

Original Research

Visual outcomes of patients bilaterally implanted with the extended range of vision IOL

¹Sanjeev Kumar Singh, ²R.K. Jaiswal

¹MBBS, MS Ophthalmology, Additional CMO, Amethi, U.P.;

²Professor & Head, Dept. of Ophthalmology, BRD Medical College, Gorakhpur, India

ABSTRACT:

Background: Cataract is a major cause of vision impairment in many low-income settings. It remains uncertain as to whether the high levels observed are explained largely by reduced access to cataract surgery or additionally to potential environmental risk factors more prevalent in low-income settings. The present study was conducted to assess visual outcomes of patients bilaterally implanted with the extended range of vision TecnisSymfony IOL (EROV IOL). **Materials & Methods:** 60 patients undergoing cataract surgery under topical anesthesia using either standard phacoemulsification or femtosecond laser-assisted cataract surgery using the Catalys Precision Laser System. The uncorrected and corrected visual acuity for distance, intermediate, and near vision was recorded at 6 weeks and 6 months' postoperative visit. **Results:** Out of 60 patients, males were 35 and females were 25. The mean UDVA was 0.87, CDVA was 0.96, UIVA was 0.99 and UNVA was 0.98. Preoperative mean spherical equivalent was -0.23 and post-operative mean spherical equivalent was -0.38. The mean ETDRS contrast sensitivity at 6 weeks post-operative period at light on, high contrast was 0.028, at light off, high contrast was 0.032, at light on, low contrast was 0.068 and at light off, low contrast was 0.94. **Conclusion:** Both extended range of focus and achromatic design resulted superior outcomes in comparison to diffractive multifocal IOLs.

Key words: Cataract, achromatic design, Visual outcomes.

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Corresponding author: Dr. R.K. Jaiswal, Professor & Head, Dept. of Ophthalmology, BRD Medical College, Gorakhpur, India

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INTRODUCTION

Cataract surgery is fast evolving into a refractive procedure with increased patient expectations for unaided distance and near vision alike.¹ Cataract is a major cause of vision impairment in many low-income settings.² It remains uncertain as to whether the high levels observed are explained largely by reduced access to cataract surgery or additionally to potential environmental risk factors more prevalent in low-income settings, such as poor diets, occupational sunlight exposure, and use of biomass fuels.³ Genetic factors may also be relevant, especially if cataract prevalence varies between low-income populations. Variations in the prevalence of different types of cataract may also suggest possible etiologic or genetic factors. The evidence to date using comparable methods of cataract measurement that include untreated opacities and

aphakia/pseudophakia generally supports a higher prevalence of cataract in various Asian populations compared with Western populations.⁴ Multifocal intraocular lenses (IOLs) afford postoperative spectacle independence by providing good visual acuity for both distance and near vision. Traditional diffractive multifocal IOLs provide two distinct foci; one for distance and the other for near.⁵ They work on the principle of simultaneous vision which means at any point of time, one sharp image and another blurred image is projected onto the retina. Although one is able to suppress the blurred image and view the other image clearly in most situations, the out of focus image can produce dysphotopsia in dim illumination.⁶ The present study was conducted to assess visual outcomes of patients bilaterally implanted with the extended range of vision TecnisSymfony IOL (EROV IOL).

MATERIALS & METHODS

The present study comprised of 60 patients undergoing cataract surgery of both genders. All were enrolled after they provided their written consent. Demographic profile such as name, age, gender etc. was recorded. All surgeries were performed by the same experience surgeon under topical anesthesia using either standard phacoemulsification or femtosecond laser-assisted cataract surgery using the

Catalys Precision Laser System. The uncorrected and corrected visual acuity for distance, intermediate, and near vision was recorded at 6 weeks and 6 months' postoperative visit. A subjective questionnaire was administered to assess spectacle independence, photic phenomenon, and overall satisfaction. Results of the study was recorded and subjected to statistical analysis using chi-square test. P value less than 0.05 was regarded significant.

RESULTS

Table I Distribution of patients

Total- 60		
Gender	Male	Female
Number	35	25

Table I shows that out of 60 patients, males were 35 and females were 25.

