

SURGICAL AND VISUAL OUTCOME OF PHACOEMULSIFICATION SURGERY (ROUTINE) AND MICRO-PHACO (BIMANUAL PHACO): A COMPARATIVE STUDY

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ABSTRACT: Cataract surgery has evolved over the past few decades with progressive decrease in the size of the incision. Originally from 12 mm intracapsular incision to bimanual phacoemulsification (Micro-Phaco) that has incision size of just 700 microns. In the present comparative PROSPECTIVE study best corrected visual acuity postoperatively and surgically induced astigmatism were compared in routine Phacoemulsification technique and bimanual phaco (Micro-Phaco) 60 eyes were studied. There was no statistically significant difference in postoperative best corrected visual acuity (BCVA) of patients operated with Micro-Phaco or routine Phacoemulsification. There was difference in surgically induced astigmatism (SIA); average SIA in microphaco was 0.5972 as against 0.8328 in routine Phacoemulsification.

KEYWORDS: Phacoemulsification, Micro-phaco, Bimanual Phaco, visual outcome, surgical outcome, surgically induced astigmatism, MICS, Rollable IOL, Woodcutter's technique.

INTRODUCTION: Cataract surgery has evolved over the past few decades with progressive decrease in the size of the incision. Originally from 12 mm intracapsular incision to bimanual phacoemulsification (Micro-Phaco) that has incision size of just 700 microns. The idea of phacoemulsification came into the mind of Dr. Kelman after a visit to his dentist when he had his teeth cleaned with an ultrasonic device. He devised the technique using a similar vibrating ultrasonic tip to break up the cataract and then remove it by suction using a small needle. The procedure was introduced in 1967.

MICS – micro incision cataract surgery, popularly known as Micro-Phaco further reduced the incision size offering many advantages. Incision size of only 1.8 to 2.2 mm is required.

In this prospective comparative study of the surgical and visual outcome of 60 matched patients of different grades of senile cataract the main focus was on two parameters – postoperative best corrected visual acuity (BCVA) and surgically induced astigmatism.¹

MATERIALS AND METHODS: The study was performed at Mahatme Eye Bank Eye Hospital, Nagpur, India between July 2006 to April 2007 after approval of ethics committee. 60 cases of various grades of senile cataract were operated by a single surgeon. The patients were equally divided in two groups – A and B. In Group A 30 patients were operated by routine phacoemulsification technique. Group B also consisted 30 patients who underwent Micro phacoemulsification surgery.

PATIENT SELECTION CRITERIA:

1. Cases of cataract with visual acuity ranging from perception of light and maximum visual acuity up to 6/12 were included.
2. Age group 40 to 80 years.

PATIENT EXCLUSION CRITERIA:

1. Congenital, traumatic or complicated cataract.
2. Glaucoma with cataract.
3. Lens induced glaucoma.
4. Corneal decompensation.
5. Active iridocyclitis.
6. High myopia with degenerative changes.
7. Diabetic patients with ophthalmic manifestation.
8. Hypertensive patients with ophthalmic manifestation.
9. Macular pathology.
10. Retinal detachment.

PREOPERATIVE EVALUATION:

1. Blood sugar fasting and postprandial.
2. Blood pressure in sitting and supine position.
3. Intraocular pressure.
4. Lacrimal duct patency.
5. Detailed eye examination including fundus examination under mydriasis.
6. Visual acuity, unaided and corrected with pin hole.
7. Corneal curvature and preoperative astigmatism.
8. IOL power and axial length determination.

POSTOPERATIVE FOLLOW UP:

1. Within 24 – 48 hours.
2. After ten days.
3. At the end of three months.

OPERATIVE PROCEDURE:

1. Routine phacoemulsification performed in 30 cases belonging to group A. The main incision was made using 3.2mm keratome. The incision was such that the inner width of the incision was 2.8mm, outer width about 3.2mm and breadth about 1.5mm. Using a clear corneal incision, site of the incision was chosen at the deeper meridian so as to reduce postoperative astigmatism. Phacoemulsification was performed using Woodcutter's nucleus cracking technique.² No sutures were taken in any of these cases.
2. Microphacoemulsification technique was used for 30 cases of group B. the main difference in routine and micro phaco was the size of incision. Here the main incision was made using 1.6mm MVR blade. After doing phaco, Main incision was extended to 2mm and hydrophilic rollable lens³ was implanted in bag.

