

Original Article

Comparative study of visual outcome in eyes following phacoemulsification and in eyes following manual small incision cataract surgery

Dr Akshay Bhandari , Dr Dipti Bhandari

Dept. of Ophthalmology, Pravara Institute of Medical Sciences and Rural Medical College, Loni.

Corresponding Author: Dr. Akshay Bhandari, Associate Professor, Dept. of Ophthalmology, Pravara Institute of Medical Sciences and Rural Medical College, Loni 413736. Dist. Ahmednagar, Maharashtra, India.

ABSTRACT:

Background and objectives: Cataract is the leading cause of blindness globally and is particularly common in India. Cataract surgery is most rewarding method of restoring vision for those with vision impairment due to cataract. Objectives of the study were to compare the pattern of astigmatism and visual function-14 score in patients undergoing manual SICS and phacoemulsification, at 6 weeks follow-up.

Materials and Methods: This was a prospective observational study, carried out in 100 patients of cataract undergoing cataract surgery divided into two groups. In each group 50 eyes operated for cataract will be included. Group A -50 eyes undergone phacoemulsification and group B -50 eyes operated by MSICS method. Study duration was of two years .

Results: Group- A of 50 cases had undergone phacoemulsification with a surgically induced astigmatism of 0.64D, and Group- B had undergone small incision cataract surgery with surgically induced astigmatism of 1.12D. Group- A had mean visual function 14 score of 92.9 and Group- B had 83.03.

Conclusion: Unaided visual acuity was better in cases undergone phacoemulsification than SICS, as the induced astigmatism as much less in cases of phacoemulsification.

Keywords: Cataract, phacoemulsification, SICS, astigmatism, visual function 14 score.

INTRODUCTION:

A Cataract, is defined as any opacity in crystalline lens of the eye which impedes the passage of light. It can occur after an injury, inflammation, disease, drugs, or may be age related. Age related cataract is the most common cause of cataracts and blindness in the world.¹ Cataract is the leading cause of treatable blindness worldwide. It accounts for nearly half (47.8%) of all cases of blindness.² According to the World Health Organization, an estimated 20 million people worldwide are blind from bilateral cataracts, and this growing backlog poses one of the greatest public health challenges for the 21st century.³ Initially cataract surgery was aimed to restore vision. Now it has progressed to refractive procedure that aims for post operative emmetropia. It is achieved by reduction in astigmatism, correct IOL power calculation and advances in design and material of newer IOLs. Most commonly performed methods of cataract extraction today are Manual Small Incision Cataract Surgery (MSICS) and Phacoemulsification (Phaco). Kratz is generally credited as the first surgeon to move from the limbus posteriorly to the sclera in order to increase appositional surfaces, thus enhancing wound healing and reducing surgically induced astigmatism.⁴ Phacoemulsification and SICS are effective techniques of

cataract surgery enabling to reduce post surgical astigmatism, reduce the incidence of complications, early mobility, good visual rehabilitation.

MATERIALS AND METHODS:

This prospective observational study was carried out in the Department of Ophthalmology at Tertiary eye hospital in Western Maharashtra to evaluate the visual outcome in patients undergoing cataract surgery by two different methods. Total 100 patients were enrolled in this study after fulfilling the inclusion and exclusion criteria and were divided into two groups according to the surgery they had undergone. Group A-50 eyes undergone phacoemulsification and group B-50 eyes operated by MSICS method. Study protocol was approved by Institutional Review Board. Written informed consent was obtained from all the patients or patient’s relative. Patients with systemic diseases like diabetes (DM), hypertension (HTN), with posterior segment pathology, ARMD, retinal vascular diseases and patients with Glaucoma, history of trauma, uveitis and corneal opacity were excluded from the study. One of the most commonly used vision-related functional questionnaires is the Visual Function 14 (VF-14). The difficulty undertaking each activity is rated on a 5-category Likert scale: (0) Not possible, (1) a lot of difficulty, (2) some difficulty, (3) a little difficulty and (4) no difficulty at all, for all questions except for 13 and 14 which are rated on a 4-category scale (categories: 1 – a lot difficulty, 2 – some difficulty, 3 – a little difficulty, 4- no difficulty at all).

RESULTS:

A total of 100 cases were included in the study. Amongst the 100 cases, 42 were male; out of which 20 had undergone phacoemulsification and 22-SICS. 58 cases were female; out of which 30 had undergone phacoemulsification and 28-SICS.

Table 1: Age distribution of cases

Mean age of the cases undergoing phacoemulsification was 62.34 ± 11.06 years for and 63.02 ± 11.14 years for SICS.

