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A Clinical Evaluation of Multifocal versus Monofocal Intraocular Lenses after Cataract Extraction in a Tertiary Care Hospital in India

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Abstract:

Background:- *Good unaided distance visual acuity is now a realistic expectation following cataract surgery and intraocular lens implantation. Near vision, however, still requires additional refractive power, usually in the form of reading glasses. Multiple optic (multifocal) IOLs are available which claim to allow good vision at a range of distances. It is unclear whether this benefit outweighs the*

optical compromises inherent in multifocal IOLs. ***Objective:-*** *To assess the effects of multifocal IOL's including effects on visual acuity, subjective visual satisfaction, spectacle dependence, glare and contrast sensitivity compared to standard monofocal lenses in people undergoing cataract surgery.* ***Design:-*** *A prospective double blind study conducted for a period of one year in the Department of Ophthalmology, SMHS Hospital, Srinagar (J&K).* ***Results:-****The studied subjects were equally distributed among male and female groups. Majority (72%) belonged to the age group of 50-65 years. Further it was seen that multifocal group had a good visual outcome as compared to monofocal group in both near and distant vision (p<0.001). Spectacle dependence was more with multifocal than monofocal group respectively (p<0.001).****Conclusion:-*** *Multifocal IOLs are effective at improving near vision relative to monofocal IOLs. Whether that improvement outweighs the adverse effects of multifocal IOLs will vary between patients. Motivation to achieve spectacle independence is likely to be the deciding factor.*

Key words: Intraocular lense, Multifocal, Monofocal.

Introduction

Currently, the goal of cataract surgery is to provide fast and complete visual rehabilitation without surgical complications with minimal postoperative refractive errors. Several materials are used to compensate for the loss of accommodation from implantation of an intraocular lens (IOL), including multifocal IOLs, accommodating IOLs and monovision. Among these approaches, bilateral implantation of multifocal IOLs is the most popular. Multifocal IOLs generate different foci to address the visual limitation at near and intermediate distances that occurs with classic monofocal IOLs. Indeed, multifocal IOLs have been shown to provide good distance and near functional vision without the use of corrective lenses.

Intraocular lenses (IOLs) are the artificial lenses implanted inside the eye after cataract surgery.[1] English

ophthalmologist Sir Harld Ridley is credited with the first successful IOL implantation in 1949.[2] Different types of IOLs[3]

- Monofocal IOL
- Multifocal IOL
- Aspheric IOL
- Anterior chamber IOL
- Scleral fixated IOL

Monofocal IOLs:- Monofocal IOLs are equivalent to multifocal IOLs regarding distant vision but not in case of near vision.[4] Spectacle dependency after implantation of a monofocal IOL is more.[5] Monofocal IOLs provide high quality and strength of image.[6] Contrast sensitivity is within normal limits at all frequencies and illuminations.[7] Glare and halos after implantation of a monofocal IOL are less.[8] Although monofocal IOLs are effective in improving vision after cataract surgery, loss of accommodation is not restored by implantation of monofocal IOLs.

Multifocal Intraocular Lens:- Multifocal IOLs of several different designs have been introduced. They differ from conventional monofocal IOLs by potentially providing both distance and near vision without additional bifocal or reading spectacles.[9] They provide good visual acuity for at least two focal points and also greater depth of vision than monofocal IOLs. However they cannot be expected to match the optical performance of monofocal IOLs in terms of image strength and image quality at a given focus. This is because the percent light intensity illuminating the best focused image will be lower for a multifocal IOL relative to monofocal IOL and the image contrast will thus suffer because of the presence of an unfocused second image. Multifocal IOLs use the principle of either alternating vision or simultaneous vision. In alternating vision, separate segments of the lens are used for distant and near vision and at any given time light is directed to the retina

through one segment only. This principle was used in the early multifocal lenses.

In using the principle of simultaneous vision, at any given time, one image is focused at the retina and the other is highly defocused, depending on the eyes gaze. [9,10] These unwanted, defocused images on the retina have to be learnt to be ignored by the brain, as a result of which it may take longer for the patient to adapt to these lenses.