ORIGINAL ARTICLE

Calculation of surgically induced astigmatism by law of Cosines $K2^2 = K1^2 + K3^2 - 2K1K3\cos K2$

Law of cosines applied to triangle in which K1, K2, K3 represent the three sides of a triangle. Angles opposite their respective side are represented by K1, K2 and K3.

K1 = preoperative astigmatism.

K2 = surgically induced astigmatism.

K3 = postoperative astigmatism.

OBSERVATIONS: We studied two groups of patients. A series of 60 patients, who willingly underwent phacoemulsification for the treatment of cataract, was divided in group A and B. each group consisted 30 patients. Table 1 shows age distribution.

AGE (YEARS)	GROUP A	PERCENTAGE	GROUP B	PERCENTAGE
41-50	4	13.33	7	23.33
51-60	7	23.33	9	30
61-70	13	43.33	7	23.33
71-80	6	20	7	23.33

Table 1: Age distribution of patients

Maximum patients in both groups belonged to age group 51-70.

Table 2 shows types of cataract.

CATARACT TYPE	GROUP A	PERCENTAGE	GROUP B	PERCENTAGE	TOTAL
NS-I	4	13.33	3	10	7
NS-II	6	20	5	16.66	11
NS-III	4	13.33	5	16.66	9
NS-IV	3	10	4	13.33	7
PSC	8	26.66	5	16.66	13
PPC	1	0.33	3	10	4
MSC	4	13.33	5	16.66	9

Table 2: Distribution of types of cataract in the two groups

Posterior subcapsular cataract was the most common type in the present study. Nuclear sclerosis of grade II was next common type. there were only 4 cases of posterior polar cataract.

Table 3 highlights preoperative uncorrected visual acuity in study groups.

Preoperative UCVA	Group A	Percentage	Group B	Percentage
PL,PR	4	13.33	5	16.66
1/0 to <6/60	3	10	1	3.33
6/60 to < 6/24	4	13.33	8	26.66
6/18 to 6/12	19	63.33	16	53.33

Table 3: Preoperative uncorrected visual acuity in two groups

It varied from perception of light to 6/12.

Table 4 shows postoperative Best Corrected Visual Acuity.

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Visual Acuity	Group A	Percentage	Group B	Percentage
6/60 – 6/36	0	0	0	0
6/24	0	0	0	0
6/18	0	0	0	0
6/12	3	10	2	6.66
6/9	7	23.33	10	33.33
6/6	20	66.66	18	60

Table 4: Postoperative Best Corrected Visual Acuity in two groups

In Group A, 20 patients had visual acuity of 6/6 and in Group B, 18 had visual acuity of 6/6. The lowest visual acuity in both the groups was 6/12.

Table 5 depicts surgically induced astigmatism on vector analysis.

Postoperative SIA	Group A	Percentage	Group B	Percentage
0	0	0	0	0
>0 to 0.5	8	26.66	7	23.33
>0.5 to 1	22	73.33	16	53.33
>1 to 1.5	0	0	4	13.33
>1.5 to 2	0	0	2	6.66
> 2	0	0	1	0.33

Table 5: Surgically induced astigmatism (SIA) on Vector Analysis

There was difference in surgically induced astigmatism (SIA); average SIA in microphaco was 0.5972 as against 0.8328 in routine Phacoemulsification. Vector analysis showed no statistically significant difference between two groups. Statistical analysis by Fisher – two paired test in table no. 6 also showed no statistically significant difference (P=1) in two groups.

