IMPROVEMENT IN VISION FOLLOWING CATARACT SURGERY: A COMPARISON OF PHACOEMULSIFICATION AND SMALL INCISION CATARACT SURGERY (SICS) TECHNIQUES

Abraham Ipe[1], Sunilkumar T. P[2], Rohith Skariah[3]

[1]Associate Professor, Department of Ophthalmology, Pushpagiri Institute of Medical Sciences and Research Centre, Tiruvalla, Kerala.
[2]Assistant Professor, Department of Ophthalmology, Pushpagiri Institute of Medical Sciences and Research Centre, Tiruvalla, Kerala.
[3]Intern, Department of Ophthalmology, Pushpagiri Institute of Medical Sciences and Research Centre, Tiruvalla, Kerala.

ABSTRACT

INTRODUCTION

Phacoemulsification is the method of choice in most of the western nations and tertiary care ophthalmology centres in India, while manual small incision cataract surgery (MSICS) is the surgical technique preferred by most of the ophthalmic surgeons working in smaller centres. Many studies have indicated that the MSICS technique is preferable for smaller centres, especially in developing countries, as the duration of surgery and requirement of equipment tends to be much smaller. This study was aimed at comparing the outcomes of MSICS and phacoemulsification surgeries carried out over a period of three months at a tertiary care hospital in South India.

MATERIALS AND METHODS

Patients diagnosed to have age related cataract and undergoing surgery in this institution were included in the study. The choice of surgical intervention was based on the preference of the operating surgeon and choice of the patient. The patients were followed up at the end of one week on their review visit to the outpatient department of the hospital. The incidence of post-operative complications was enquired, apart from measurement of visual acuity and corneal diameters.

RESULTS

A total of 106 participants were included in the study. Eighty percent of the patients who underwent phacoemulsification had some improvement in vision, while 81.9% of the participants in the MSICS group showed improvement, (p-0.825), only one participant had a complication related to the surgery, and he belonged to the MSICS group. The changes in K1 (p-0.547) and K2 (p-0.698) corneal diameters during surgery was also not significantly different between the groups.

CONCLUSIONS

It was observed that MSICS and phacoemulsification procedures have similar outcomes when used at a tertiary care teaching hospital in South India. A large multicentric Randomised Control Trial (RCT) is warranted to compare the outcomes of the two surgical procedures and the cost-effectiveness of each, before concrete recommendations are formulated.

KEYWORDS

Cataract Extraction/methods*, Lens Implantation, Intraocular/methods*, Lenses, Intraocular*, Phacoemulsification/methods, Visual Acuity.

HOW TO CITE THIS ARTICLE: Ipe A, Sunilkumar TP, Skariah R. Improvement in vision following cataract surgery: A comparison of phacoemulsification and small incision cataract surgery (SICS) techniques. J. Evid. Based Med. Healthc. 2016; 3(24), 1071-1074. DOI: 10.18410/jebmh/2016/246

INTRODUCTION: The efforts to reduce the burden of cataract in India began in the sixties with makeshift surgical camps in the vast rural hinterland catering to the needs of our rural population. The localised nature of this initiative helped in the success of these camps and also in sensitising the population on issues related to ophthalmological problems.

Submission 12-02-2016, Peer Review 25-02-2016, Acceptance 10-03-2016, Published 24-03-2016.
Corresponding Author:
Dr. Abraham Ipe,
Associate Professor, Department of Ophthalmology, Pushpagiri Institute of Medical Sciences and Research Centre, Tiruvalla-689101, Kerala.
E-mail: pushpagiriceu@pushpagiri.in
DOI: 10.18410/jebmh/2016/246

The strategy changed in the eighties and the focus was on conducting screening camps for cataract in rural areas and referring the needy patients for surgery in fixed facilities. Intra-capsular cataract extraction (ICCE) with aphakic spectacles were the pivotal points in this strategy.[1] The intraocular lenses, which were exorbitantly expensive previously, started being used extensively in cataract surgeries since the late eighties. The higher complication rates observed initially with intraocular lenses came down drastically in later stages as the quality of lenses became better over time and the expertise of the ophthalmic surgeons improved.[2] Also, the cost of the intraocular lenses came down after manufacturing started in developing countries and many non-profit organisations took up the cause. The awareness, affordability and accessibility of

cataract surgery services went up over the last two decades, resulting in a rapid increase in the cataract surgeries done in the country. Even with this increase in recent years, the number of cataract surgeries in the country are way below the actual need of the population.[3] It is estimated that the total number of cataract surgeries went up from 0.5 million in 1980 to 4.8 million in 2006 and the acceptance rate of intraocular lens is over 90%. Also, India has matured from being the manufacturing centre for low-cost lenses to the hub of technology driven, high quality and value-priced lens manufacturing process.[4]