Table II Assessment of parameters

Parameters	Mean
UDVA	0.87
CDVA	0.96
UIVA	0.99
UNVA	0.98
Preoperative mean spherical equivalent	-0.23
Post-operative mean spherical equivalent	-0.38

Table II, graph I shows that mean UDVA was 0.87, CDVA was 0.96, UIVA was 0.99 and UNVA was 0.98. Preoperative mean spherical equivalent was -0.23 and post-operative mean spherical equivalent was -0.38.

Graph I Assessment of parameters

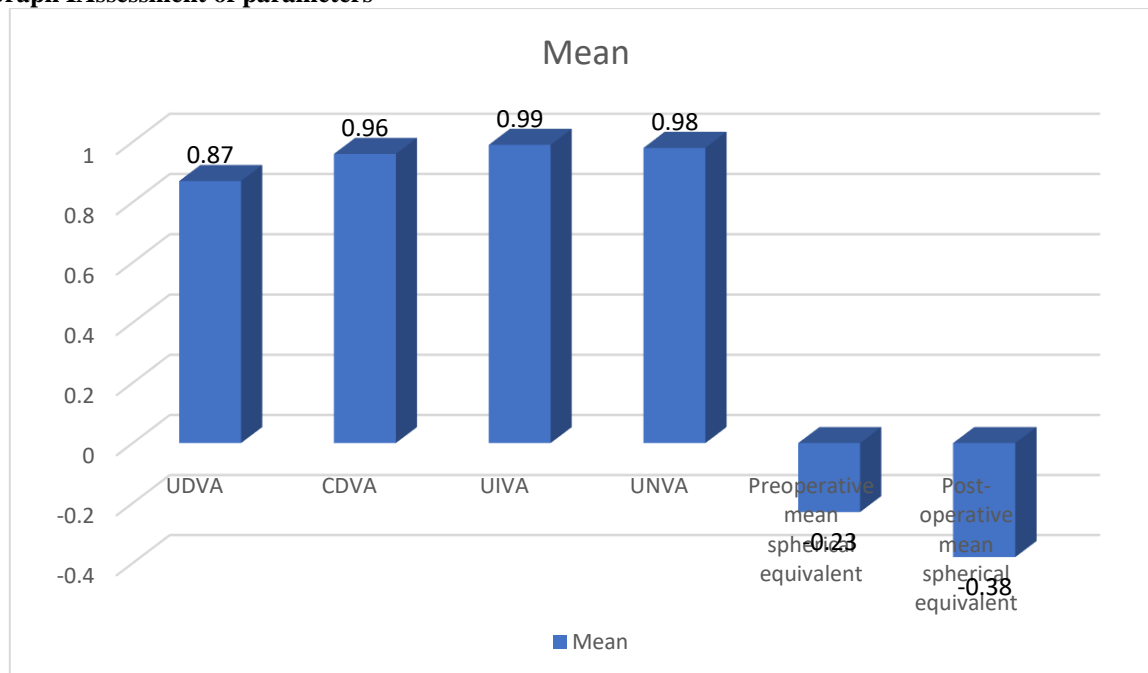
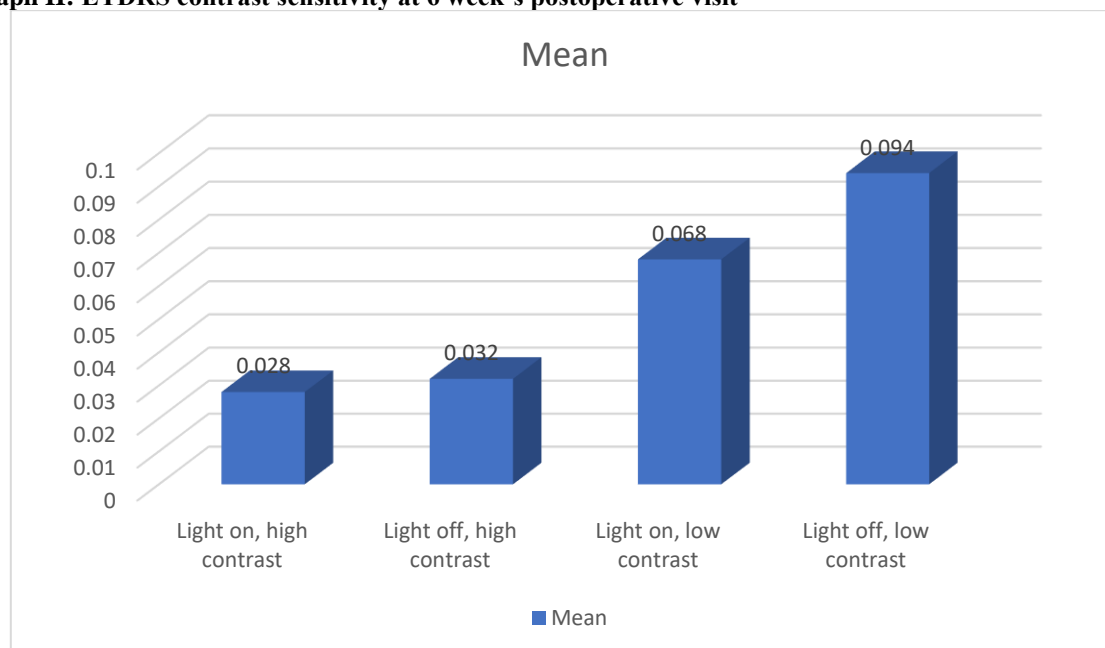