Multifocal IOLs produce simultaneous images using either diffractive or refractive optics. All diffractive IOLs are bifocals. These IOLs consist of an anterior spherical surface with multiple, concentric microslope rings on the posterior surface. The microslope rings diffract the incoming light creating a diffractive pattern. Distance and near foci are formed by the combination of the anterior refractive surface with the zero and first order of diffraction respectively created by the posterior surface.[11]Hence in each ring both, distance and near correction is achieved. Because the diffractive optical effect is simultaneously located throughout the central and paracentral regions of the lens, hence the relative power distribution tends to be little affected by pupil size. Refractive IOLs achieve more than one plane of focus by alternating zonular rings of different refracting powers.[12] Because of the localized nature of the diopteric power in alternating zones, pupil size can affect the refractive zones available in refractive bifocal IOLs.[13] The amount of light transmitted to the retina for image formation also differ among IOL designs. With diffractive IOLs, approximately 41% of the transmitted light is allocated to the distance focus and 41% to the near focus. The remaining 18% is lost to higher order diffraction. In contrast, refractive IOLs transmit all of the available light to the retina. For bifocal refractive IOLs, the transmitted light is divided between near and distance foci. Multifocal IOLs focus the transmitted light for intermediate vision in addition to near and distance vision.[14,15] The study was therefore done to assess the visual

effects of multifocal intraocular lenses in comparison with monofocal intraocular lenses after cataract extraction.

Methodology

The study was conducted in the Department of Ophthalmology, SMHS Hospital Srinagar on 100 cases, 50 each group in a prospective double blind study. In one year duration, patients were followed up for 1st week, 3rd week, 6th week and 3 months after cataract extraction.

Group 1:-Those who were selected for monofocal intraocular lens implantation.

Group 2:-Those who were selected for multifocal intraocular lens implantation.

Patients included in the study were:

- Grade 1-3 nuclear cataracts (LOCS-III classification systems).
- Patients who were not willing to wear glasses.
- Patients who were not occupational drivers and depend upon good night vision.

Patients excluded from the study were those with:

- Significant corneal opacity.
- Uveitis
- Glaucoma or ocular hypertension
- High myopia
- Any other ocular pathology
- Small pupil
- Aniridia

Patients were admitted in the hospital on day prior to surgery; each group consisted of 50 patients. In all the patients following data were recorded: Age, Sex, Occupation, Eye undergoing operation, Preoperative visual acuity, type of the cataract, pupil size, anterior chamber depth, intraocular pressure, slit lamp examination, retinoscopy, fundus examination, keratometry, A-scan, type of the operation and type of the intraocular lens

implanted. All the patients who were selected for the study were required to have at least 3 months follow up with documentation of uncorrected distant and near vision acuity and best corrected distant and near visual acuity and overall patient satisfaction in terms of performing daily activities, watching television, reading, driving and spectacle independence both for distant and near vision. At each visit patients uncorrected visual acuity (distant and near vision) slit lamp examination regarding corneal edema, SK, KPs, anterior chamber cells or flare, pupillary reaction, IOL centration, posterior capsular opacity and rent, fundus examination, IOP, retinoscopy and best corrected visual acuity for distant and near vision was assessed.

Surgical Technique:- Phacoemulsification was performed under peribulbar anaesthesia. It was carried out through a 3.2mm self-sealing scleral packet or clear corneal incision using a continuous curvilinear capsulorhexis, hydrodissection, phacoemulsification, aspiration of cortex with the help of irrigation and aspiration port with the implantation of a 5.25mm polymethyl methacrylate monofocal or a refractive multifocal intraocular lens. Dexamethasone and Gentamycin were injected into the sub-conjunctival space and a standard regimen of postoperative topical steroid and antibiotic administered. Mydriatic and cycloplegic was given for first postoperative week. Statistical analysis was performed using descriptive statistics, inter-group comparison by means of Chi-square and Mann-whitney U test.

Results

Table 1 shows age and sex distribution of the studied subjects i.e. monofocal and multifocal group. In both the groups, majority of patients were in age group of 50 to 65. Further in monofocal group 21 patients (42%) were males and 29 patients

(58%) were females. Among multifocal group 29 patients (58%) were males and 21 patients (42%) were females.