Extra-capsular cataract extraction (ECCE) with posterior chamber intra-ocular lens insertion was the technique of choice in the initial years of the IOL revolution. The improvement in visual acuity and the complication rates in this technique were much lower than that of ICCE. But in the recent years, other surgical techniques have gained foothold, with promise of even better success rates. Phacoemulsification is the method of choice in most of the western nations and tertiary care ophthalmology centres in India, while manual small incision cataract surgery (MSICS) is the surgical technique preferred by most of the ophthalmic surgeons working in smaller centres.[5] Many studies have indicated that the MSICS technique is preferable for smaller centres, especially in developing countries, as the duration of surgery and requirement of equipment tends to be much smaller. The visual outcomes in surgeries using MSICS technique was seen to be comparable with those obtained from phacoemulsification procedures.[6] The MSICS technique is also considered as the cost-effective option among the two procedures. In a study done in Thailand, it was observed that cataract surgeries using MSICS technique were 15% cheaper than those following phacoemulsification, with no significant difference in visual acuity.[7] Other studies have demonstrated the comparable safety profile of the two surgeries. In a study done in Pune, India, it was shown that expected adverse events like posterior capsular rent and corneal oedema were almost equal among people undergoing MSICS and phacoemulsification. The only difference was observed in the extend of post-operative astigmatism with the mode of astigmatism as 0.5 dioptres (D) for the phacoemulsification group and 1.5D for the small-incision group.[8]

This study was aimed at comparing the outcomes of MSICS and phacoemulsification surgeries carried out over a period of three months, in terms of the improvement in visual equity, changes in corneal diameter and also adverse effects.

MATERIALS AND METHODS: The study was conducted at Pushpagiri Institute of Medical Sciences and Research Centre, Tiruvalla, Kerala, India, which is a tertiary care teaching hospital in the central Travancore region of Kerala state. The study was completed over a period of four months from September to December, 2015 and a total of 106 participants were included in the study.

Patients diagnosed to have age related cataract and undergoing surgery in this institution were included in the study. Those undergoing surgery for congenital or paediatric cataract and those with secondary cataracts were excluded from the study. The potential participants were approached a day before surgery and those who gave their consent were included in the study.

The clinic-social correlates of the participants were collected before the surgery, and the visual acuity was tested using a standardised Snellen's chart by trained optometrists. The horizontal and vertical corneal diameters were also measured before the surgery, using a standardized ruler.

The choice of surgical intervention was based on the preference of the operating surgeon, choice of the patient and financial backup of the patient. The investigators did not have a say in choice of procedure and did not do anything to influence the choice of the surgeon or the patient. The intraoperative findings and complications were recorded by the surgeons in their operation notes and were transcribed into the study proforma. The patients were followed up at the end of one week on their review visit to the out-patient department of the hospital. The incidence of late operative complications were inquired, apart from measurement of visual acuity and corneal diameters.

The data was digitalised using a data entry platform created using Epi-Info 7.0, a free software created and marketed by Centres for Disease Control, Atlanta, USA. The data analysis was done using the statistical package of Epi-Info 7.0.

RESULTS: A total of 106 participants were included in the study and all the potential participants approached for the study gave their consent. Fifty (47.2%) of the participants were male and 89(84%) were aged sixty or above. A majority of the participants (55.6%) had immature cataract, while 39.5% had mature cataract and 3.9% had hyper mature cataract. Seventy-six (71.7%) participants underwent manual small incision cataract surgery (MSICS) and 30(28.3%) had a phacoemulsification procedure. Only one person suffered from a surgery-related complication-posterior synechiae with iris bombe and burnt out retinopathy. The presence of comorbidities was also high among the study population, with 40.6% having diabetes, 32.1% having hypertension, 12.2% having coronary artery disease and 11.3% having chronic obstructive pulmonary disease. (table 1).

