17</sup> SICS is the more appropriate technique for addressing the large and growing backlog of blinding cataracts in the developing world<sup>18</sup>.

ECCE is a time-tested surgery, a method of improving vision related quality of life in developing countries but has lost its edge due to longer surgical time, increased postoperative astigmatism and longer rehabilitation time. Mujaini et al. showed that ECCE in patients with advanced cataract and pseudoexfoliation was quite safe<sup>19</sup> similar to our study. In ECCE, postoperative high astigmatism has been an issue in various studies. In our study, the astigmatism was reduced intraoperatively by avoiding tightness or looseness of the sutures.

The World Health Organization defines visual impairment as vision worse than 20/60. With the use of this standard of better than or equal to 20/60, both techniques were extremely successful in restoring good vision.

Two patients during MSICS procedure in this study developed inferior iridodialysis but not in ECCE group. Chakraborty S et al found the same.<sup>20</sup> Gogate PM et al<sup>14</sup> found that posterior capsular rent was more in MSICS group compared to ECCE group but in this study the frequency was more in ECCE group. The mean OCTET score for intra operative complications was slightly higher for ECCE group in this study which is contrary to other study. Folds in Descemet's membrane were more common in ECCE group in our study than MSICS group.

The mean surgically induced astigmatism in MSICS group was ATR 1.05D at 3 weeks time and it was

2.24 WTR in ECCE similar to Kshetrapal A et al who reported that 78% had astigmatism of 1.5D<sup>21</sup>.

88% of patients in MSICS group and 76% of patients in ECCE group attained 6/9 or better vision. The average uncorrected visual acuity of the small incision group was definitely higher than conventional large incision group in this study akin to Xiang Q et al study<sup>22</sup>. Gogate et al<sup>3</sup> also indicated that 37.3% of ECCE group and 47% of MSICS group had uncorrected visual acuity of 6/18 or better after six weeks. This study has found that MSICS gave an uncorrected visual acuity of 6/18 or better in higher proportion of patients than ECCE at six weeks.

The rates of intra and post-operative complications were similar in two groups except for transient post-operative corneal edema which was more common in MSICS group in our study. Jakhnaval SP et al noticed that rehabilitation time was better in MSICS than in ECCE group.<sup>23</sup> akin to our study.

Patients having BCVA of >6/12 in our study were 184 (88.88%). This was similar to Gogate study of 86.7% but better than Gurung *et al.* study of 72%. In our study, a higher BCVA may have been due to the lower postoperative astigmatism<sup>24</sup>.

According to WHO guidelines 85% of cataract surgeries should attain GOOD visual outcome (presenting visual acuity PVA: 6/18 or better). Our study shows 83% similar results. The WHO recommends that poor visual outcomes should not be more than 5% after cataract surgery. In this study it is worse than WHO guidelines but still better than other studies.<sup>25</sup> Another finding in current study is that among 7% of the patients having poor visual results, women had higher proportion than men (23 vs 12-female, male ratio) and another 8% having irregular pupil, female/male ratio was (28 vs 12) is consistent with the findings of the Pakistan National Blindness and Visual Impairment Survey.<sup>26</sup> This explains the "fears" of operation or its poor outcomes were present among women than men.<sup>27</sup> This gender difference needs to be more elaborated in future.

## CONCLUSION

A huge backlog of cataract blindness exists in the developing world. This group of patients having visual acuity as counting fingers/hand movement (CF-HM) is much benefited with SICS with IOL as far as visual improvement to 6/18-6/12 is concerned.

**Recommendations:** Various cataract surgical techniques dealing with this backlog should be affordable to the patients.