	Monofocal		**Multifocal**		**Total**	
Age (yr)	N	%	N	%	N	%
35 to 49	13	26.0	15	30.0	28	28.0
50 to 65	37	74.0	35	70.0	72	72.0
Gender						
Male	21	42.0	29	58.0	50	50.0
Female	29	58.0	21	42.0	50	50.0

Table 1 : Age and Sex Distribution of the Studied Subjects

Table 2(a) shows preoperative visual acuity for distance in the studied subjects. Among the monofocal group, 7 patients (14%) had a visual acuity of 6/24, 5 patients (10%) had 6/36, 4 patients (8%) had 6/60, 34 patients (68%) had preoperative visual acuity of >6/60. Among the multifocal group, 14 patients (28%) had 6/60, 36 patients (72%) had a preoperative visual acuity of >6/60.

Pre Op Visual Acuity (Far)	**Monofocal**		**Multifocal**		**Total**		**p value**
	n	**%**	**n**	**%**	**n**	**%**	
6/24	7	14.0	0	0.0	7	7.0	0.252 (NS)
6/36	5	10.0	0	0.0	5	5.0	
6/60	4	8.0	14	28.0	18	18.0	
> 6/60 (Hand movements)	34	68.0	36	72.0	70	70.0	

Table 2(a): Pre Op Visual Acuity (Far) in Studied Subjects

Table 2(b) reveals preoperative visual acuity for near in the studied subjects. Among the monofocal group, 17 patients (34%) had N/8, 22 patients (44%) had N/10, 9 patients (18%) had N/12 and 2 patients (4%) had a preoperative near visual acuity of N/36. Among the multifocal group 23 patients (46%) had N/8, 19 patients (38%) had N/10, 5 patients (10%) had N/12 and 3 patients (6%) had a preoperative near visual acuity of N/36. However there was no statistical significance in both far and near groups (p>0.05).

Pre Op Visual Acuity (Near)	Monofocal		Multifocal		Total		p value
	n	%	n	%	n	%	
N/8	17	34.0	23	46.0	40	40.0	0.241 (NS)
N/10	22	44.0	19	38.0	41	41.0	
N/12	9	18.0	5	10.0	14	14.0	
N/36	2	4.0	3	6.0	5	5.0	

Table 2(b) : Pre Op Visual Acuity (Near) in Studied Subjects

Table 3 depicts the comparison in the uncorrected visual acuity for distance between the monofocal and multifocal group at various periods of follow-up. Patients were followed at 1st week, 3rd week, 6th week and 3 months postoperatively. At 3 months follow up, among the monofocal group, 11 patients (22%) had 6/9, 24 patients (48%) had 6/12 and 15 patients (30%) had 6/24 uncorrected visual acuity for distance at 3 months follow up. Among the multifocal group, 8 patients (16%) had 6/6, 41 patients (82%) had 6/9 and 1 patient (2%) had 6/12 uncorrected visual acuity for distance. Multifocal group had a good visual outcome and the analysis was statistically highly significant ($p<0.001$).

Group	VA	Pre Op		Ist Wk FU		3rd Wk FU		6th Wk FU		3 month FU		Friedman test (Within group)
		n	%	n	%	n	%	n	%	n	%	
Monofocal (n=50)	6/6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	$\chi^2 = 98.9$, p=0.000(Sig)
	6/9	0	0.0	0	0.0	9	18.0	11	22.0	11	22.0	
	6/12	0	0.0	2	4.0	20	40.0	24	48.0	24	48.0	
	6/24	7	14.0	10	20.0	21	42.0	15	30.0	15	30.0	
	6/36	5	10.0	17	34.0	0	0.0	0	0.0	0	0.0	
	6/60	4	8.0	21	42.0	0	0.0	0	0.0	0	0.0	
	> 6/60 (Hand movements)	34	68.0	0	0.0	0	0.0	0	0.0	0	0.0	
Multifocal (n=50)	6/6	0	0.0	0	0.0	3	6.0	8	16.0	8	16.0	$\chi^2 = 92.65$, p=0.000(Sig)
	6/9	0	0.0	17	34.0	25	50.0	41	82.0	41	82.0	
	6/12	0	0.0	15	30.0	12	24.0	1	2.0	1	2.0	
	6/24	0	0.0	7	14.0	10	20.0	0	0.0	0	0.0	
	6/36	0	0.0	6	12.0	0	0.0	0	0.0	0	0.0	
	6/60	14	28.0	5	10.0	0	0.0	0	0.0	0	0.0	
	> 6/60 (Hand movements)	36	72.0	0	0.0	0	0.0	0	0.0	0	0.0	
p value (Between group)		0.290		0.000		0.012		0.000		0.000		