Age group (in years)	Pre-operative visual acuity		
	≤6/60	6/36	6/24
31-35	1 (1%)	0 (0%)	0 (0%)
36-40	1 (1%)	1 (1%)	0 (0%)
41-45	4 (4%)	1 (1%)	0 (0%)
46-50	1 (1%)	3 (3%)	0 (0%)
51-55	9 (9%)	0 (0%)	0 (0%)
56-60	15 (15%)	3 (3%)	2 (2%)
61-65	26 (26%)	4 (4%)	0 (0%)
66-70	15 (15%)	4 (4%)	2 (2%)
71-75	3 (3%)	1 (1%)	1 (1%)
76-80	3 (3%)	0 (0%)	0 (0%)
Total	78	17	5

Table 2: Distribution of cases according to pre-operative visual acuity

Age in years	Cases undergoing phacoemulsification and SICS (n=100)		
	Number of cases undergoing phacoemulsification	Number of cases undergoing SICS	Total
31-35	0	1 (2%)	1 (1%)
36-40	1 (2%)	1 (2%)	2 (2%)
41-45	3 (6%)	2 (4%)	5 (5%)
46-50	3 (6%)	1 (2%)	4 (4%)
51-55	6 (12%)	3 (6%)	9 (9%)
56-60	11 (22%)	9 (18%)	20 (20%)
61-65	15 (30%)	16 (32%)	31 (31%)
66-70	9 (18%)	12 (24%)	21 (21%)
71-75	2 (4%)	2 (4%)	4 (4%)
76-80	0	3 (6%)	3 (3%)
Total	50	50	100

Out of 100 cases, maximum patients that is, 78 cases had visual acuity $\leq 6/60$; out of which, 26 (26%) belonged to the age group of 61-65, 15 (15%) each from group 56-60 and 66-70.

Table 3: Distribution of cases according to post operative visual acuity on 6th post operative week

Visual acuity on 6 th postop week	Cases undergone Phacoemulsification(50)		Cases undergone SICS(50)	
	Unaided	BCVA	Unaided	BCVA
6/18	0	0	0	0
6/12	2 (4%)	2 (4%)	4 (8%)	4 (8%)
6/9	25 (50%)	3 (6%)	29 (58%)	9 (18%)
6/6	23 (46%)	45 (90%)	17 (34%)	37 (74%)

Amongst the 50 cases of phacoemulsification 25 (50%) had unaided visual acuity-6/9, 23 (46%) had 6/6. BCVA in cases of phacoemulsification was 6/6 (90%) in 45 cases. In cases that had undergone SICS had unaided visual acuity-6/9 in 29 (58%) cases and 6/6 in 17 (34%) cases; where 37 (74%) patients had BCVA-6/6, and 9 (18%) had BCVA-6/9.

The average size of incision in cases undergoing cataract extraction by phacoemulsification technique was around 2.8 mm; and that of cases undergoing SICS was 5.5 mm.

Table 4: Distribution of post-operative astigmatism in patients undergoing phacoemulsification and SICS

Post-operative astigmatism	Cases undergone Phacoemulsification	Cases undergone SICS
0-0.5D	15 (30%)	3 (6%)
0.6-1D	34 (68%)	27 (54%)
1.1-1.5D	1 (2%)	15 (30%)
1.6-2D	0	5 (10%)
Total	50	50

Surgically induced astigmatism in both the operating techniques ranged from 0-2 dioptres (D). 34 (68%) patients out of 50 those who underwent phacoemulsification had surgically induced astigmatism in the range 0.6-1D; whereas 15 (30%) cases had in the range of 0-0.5D and only 1 (2%) case had in the range of 1.1-1.5D. Whereas, amongst the 50 cases who had undergone SICS, 27 (54%) cases had surgically induced astigmatism in the range of 0.6-1D, 15 (30%) cases had in the range of 1.1-1.5D, 5 (10%) cases had between 1.6-2D, and only 3 (6%) cases had 0-0.5D. Mean astigmatism following phacoemulsification technique was found to be 0.64D, and that following SICS was 1.12D.

Out of 50 cases undergoing phacoemulsification, maximum cases that is 33 (66%) had visual function score in the range of 85.1-90, 17 (34%) cases had 90.1-95. Out of 50 cases undergoing SICS, maximum cases that are 32 (64%) had score in between 85.1-90, 11 (22%) cases had 90.1-95, 5 (10%) cases had 80.1-85, and 2 (4%) cases had 75.1-80.

