

The Study of Efficacy and Safety of Phacoemulsification for Cataract Surgery in Bikaner Population

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ABSTRACT

Introduction: The “right to sight” is the common global agenda launched by the WHO and task force of International NGOs to combat the gigantic problem of blindness and the aim of vision 2020 is to reduce the current expected 78 million blind people to 25 million by the year 2020. There are an estimated 9 to 12 million cases of blindness in India, half of which can be attributed to cataract. In India approximately 5 million cataract surgeries are performed per year. Conventional extra capsular cataract extraction (ECCE), manual small incision cataract surgery and phacoemulsification are the three most popular form of cataract surgery in India and rest of the world.

Materials and Methods: This is a randomized single site study which was done in the Department of Ophthalmology, S.P. Medical College, Bikaner. It comprises 60 patients of senile cataract, aged 40 yrs. or above and both male and female (also cases with controlled DM and HT). The eligible patients were divided into two groups (A and B) randomly. All patients were undergone either on phacoemulsification with PCIOL surgery under local anesthesia (LA) or with another procedure by the faculty.

Results: Observations of the present study are based on a 6 weeks follow up of 30 cases, who had undergone cataract extraction with PCIOL Phacoemulsification.

Conclusion: The phacoemulsification technique gives better uncorrected visual acuity in a slightly larger proportion of patients at 6th weeks.


Keywords: PCIOL, ECCE, Phacoemulsification.

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INTRODUCTION

The “right to sight” is the common global agenda launched by the WHO and task force of International NGOs to combat the gigantic problem of blindness and the aim of vision 2020 is to reduce the current expected 78 million blind people to 25 million by the year 2020.¹

In 2002, WHO estimated that blindness affected 37 million people globally.² If efforts are not increased to treat avoidable blindness worldwide this is projected to increase to 76 million by the year 2020.³ Cataract is the chief cause of avoidable blindness all over the world.⁴ Approximately 18 million people worldwide are blind from bilateral mature cataracts.⁴ There are an estimated 9 to 12 million cases of blindness in India, half of which can be attributed to cataract.⁵ In India approximately 5 million cataract surgery are performed per year.⁶ Conventional extra capsular cataract extraction (ECCE), manual small incision cataract surgery and phacoemulsification are the three most popular form of cataract surgery in India and rest of the world. In phacoemulsification an ultrasound probe emulsifies the cataract lens through a much smaller (approximately 3-4 mm) incision. Both of these procedures

give optimal visual result, less induced astigmatism and there is no suture related complications.

Phacoemulsification is however difficult to employ in high volume in developing countries as the technology requires costly machinery and consumables, a permanent and reliable source of electricity, regular maintenance and specially trained surgeons and support staff. Phacoemulsification can also potentially leads to more serious complications, when used to remove extremely dense cataract commonly encountered in developing countries. Phacoemulsification has a steep learning curve, while MSICS is easier to learn, achieves excellent visual outcomes with low complication rates, significantly faster, less expensive and required less technology.⁷

A randomized controlled trial in India found MSICS to be more effective and economical than conventional ECCE.⁸ A randomized controlled trial in UK found Phacoemulsification surgery to be more effective than ECCE for rehabilitation of patients at a more economical cost.⁹ A randomized controlled trial in India and Nepal comparing phacoemulsification and MSICS found that both

techniques are almost equally effective and safe. Both techniques achieved excellent visual outcomes with low complication rates.¹⁰ Phacoemulsification, however, is difficult to employ in high volume in developing countries as the technology requires costly machinery and consumables, a permanent and reliable source of electricity, regular maintenance, and specially trained surgeons and support staff. Phacoemulsification can also potentially lead to more serious complications when used to remove extremely dense cataracts, commonly encountered in developing countries.¹¹

MATERIALS AND METHODS

This is a randomized single site study which was done in the Department of Ophthalmology, S.P. Medical College, Bikaner. It comprises 60 patients of senile cataract, aged 40 yrs. or above and both male and female (also cases with controlled DM and HT). Informed consent for the surgery & study was taken. The eligible patients were divided into two groups (A and B) randomly. All patients were undergone either on phacoemulsification with PCIOL surgery under local anesthesia (LA) or with another procedure by the faculty.

Group A (n=30) has undergone another procedure and Group B (n=30) has undergone phacoemulsification with foldable PCIOL surgery under LA.

Inclusion Criteria

Senile cataract, Age 40 to 90 years, Controlled DM, Controlled HT

Exclusion Criteria

Patients with fuchs' dystrophy, macular degeneration, glaucoma, uveitis, pseudoexfoliation (PEX), corneal pathology, Diabetic Retinopathy and any other Intra ocular pathology. Traumatic and subluxated cataract Previous intraocular surgery in same eye, Patient who are not suitable for follow-up visits.