Table 3: Monofocal Lens Visual Acuity (VA) in comparison with Multifocal Lens VA for Distant Vision (Pre and Postoperative).

Table 4 shows comparison in the uncorrected visual acuity for between the monofocal and multifocal groups at 3 months follow up. Among the monofocal group 27 patients (54%) had

N/8 and 23 patients (46%) had N/10 uncorrected visual acuity for near. Among the multifocal group, 47 patients (94%) had an uncorrected visual acuity of N/6, at 3 months follow up postoperatively. The results were statistically significant between the two groups (p<0.001).

Group	VA	Pre Op		Ist Wk FU		3rd Wk FU		6th Wk FU		3 month FU		Friedman test (Within group)
		n	%	n	%	n	%	n	%	n	%	
Monofocal (n=50)	N/6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	χ^2 = 75.8, p=0.000(Sig)
	N/8	17	34.0	21	42.0	27	54.0	27	54.0	27	54.0	
	N/10	22	44.0	21	42.0	23	46.0	23	46.0	23	46.0	
	N/12	9	18.0	8	16.0	0	0.0	0	0.0	0	0.0	
	N/18	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	
	N/36	2	4.0	0	0.0	0	0.0	0	0.0	0	0.0	
Multifocal (n=50)	N/6	0	0.0	0	0.0	30	60.0	47	94.0	47	94.0	χ^2 = 89.4, p=0.000(Sig)
	N/8	23	46.0	35	70.0	17	34.0	0	0.0	0	0.0	
	N/10	19	38.0	12	24.0	0	0.0	0	0.0	0	0.0	
	N/12	5	10.0	0	0.0	0	0.0	3	6.0	3	6.0	
	N/18	0	0.0	3	6.0	3	6.0	0	0.0	0	0.0	
	N/36	3	6.0	0	0.0	0	0.0	0	0.0	0	0.0	
p value		0.111		0.111		0.000		0.000		0.020		

Table 4: Monofocal Lens Visual Acuity (VA) in comparison with Multifocal Lens VA for Near Vision

Table 5 depicts spectacle dependency between monofocal and multifocal groups. Among monofocal group, spherical correction given to 8 patients (16%) ,cylindrical correction to 31 patients (62%) sphere/cylindrical correction to 11 patients (22%). Among multifocal group spectacles were not needed in 8 patients (16%), spherical correction was given to 18 patients (36%) cylindrical correction to 24 patients (48%) sphere/cylindrical correction to 0%. Spectacle independence was more with multifocal than monofocal group and the results were significant between the two groups (p<0.001). Overall patient satisfaction with multifocal IOLs was good with respect to spectacle dependency and performing daily activities.

	Monofocal		Multifocal		p value
	N	%	N	%	
Not needed	0	0.0	8	16.0	0.000 (Sig)
Sphere	8	16.0	18	36.0	
Cylindrical	31	62.0	24	48.0	
Sphere/Cylindrical	11	22.0	0	0.0	

Table 5: Type of Glasses

Discussion

A monofocal lens implant is the most basic type of lens implant used to correct vision after cataract surgery and can provide good vision after cataract surgery but only for distance. It does not correct intermediate or near vision for doing daily activities like, reading, playing cards, watching television without wearing near glasses, which are the usual type of activities in an older age group, which is the group commonly afflicted with cataract . Hence there arises a need to look for a substitute with these attributes. A multifocal lens implant on the other hand provides excellent vision after cataract surgery both for distance and near, with patients typically experiencing a greater overall freedom from spectacles allowing them to participate in most daily activities without dependence on glasses.