Characteristic	Number	Percentage
Sex		
Male	50	47.2%
Female	56	52.8%
Age		
Up to 59	17	16.0%
60 and above	89	84.0%
Stage of Disease		
Immature	59	55.6%
Mature	42	39.5%
Hyper mature	5	3.9%

Type of surgery		
Phacoemulsification	30	28.3%
Manual Small Incision Cataract Surgery (MSICS)	76	71.7%
Complications		
Present	1	0.9%
Absent	105	99.1%
Diabetes		
Present	43	40.6%
Absent	63	59.4%
Hypertension		
Present	34	32.1%
Absent	72	67.9%

Table 1: Baseline demographic and clinical characteristics

Among the 30 participants who underwent phacoemulsification procedure, 4 had a pre-op vision of between 6/6 and 6/18, 12 had vision of between 6/24 and 6/60 and 14 had vision worse than 6/60. Among the patients who had pre-op vision between 6/6 and 6/18, 75% had their vision in similar range after the surgery while 25% had their vision reduced to a level between 6/24 and 6/60. Among the participants with vision between 6/24 and 6/60, 91.7% had their vision improving to a level between 6/6 and 6/18, while the rest had their sight remaining in the same level. Among the 14 patients with pre-op vision less than 6/60, 50% improved to a range between 6/6 and 6/18, while 42.9% improved to a level between 6/24 and 6/60. (table 2).

Pre-op vision	Post-op vision	6/6 to 6/18	6/24 to 6/60	Below 6/60
6/6 to 6/18		3(75%)	1(25%)	0
6/24 to 6/60		11(91.7%)	1(8.3%)	0
Below 6/60		7(50.0%)	6(42.9%)	1(7.1%)

Table 2: Improvement in vision following phacoemulsification

Among the 76 participants who underwent manual small incision cataract surgery (MSICS), 4 had a pre-op vision of between 6/6 and 6/18, 19 had vision of between 6/24 and 6/60 and 53 had vision worse than 6/60. Among the patients who had pre-op vision between 6/6 and 6/18, all of them had their vision in similar range after the surgery also. Among the participants with vision between 6/24 and 6/60, 73.7% had their vision improving to a level between 6/6 and 6/18, while the rest had their sight remaining in the same level. Among the patients with pre-op vision less than 6/60, 75.5% improved to a range between 6/6 and 6/18, while 15.1% improved to a level between 6/24 and 6/60. (table 3).

Pre-op vision	Post-op vision	6/6 to 6/18	6/24 to 6/60	Below 6/60
6/6 to 6/18		4(100%)	0	0
6/24 to 6/60		14(73.7%)	5(26.3%)	0
Below 6/60		40(75.5%)	8(15.1%)	5(9.4%)

Table 3: Improvement in vision following Manual Small Incision Cataract Surgery (MSICS)

Characteristic	Phacoemulsification (n=30)	MSCIS (n=76)
Some improvement in Vision-Number (%)	24(80%)	62(81.6%)
Complications-Number (%)	0	1(1.32%)
Mean (SD) Pre-op Corneal Diameter-k1	44.79 mm (1.34)	44.20 mm (1.65)
Mean (SD) Pre-op Corneal Diameter-k2	44.45 mm (1.47)	44.46 mm (1.60)
Mean (SD) Post-op Corneal Diameter-k1	43.91 mm (1.50)	44.16 mm (1.46)
Mean (SD) Post-op Corneal Diameter-k2	44.11 mm (1.81)	44.46 mm (1.81)
Mean (SD) reduction in Corneal Diameter-k1	-0.93 mm (0.64)	-0.76 mm (1.09)
Mean (SD) reduction in Corneal Diameter-k2	0.09 mm (1.36)	-0.36 mm (1.52)

Table 4: Comparison of the outcomes between participants who underwent phacoemulsification and Manual Small Incision Cataract Surgery (MSICS)

Eighty percent of the patients who underwent phacoemulsification had some improvement in vision, while 81.9% of the participants in the MSICS group showed improvement, (p-0.825), only one participant had a complication related to the surgery, and he belonged to the MSICS group. The mean (SD) reduction in K1 corneal diameter during surgery was -0.93 mm (0.64) in phacoemulsification group and -0.76 mm (1.09) in MSICS group. The mean (SD) reduction in K2 corneal diameter during surgery was 0.09 mm (1.36) in phacoemulsification group and -0.36 mm (1.52) in those who underwent MSICS. The changes in K1 (p-0.547) and K2 (p-0.698) corneal diameters during surgery was also not significantly different between the groups. (table 4).