Table 5: Comparison of visual function-14 score in both the groups

Visual function 14 (VF-14) score	Cases undergoing phacoemulsification	Cases undergoing SICS
75.1-80	0	2 (4%)
80.1-85	0	5 (10%)
85.1-90	33 (66%)	32 (64%)
90.1-95	17 (34%)	11 (22%)
Total	50	50

Mean visual function 14 score out of 50 cases undergoing phacoemulsification was 92.9 and those undergoing SICS had VF-14 of 88.03.

DISCUSSION:

The two main objectives of modern cataract surgery are to minimize surgically induced astigmatism and to achieve rapid visual rehabilitation. Clear corneal or scleral tunnel incisions of the minimum possible size are the key to achieving these objectives. Today, phacoemulsification has surpassed multiple large incision extra capsular cataract extraction as the method of choice among most surgeons in developed countries. The advantages of phacoemulsification are that it gives excellent postoperative astigmatic control, early visual recovery, and better wound stability, especially in the early postoperative period. Phacoemulsification has become the biggest surgical achievement of the present decade; it is being practiced by the majority of the surgeons in developing countries such as India. This technique has a prolonged and sometimes traumatic learning curve and, secondly, it requires expensive and complex equipment. Manual small incision suture less cataract surgery using various methods is a good and effective alternative in this situation.

In a study of 108 patients done by Sanduk Ruit et al. 54 cases had undergone phacoemulsification and 54 had SICS; the mean age of phacoemulsification cases was 65.8 years and that of SICS cases was 63.8 years.⁵ Mean age of cases undergoing phacoemulsification was 62.34 ± 11.06 years and that of SICS was 63.02 ± 11.14 years. The overall mean age amongst the 100 cases in our study was 62.68 years.

In our study, on last follow-up of 6th week, 23 (46%) cases of phaco had unaided visual acuity of 6/6, whereas only 17 (34%) of SICS had 6/6. BCVA was 6/6 in 45 (90%) cases of phaco and 37 (74%) of SICS. Unaided vision was 6/9 in 25 (50%) cases of phaco and 29(58%) cases of SICS, whereas BCVA 6/9 was amongst 3 (6%) cases of phaco and 9 (18%) of SICS. 2 (4%) cases of phaco had unaided 6/12, and 4 (8%) of SICS had unaided 6/12, whereas 2 (4%) cases of phaco had BCVA 6/12, and 4 (8%) of SICS had BCVA of 6/12. In a study of 108 patients done by Sanduk Ruit et al. eighty-nine percent of the manual SICS group had better than or equal to 6/18 UCVA, compared with 85% of the phacoemulsification group at the six month follow-up visit. Ninety-eight percent of both the manual SICS group and the phacoemulsification group attained BCVA of better than or equal to at the six-month follow-up visit. Gogate et al. found that 68.2% patients in the phacoemulsification group and 61.25% patients in the SICS group had UCVA better than or equal to 6/18 at 1 week. At 6 weeks follow up, 81.08% patients in the phacoemulsification group and 71.1% patients in the SICS group had UCVA of better than or equal to 6/18. They concluded that both phacoemulsification and SICS are safe and effective

for visual rehabilitation of cataract patients, although phacoemulsification gives better UCVA in a larger proportion of patients at 6 weeks.⁶ In a study of 300 cases, done by Husain R, visual outcome of SICS patient was 6/60 or less in 6 cases (4%), 6/18 to 6/60 in 62 cases (41.33%), 6/18 to 6/6 in 82 cases (54.70%) on 1st postoperative day. After 4-11 weeks of operation, Best Corrected Visual Acuity (BCVA) was 6/60 or less in 2 cases (1.70%), 6/18 to 6/60 in 13 cases (8.50%) and 6/18 to 6/6 in 118 cases (89.80%).⁷

The average astigmatism in cases undergoing phacoemulsification was 0.64D and in SICS 1.12D. Study of 130 cases done by Iqbal S et al, postoperative astigmatism in SICS, 10.09% (11 eyes) did not have any astigmatism, 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 and none had astigmatism more than 2D.⁸ George et al in 2005 compared surgically induced astigmatism (SIA) following MSICS and phacoemulsification (PE) in eyes with nuclear sclerosis of grade 3 or less. Mean SIA was 1.17D in the SICS group and 0.77D in the Phacoemulsification group.⁹ Our results are comparable with the results of Iqbal et al and George et al. Thus in this study, we tried to compare functional visual outcome in eyes following phacoemulsification and in eyes following manual small incision cataract surgery.

CONCLUSION:

Unaided visual acuity was better in cases undergone phacoemulsification than SICS, as the induced astigmatism is much less in cases of phacoemulsification.

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