Preoperative Examination

Patients were examined thoroughly preoperatively. Diabetic and hypertensive patients were taken for surgery, only after proper control of disease. Patients were examined for visual acuity (VA) both UCVA and BCVA, IOP, slit lamp examination, fundus examination, keratometry (AR) & A-scan. Routine investigations for surgery like BP, FBS, HB, BT, CT, Urine for albumin and sugar were done.

Postoperative Examination

Postoperative Examination was performed at - Day 1, 1st week, 3rd Week & 6th Weeks. It included visual Acuity both distant and near (uncorrected visual acuity) UCVA at 1st week and 3rd Week, (corrected and uncorrected) both UCVA and BCVA at 6th Week, slit lamp examination of anterior segment and fundus examination at every visit, and IOP (shiotz tonometer) at 6th weeks.

TECHNIQUE: Phacoemulsification

- 1) Peirbulbar block given.
 - 2) Painting with povidone - iodine & draping done.
 - 3) Incisions - Size of main incision was 3.2 mm. Incision was clear corneal. A side port stab incision was made 2 to 3, O'Clock to the left of the main incision. Capsulorrhexis by 26 G needle capsulotome was done. Size of capsulorrhexis was about 5.5 mm.
 - 4) Hydrodissection - performed to separate the nucleus and cortex from the capsule.
 - a. A 26 G blunt cannula with fluid is inserted just beneath the edge of rhexis and fluid is injected under the capsule.
 - b. Phaco probe is inserted and the superficial cortex and epinucleus are aspirated.
 - 5) Nucleotomy was done with divide & conquer technique.
 - a. Sculpting was performed with the probe to create a groove.
 - b. Nucleus was rotated & a second groove is made at right angle to the first.
 - c. Probe & chopper are engaged in opposite walls of the groove & the nucleus is cracked by applying force in opposite directions.
 - d. Nucleus is rotated 90° & a crack made in the perpendicular groove.
 - e. Each of four quadrants was emulsified & aspirated in turn.
 - 6) Cortical clean up – Cortical fragments were engaged by vaccum, pulled centrally & aspirated.
 - 7) Insertion of foldable PC IOL.
 - 8) Completion – Viscoelastic was aspirated.
- Incision was sealed with a jet of saline in corneal layers. Sub conjunctival injection of steroid & antibiotic was given.

Table 1: Distribution of cases according to age (N = 60)

Age group (years)	Group A (MSICS)		Group B (PHACO)	
	No. of Cases	%	No. of Cases	%
40 - 50	5	17 %	6	20%
51 - 60	5	17 %	8	27 %
61 - 70	9	30%	15	50%
71 - 80	9	30%	1	3.33%
> 80	2	6.67 %	0	0
Total No. of Cases	30	100%	30	100%
	$\chi^2 = 10.60$		$p = 0.06$	

Table 2: Distribution of cases according to Sex (N = 60)

Group A (MSICS)			Group B (PHACO)		
	No. of Cases	%		No. of Cases	%
Male	12	40%	Male	17	56.67%
Female	18	60%	Female	13	43.33%
Total	30	100%	Total	30	100%
	$\chi^2 = 2.40$			$\chi^2 = 1.06$	
	$p = 0.12$			$p = 0.303$	

Table 3: Grades of pain on follow ups of cases of Study group (Phaco, n = 30)

Post-operative day	Severity of pain								Statistical data
	Nil		Mild		Moderate		Severe		
	No. of cases	%	No. of cases	%	No. of cases	%	No. of cases	%	
1	08	27	20	66.7	02	6.6	0	00	χ^2 25.2 (p=0.0001) χ^2 52.26 (p=0.0001)
1 st week	29	97	01	3.3	0	00	0	00	
3 rd week	30	100	0	00	0	00	0	00	
6 th week	30	100	0	00	0	00	0	00	

Table 4: Grades of Corneal Edema observed by Slit-lamp Biomicroscopy during follow ups of cases of study group (Phaco, n = 30)

Post-operative day	Severity of Corneal Edema								Statistical data
	Nil		Mild		Moderate		severe		
	No. of cases	%	No. of cases	%	No. of cases	%	No. of cases	%	
1	21	70	7	23.3	2	6.6	0	00	$\chi^2=29.1$ (p=0.0001)
1 st week	30	100	0	00	0	00	0	00	
3 rd week	30	100	0	00	0	00	0	00	
6 th week	30	100	0	00	0	00	0	00	

Table 5: Grades of Striate Keratitis based on Slit-lamp Biomicroscopy during follow ups of cases of study group (Phaco, n = 30)