DISCUSSION: The mean age of the participants was above 60 and this trend is seen across studies done in other Indian states. The clinical presentation of the disease and the disabilities associated with it tends to occur in geriatric population.[9] The unique demographic nature of this population and the socioeconomic problems associated with this age-group, makes access to healthcare difficult. This is even more evident in case of health problems like cataract which requires surgical correction and highly trained personnel. With improving awareness and increasing income levels, the patients with cataract presents earlier to the health facilities when compared to the situation a few decades back. Earlier most of the patients used to present

with mature or hyper mature cataracts and surgical correction used to be a more tedious procedure.[10] In our study, a majority (55.6%) of the patients have presented with cataracts at an immature stage and this reflects improved awareness about the disorder among the general population. The preference of surgical technique is also an indicator of the general socioeconomic status of the population. The affluent population using tertiary healthcare facilities tends to prefer phacoemulsification above other procedures, while the patients coming from a relatively poor background prefers MSICS. In our study, 28.3% of the patients preferred phacoemulsification while 71.7% opted for MSICS, the main consideration while choosing between the two procedures was cost of treatment. This is because the centre is located in a semi-urban area and is used by patients from both urban and rural backgrounds. Also, the treatment is subsidised for a large number of patients, and this improves the economic accessibility to patients from a poorer background. The trend is observed internationally also, as most of the cataract surgeries done in developing nations follow MSICS technique while those done in rich nations are more likely to be phacoemulsification.[7] The outcomes of both surgical techniques, in terms of improvement in visual acuity and incidence of complications, was comparable in our study and there was no statistically significant difference between the procedures. The overall improvement in visual acuity was 80% in phacoemulsification group and 81.6% in those who underwent MSICS. This is similar to the statistics observed in other parts of the country and world.[11] Also, our study further strengthens the argument that manual small incision cataract surgery (MSICS) is a technique which is as good as phacoemulsification, in terms of improvement in visual acuity and betterment in quality of life following surgery.[6]

CONCLUSION: It was observed that MSICS and phacoemulsification procedures have similar outcomes when used at a tertiary care teaching hospital in South India. The rate of incidence of complications and the general improvement in quality of life are also comparable between patients who underwent the two procedures. This has to be seen in the light of the fact that phacoemulsification procedure is costlier, requires expensive equipment and also highly trained personnel. A large multi-centric Randomised Control Trial (RCT) is warranted to compare the outcomes of the two surgical procedures and the cost-effectiveness of each, before concrete recommendations are formulated.

ACKNOWLEDGEMENTS: The authors would like to thank the students, faculty, management and patients of Pushpagiri Medical College Hospital, Tiruvalla, for their immense help and support.

REFERENCES:

1. Prajna NV, Venkataswamy G. Cataract blindness--the Indian experience. Bull World Health Organ 2001;79(3):259-60.
2. Raju NS. Anterior chamber intraocular lens implantation. Indian J Ophthalmol 1989;37(2):73-4.
3. VS Murthy G, Jain B, Shamanna B, et al. Improving cataract services in the Indian context. Community Eye Health 2014;27(85):4-5.
4. Aravind S, Haripriya A, Sumara Taranum BS. Cataract surgery and intraocular lens manufacturing in India. Curr Opin Ophthalmol 2008;19(1):60-5.
5. Gogate PM. Small incision cataract surgery: Complications and mini-review. Indian Journal of Ophthalmology 2009;57(1):45-49.
6. Riaz Y, de Silva SR, Evans JR. Manual small incision cataract surgery (MSICS) with posterior chamber intraocular lens versus phacoemulsification with posterior chamber intraocular lens for age-related cataract. Cochrane Database Syst Rev 2013;10;10:CD008813.
7. Jongsareejit A, Wiriyaluppa C, Kongsap P, et al. Cost-effectiveness analysis of manual small incision cataract surgery (MSICS) and phacoemulsification (PE). J Med Assoc Thai 2012;95(2):212-20.
8. 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-week results. Ophthalmology 2005;112(5):869-74.
9. Nirmalan PK, Thulasiraj RD, Maneksha V, et al. A population based eye survey of older adults in Tirunelveli district of south India: blindness, cataract surgery, and visual outcomes. Br J Ophthalmol 2002;86(5):505-12.
10. Murthy G, John N, Shamanna BR, et al. Elimination of avoidable blindness due to cataract: where do we prioritize and how should we monitor this decade? Indian J Ophthalmol 2012;60(5):438-45.
11. Thulasiraj RD, Reddy A, Selvaraj S, et al. The Sivaganga eye survey: II. Outcomes of cataract surgery. Ophthalmic Epidemiol 2002;9(5):313-24.