Our study was done on 100 patients, 50 each group. In our study, comparison was made between monofocal IOL and multifocal IOL implantation with regard to uncorrected and best corrected visual acuity for distance and near, spectacle dependency and overall subjective patient satisfaction up at 1st week, 3rd week, 6th week and 3 months postoperatively. Better postoperative uncorrected distance visual acuity was experienced by the patients in the multifocal study group. Also multifocal group showed more improvement in the UCVA at each follow up than the monofocal group. Our findings were similar to findings reported by J. Javitt, KP Brauweiler et al (2000)[16] and Martin Leyland (20003)[17]. The difference in the uncorrected visual acuity was due to the fact that there is less induced astigmatism in multifocal group.

When comparing the results between the monofocal and multifocal group for uncorrected visual acuity for near at 3 months follow up, significant outcomes were seen .Here again the multifocal group showed better uncorrected visual acuity

for near with 27 patients (54%) among the monofocal group having UCVA for near of N/8, in comparison to N/6 seen in 47 patients (94%) among the multifocal group. These findings were similar to findings reported by Jacobi, Dietlein et al (2002)[5] and Nijkamp, Dolders et al (2004)[18]. This could be explained by the fact that multifocal IOLs are provided with different zones for distance and near vision, hence near vision is not compromised in these patients, whereas the monofocal implant corrects the patient only for one distance.

Comparison between the monofocal and multifocal group was made for BCVA for distance at 3 months follow up. Among monofocal group, 20 patients (40%) had BCVA of 6/6, 23 patients (46%) had 6/9, 7 patients (14%) had a BCVA of 6/12, whereas among multifocal group, 50 patients (100%) had a BCVA of 6/6. These findings were similar to Walkow et al. (2001)[19], MA Elgohary et al. (2005)[20] and Chiam et al. (2006)[21]. Results were statistically significant. This could be explained by the fact that multifocal IOLs produce less induced astigmatism than monofocal group. Similarly when comparing the BCVA for near between monofocal and multifocal group we can see that among monofocal group 38 patients (76%) had a BCVA for near vision of N/6, 12 patients (24%) had N/8,whereas among the multifocal group, 50 patients (100%) had a BCVA (near vision of N/6). These findings were similar to findings to Alio, Fernando et al. (2004)[22], Pieh S. et al (1997)[23], Nijkamp, Dolders et al. (2004)[24].

Spectacle dependence was more with monofocal than multifocal group. The results were similar to findings with Pieh S. et al (1997)[23], Elgohary et al (2006)[20]. This could be explained by the fact that multifocal IOL produced less induced astigmatism postoperatively. Multifocal IOLs are provided with multiple zones for distance and near vision. So there is no need for reading glasses after multifocal IOL implantation.

Overall patient satisfaction with multifocal IOL was good in respect to spectacle dependency and performing daily

activities.

Summary & Conclusion

- Our study was conducted on 100 patients who underwent cataract extraction at SMHS hospital, Department of Ophthalmology, Government Medical College, Srinagar.
- The patients were divided into two groups of 50 each for the implantation of monofocal and multifocal intraocular lenses.
- Patients underwent phacoemulsification technique of cataract extraction for both groups.
- Preoperative visual acuity for distance and near vision was recorded.
- Patients were followed up postoperatively at 1st week, 3rd week, 6th week and 3 months.
- Patients who receive multifocal IOL show better uncorrected visual acuity (UCVA) for distance than monofocal IOL at each follow up.
- Among 50 patients with multifocal IOL, 47 had an uncorrected near vision of N/6 at 3 months follow up.
- Patients with multifocal IOLs showed more spectacle independence than monofocal IOL.
- Overall subjective patient satisfaction was more with multifocal IOL than monofocal IOL.
- Patients with multifocal IOLs could perform daily activities like reading, watching television playing cards in a better way without near glasses than monofocal IOL.