Fisher's Exact Test	
P Value	1
P value summary	Not Significant
One or Two sided	Two sided
Statistically significant? (alpha < 0.05)	No

Table 6: Statistical Analysis – Surgically Induced Astigmatism – Fisher test

DISCUSSION: In the present study, the postoperative best corrected visual acuity of patients in our study ranged from 6/12 to 6/6 in both groups. 20 patients (66.66%) had 6/6 and 27 patients had more than or equal to 6/9 (90%) postoperative best corrected visual acuity in Micro-Phaco group B. 18 (60%) patients had 6/6 and 28 (93.33%) had more than or equal to 6/9 postoperative best corrected visual acuity. This compares well with the study carried out by Afsa J Afsar et al 1999.⁴

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They performed phacoemulsification in 86 patients; of which 67 patients completed the study. All of them had visual acuity of 6/9 or better. Col. J K S Parihar et al⁵ carried out prospective study in 80 cases. All the patients were operated by sub-millimeter 'Phaconit'⁶ surgery with implantation of rollable IOL in 40 cases all cases had and Acrylic foldable IOL in remaining 40 cases. They found postoperative best corrected visual acuity of 6/6 in 65 (81.25%) patients by third postoperative day. All cases had surgically induced astigmatism of less than or equal to + or - 0.25D in four to six weeks after rollable IOL and + or - 0.5 D to 0.75 D after acrylic IOL implantation.

Parul Desai et al⁷ in their National Cataract Survey 1997-98, showed that on refraction 92% patients achieved visual acuity of 6/12 or better. Age has a significant role in the improvement of postoperative best corrected visual acuity. We had 7 patients in the age group of 76 to 85 years. Non improvement of visual acuity in this age group could be attributed to posterior segment pathology like gross chorioretinal atrophy and the presence of age related macular changes. Mc Westcot et al in their study has shown the proportion of achieving visual acuity of 6/12 or better decreases with age ($p < 0.001$).

Surgically induced astigmatism (SIA) though differed in two groups, showed no statistically significant difference between two groups. John Merriam C et al⁸ in their study found that there is significant change in corneal curvature when incision is taken on temporal clear cornea.⁹ Kurz S et al¹⁰ found BCVA was 20/20 in microphaco and 20/25 in routine. Median changes in astigmatism were -0.15D in microphaco group and -0.31 D in routine group. Both were not significant statistically.

CONCLUSION: There was no statistically significant difference in postoperative best corrected visual acuity of patients operated by microphaco or routine phacoemulsification. Apparently, there was difference in SIA in both techniques 0.5972 in microphaco as against 0.8328 in routine phaco. However this difference was not significant statistically.

REFERENCES:

1. Duke elders: Practice of refraction 10th Edition 1993: 65.
2. Mahatme V: Step by step Phaco tips and tricks: Jaypee 2005: 83-105.
3. Agarwal A: Agarwal's Phaconit thinoptix Rollable IOL: Delhi Ophthalmological Society Times: Jan 2004: 9: 7.
4. Afsar JA, Patel S., Russel L Woods, Wykes W: A comparison of visual performance between rigid PMMA and a foldable acrylic intraocular lens: Eye 13 (34): 1999: 329-335.
5. Parihar et al: MJAFI2007: 63: 19-22.
6. Agarwal A, Agarwal S. Phaconit with Acri Tec IOL: J Cataract Refract Srg 2003: 29: 854-5.
7. Parul Desai, Minassian DC, Reidy A.: National cataract survey 1997-1998: A report of the results of the clinical outcomes: Br. J. of ophthalmology: 1999: 83: 1336 - 1340.
8. Merriam J C, Lei Zheng Zoanna E, Zaider Bo Lindstorm: The effect of incision for cataract on corneal curvature: Ophthalmology, 2003: Vol 110: issue 9: 1807-1813.
9. Ermis SS, Inan UU, Ozturk F: Surgically induced astigmatism after superotemporal and superonasal clear corneal incision in phacoemulsification: J. Cataract Refractive Surg: June 2004: 30 (6): 1316-1319.
10. Kurz S. Krummenauer F, Gabriel P., Pflaffer N: H.B. Ophthalmology2006: Oct 113(10): 1818-26.

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