**Conflict of interest:** No conflict of interest present

## REFERENCES

1. Aruta A, Marengo M, Marinozzi S. History of cataract surgery. *Med Secoli*, 2009. 21(1):403- 428.
2. Majka C, Carlson A. *Ophthalmic Pearls: Cataract: When to Use Multifocal Intraocular Lenses*. American Academy of Ophthalmology website. Available at <http://www.aao.org/publications/eyenet/200609/pearls.cfm>, Accessed May 9, 2016.
3. Gogate P. Comparison of various techniques for cataract surgery, their efficacy, safety and cost. *Oman Journal of Ophthalmology*. 2010; 3(3):105-106.
4. Anjum KM, Qureshi MB, Khan MA, et al. Cataract blindness and visual outcome of cataract surgery in a tribal area in Pakistan. *Br J Ophthalmol* 2006;90:135–8.
5. Pascolini D, Mariotti SPM. Global estimates of visual impairment: 2010. *British Journal Ophthalmology Online* First published December 1, 2011 as 10.1136/bjophthalmol-2011-3005395
6. PB17 Session. Vision2020: the right to sight – the first five years, *World Ophthalmology Congress*, Sao Paulo, Brazil; 21 February 2006.
7. Bourne R, Dineen B, Jadoon Z, et al. The Pakistan National Blindness and Visual Impairment Survey research design, eye examination methodology and results of pilot study. *Ophthalmic Epidemiol* 2005;12:321–33.
8. Tabin G, Chen M, Espandar L. Cataract surgery for the developing world. *Current opinion in ophthalmology*. 2008;19(1):55–9.
9. Federal Bureau of Statistics, Statistics Division, Government of Pakistan <http://statpak.gov.pk> (accessed 2 June 2006)
10. Pakistan National Human Development Report 2003. [http://hdr.undp.org/statistics/data/country\\_fact\\_sheets/cty\\_fs\\_PAK.html](http://hdr.undp.org/statistics/data/country_fact_sheets/cty_fs_PAK.html) (accessed 1 August 2006)
11. Kongsap P. Visual outcome of manual small-incision cataract surgery: comparison of modified Blumenthal and Ruit techniques. *Int J Ophthalmol*, 2011;4(1):62-5.
12. Emery J, Steinert RF. Extra-capsular cataract surgery, indications and techniques. In: Steiner RF, editor. *Cataract surgery: techniques, complications and management*, 2nd ed. Philadelphia, USA: Elsevier Sciences. 2004;3:97-108.=
13. Ruit S, Tabin G, Chang D, Bajracharya L, Kline DC, Richeimer W, Shrestha M, Paudyal G. A prospective randomized clinical trial of phacoemulsification vs manual sutureless small-incision extracapsular cataract surgery in Nepal. *Am J Ophthalmol*. 2007;143(1):32–38
14. Gogate PM, Kulkarni SR, Krishnaiah S, et al., Safety and efficacy of phacoemulsification compared with manual small incision cataract surgery by a randomized controlled clinical trial: Six weeks results, *Ophthalmology*, 2005;112:869–74
15. Oshika T, Nagahara K, Yaguchi S, et al., Three year prospective randomized evaluation of intraocular lens implantation through 3.2 and 5.5 mm incisions, *J Cataract Refract Surg*, 1998;24:509–14.
16. Gokhale NS, Sawhney S, Reduction in astigmatism in manual MSICS through change in astigmatism site, *Indian J Ophthalmol*, 2005;53:201–3.
17. Shaumberg DA, Dana MR, Christen WG, Glynn RJ. A systemic overview of the incidence of posterior capsular opacification. *Ophthalmology*. 1998;105:1213–21
18. Tabin G, Chen M, Espandar L. Cataract surgery for the developing world. *Current opinion in ophthalmology*. 2008;19(1):55–9.
19. Bourne R, Dineen B, Jadoon Z, Lee PS, Khan A, Johnson GJ, et al. Outcomes of cataract surgery in Pakistan: results from The Pakistan National Blindness and Visual Impairment Survey. *The British journal of ophthalmology*. 2007;91(4):420–6.
20. Ahmad K, Zwi AB, Tarantola DJ, Chaudhry TA. Self-Perceived Barriers to Eye Care in a Hard-to-Reach Population: The Karachi Marine Fishing Communities Eye and General Health Survey. *Investigative ophthalmology & visual science*. 2015;56(2):1023–32.
21. Hennig A, Kumar J, Yorston D, Foster A. Sutureless cataract surgery with nucleus extraction: outcome of a prospective study in Nepal. *Br J Ophthalmol* 2003;87:266 –270
22. Al-Mujaini A, Wali UK. Visual outcome following extracapsular cataract extraction in mature cataracts with pseudoexfoliation syndrome: A retrospective study. *Oman J Ophthalmol*. 2013;6:23–6.
23. Chakraborty S, Chakraborty A, Ray B. Complications of manual SICS – A retrospective study. In: Bhattacharya D, editor. *Proceeding of all India ophthalmological Society Conference year book*, Bhubaneswar: Non Enterprises, 2005:121-2.=
24. Kshetrapal A, Kshetrapal R. Phaco-fewer sutures less cataract extraction with IOL. A new technique. In: Lavingia BC, editor. *Proceedings of 5th All India Ophthalmological Society Conference*, Cochin: Non Enterprises. 1999;140-1.=
25. Xiang Q, Xu XL, Tan Q. Cataract extraction through no stitch small incision combined with intra ocular lens implantation. *Human Yi Ke Da Xue Bao* 2002;27(2):135-8
26. Jakhanval SP. ECCE vs. SICS: A comparative study related to rehabilitation time. In: Bhattacharya D, editor. *Proceeding of all India ophthalmological Society Conference year book*, Bhubaneswar: Non Enterprises. 2005:144-6
27. Reddy B, Raj A, Singh VP. Site of incision and corneal astigmatism in conventional SICS versus phacoemulsification. *Ann Ophthalmol (Skokie)* 2007;39:209-16.
28. Gurung A, Karki DB, Shrestha S, Rijal AP. Visual outcome of conventional extracapsular cataract extraction with posterior chamber intraocular lens implantation versus manual small-incision cataract surgery. *Nepal J Ophthalmol*. 2009;1:13–9
29. Riley, Malik, Grupcheva, et al. The Auckland cataract study: Co Morbiditiesurgical techniques and clinical outcome in a public hospital services. *Br.J.Ophthalmol* 2002;86; 185-190.
30. Ahmad K, Zwi A, Daniel J, MTarantola. Eye Care Service Use and Its Determinants in Marginalized Communities in Pakistan: The Karachi Marine Fishing Communities Eye and General Health Survey. *Ophthalmic epidemiology* April 2015; 22(6):1-10.