BIBLIOGRAPHY:

Acutsu, K., Legge et al. 1993. "Multifocal intraocular lenses and glare." *Optom Vis Sci* 70: 487-95. [14]

Alio, Marco et al. 2004. "Near vision restoration with refractive lens exchange and pseudo-accommodating and multifocal refractive and diffractive intraocular lenses." *J Cataract Refract Surg* 30: 2494-2503. [22]

Arens, B., Freudenthaler, N. et al. 1999. "Binocular function after bilateral implantation of monofocal and refractive multifocal intraocular lenses." *J Cataract Refract Surg* 25: 399-404. [15]

Christie, Bruce and Gupta, Amitava.1992. "Multifocal intraocular lenses." *United States Patent* 511: 2351. [4]

Desai, P., Reidy, A., and Minassian, D. 1999. "The National Cataract Surgery Survey 1997/98. A report of the results of the clinical outcome." *Br J Ophthalmol* 83: 1336-1340. [1]

Dolders, Nijkamp et al. 2004. "Cost effectiveness of foldable multifocal intraocular lenses compared to foldable monofocal intraocular lenses." *Br J Ophthalmol* 88(9): 1163-8. [18]

Elgohary, M.A., Beckingsale et al. 2006. "Effects of illumination on visual function after monofocal and multifocal intraocular lens implantation." *Eye* 20: 144-149. [20]

Holladay, J.T., Van Dijk, H. et al. 1990. "Optical performance of multifocal intraocular lenses." *J Cataract Refract Surg* 16: 413-422. [10]

Jacobi, P.C., Dietlein, T.S., Luke, C., and Jacobi, F.K. 2002. "Multifocal IOL implantation in pre-presbyopic patients." *Ophthalmology* 109(4): 680-685. [5]

Javitt, J., Hans Peter, Brauweiler et al. 2000. "Cataract extraction with multifocal intraocular lens implantation." *J Cataract Refract Surg* 26: 1356-1366. [16]

Koch, D.D., Samuelson, S.W. et al. 1991. "Pupillary size and responsiveness, implications for selection of a bifocal intraocular lens." *Ophthalmology* 98: 1030-1035. [13]

Layland, Martin. 2003. "Multifocal vs. monofocal intraocular

lenses in cataract surgery." *Ophthalmology* 110: 1789-98. [17]

Liz, Segre et al. *Intraocular lenses*. New Advances, Vision 2000-2008. [12]

Montes-Mico, R., Espana, E. et al. 2004. "Visual performance with multifocal IOL implantation." *Ophthalmology* 111(1): 85-96. [6]

Nijkamp, M.D., Dolders, M.G., de Brabenda et al. 2004. "Effectiveness of multifocal intraocular lenses." *Ophthalmology* 111(10): 1832-9. [8]

Patrick, Chiam, Chan et al. 2006. "ReSTOR intraocular lens implantation in cataract surgery." *J Cataract Refract Surg* 32: 1459-1463. [21]

Pieh, S., Weghaupt, H., Rainer, G., and Skorpik, C. 1997. "Visual acuity and use of eye glasses after implantation of a diffractive multifocal IOL." *Klin Monatsbl Augenheilk* 210(1): 38-42. [23]

Roger, F., Steinert, M.D., Charles, T. et al. 1992. "A prospective comparison of a zonal progressive multifocal intraocular lens and a monofocal intraocular lens." *Ophthalmology* 99: 853-751. [9]

Sen, H.N., Sarikkola, A.V. et al. 2004. "Quality of vision after AMO array multifocal IOL implantation." *J Cataract Refract Surg.* [7]

Shah, Sushmita and Yogesh Shah. *Implants in ophthalmology*. AIOS, CME Series, No. 15. [3]

Taieb, A. 1955. "Des Memoires di Casanova I. operation di Ridley." *Arch Ophthalmol* 15: 501-503. [2]

Walkow, T., Liekfeld et al. 1997. "A prospective evaluation of a diffractive versus a refractive designed multifocal intraocular lens." *Ophthalmology* 104: 1380-1386. [11]

Walkow, L., Klemen et al. 2001. "Patient satisfaction after implantation of diffractive designed multifocal intraocular lenses." *Ophthalmol* 239(9): 683-7. [19]