Follow ups of cases of study group (n= 36)									
Post-operative day	Severity of Striate Keratitis								Statistical data
	Nil		Mild		Moderate		Severe		
	No. of cases	%	No. of cases	%	No. of cases	%	No. of cases	%	
1	27	90	02	6.66	01	3.33	0	00	$\chi^2 = 65.1$ (p=0.0001)
1 st week	29	96.7	01	3.33	0	00	0	00	$\chi^2 = 52.26$ (p= 0.0001)
3 rd week	30	100	0	00	0	00	0	00	
6 th week	30	100	0	00	0	00	0	00	

OBSERVATIONS

Observations of the present study are based on a 6 weeks follow up of 30 cases, who had undergone cataract extraction with PCIOL Phacoemulsification. The study was conducted from September 2010 to April 2011 at Dept of Ophthalmology, S.P Medical College, Bikaner.

The table1 shows distribution of cases according to age, ranging from 40 to > 80 years. Most of the cases were within age group of 61 – 80 years in group. There was no statistically significant difference (P value = 0.6) in age distribution of cases of group.

The table 2 and Figure 2 shows distribution of cases according to sex.- male : female ratio is 1: 0.76 in group (PHACO). P value in our group = 0.303 (Non-Significant) means there was no statistically significant difference in sex distribution of cases. The table 3 shows grading of pain during follow ups of cases of group (PHACO, n = 30). On 1st post-operative day no one had severe pain, 73.33 % cases experienced mild to moderate pain, while only 3.33 % cases had no pain. On 7th post-operative day 6.67 % cases had mild pain, while 93.33 % cases were free from any pain. On 14th post-operative day and onwards no one had any pain. P value is 0.0001 & 0.0001 (significant) at post-operative day 1 & 1st week respectively, means there was a statistically significant improvement in pain at 1st week. Severity of pain is significantly less in phaco group at 1st post-operative day.

The table 4 shows grading of Corneal Edema observed by Slit-lamp Biomicroscopy during follow ups of cases of group (PHACO, n = 30). On 1st post-operative day no case had severe corneal edema, 30 % cases had mild to moderate corneal edema, while 70 % cases had no corneal edema. On 7th post-operative day and onwards no one had Corneal edema.

In group A, P value is 0.0045 and in group B, P value is 0.0001 on post-operative day1respectively so severity of corneal edema is statistically significant less at 1st post-operative day in phaco group. The table 5 shows grading of Striate Keratitis observed by Slit-lamp Biomicroscopy during follow ups of cases of group B (PHACO, n = 30) On 1st post-operative day no case had severe Striate Keratitis, 10 % cases had mild to moderate Striate Keratitis, while 90 % cases had no Striate Keratitis.

On 7th post-operative day 3.33 % cases had mild Striate Keratitis while 96.7 % cases were free from Striate Keratitis.

On 3rd post-operative week no one had Striate Keratitis.

In group B, P value is 0.0001 & 0.0001 (significant) post-operative day 1 & at 1st week post operatively, means there was a statistically significant improvement of striate keratitis at 1st week. P value in group A is 0.0001 and 0.0001 at post-operative day 1 and at 1st week respectively which is equal to group B so there is no statistically significant difference in severity and improvement of striate keratitis in both groups.

DISCUSSION

Cataract is the commonest cause of avoidable blindness worldwide, and cataract surgery is the commonest procedure performed in ophthalmology. Cataract surgery is also one of the most cost-effective surgical interventions in terms of the quality of life restored. It is fast, relatively risk free, does not need admission or general anesthesia and yet gives dramatic recovery compared to the preoperative condition.

Techniques of cataract surgery have changed dramatically in the past three decades. Sir Stewart Duke Elder mentioned intracapsular cataract extraction (ICCE) as the surgery of choice in his venerable tome in 1967 and was not impressed by the new technique called phacoemulsification (Phaco).¹² That would be hearsay today. Manual small incision cataract surgery (MSICS) in which the nucleus was prolapsed through a self-sealing scleral tunnel, developed in United States and Israel and later popularized in India. As it was found to be safer, more effective and cheaper than ECCE, it became popular in India and forms the major proportion of the cataract surgeries done in south Asia.¹³ Manual SICS was considered a poor cousin of Phaco till a randomized control trial demonstrated it to be not only economical¹⁴, but almost as effective as phacoemulsification. A version of SICS is being taught and popularized the world over by major international non-governmental developmental organizations. While it may be possible to have small incision 99.9% of the times¹⁵, some cataracts such as grossly subluxated lenses, very hard cataracts, or those with poor endothelial counts are better removed through a larger incision.

CONCLUSION

The phacoemulsification technique gives better uncorrected visual acuity in a slightly larger proportion of patients at 6th weeks. MSICS is safe and nearly as effective as phacoemulsification.

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