Table III ETDRS contrast sensitivity at 6 week's postoperative visit

Parameters	Mean
Light on, high contrast	0.028
Light off, high contrast	0.032
Light on, low contrast	0.068
Light off, low contrast	0.94

Table III, graph II shows that mean ETDRS contrast sensitivity at 6 weeks post-operative period at light on, high contrast was 0.028, at light off, high contrast was 0.032, at light on, low contrast was 0.068 and at light off, low contrast was 0.94.

Graph II: ETDRS contrast sensitivity at 6 week's postoperative visit

DISCUSSION

Quality cataract surgeries affect patient's visual outcome and thus are found to affect the quality of their lives. The qualities of cataract surgeries are achieved at any size and type of setups. In India the coverage and outcome of cataract management are through camps and hospital.⁷The cataract surgical outcomes have inbuilt dependency on standardize cataract surgical protocols, surgical skills and post-operative follow-up care. Routinely monitoring of the outcomes of cataract surgery can serve in interpretations of communities' expectations.⁸A new concept of extended range of vision IOLs (EROV IOLs) has been designed to overcome limitations associated with traditional IOLs correcting presbyopia. This technology uses an elongated continuous range of focus and proprietary achromatic diffractive echelette design with an aim to provide superior visual results.⁹The present study was conducted to assess visual outcomes of patients bilaterally implanted with the extended range of vision TecnisSymfonyIOL(EROV IOL).

In present study, out of 60 patients, males were 35 and females were 25. We observed that mean UDVA was 0.87, CDVA was 0.96, UIVA was 0.99 and UNVA was 0.98. Preoperative mean spherical equivalent was -

0.23 and post-operative mean spherical equivalent was -0.38. Sachdev et al¹⁰ analyzed the objective and subjective visual outcomes of patients bilaterally implanted with the extended range of vision intraocular lens (EROV IOL), the TecnisSymfony. Study included fifty patients with bilateral implantation of EROV IOLs. The mean age was 59.84 ± 11.68 years. The mean uncorrected binocular distance, intermediate, and near visual acuity (in standard decimal equivalent) was 0.89, 0.99 and 0.99 respectively, at 6 months' postoperative visit. Ninety-six percent of the patients did not require spectacles for distance and 98% of the patients were free from spectacles for intermediate and near vision. 94% of our patients perceived no or minimal photic phenomena such as glare and halos. The mean subjective patient satisfaction score (out of 10) for distance, intermediate, and near was 9, 10, and 9, respectively.

We observed that mean ETDRS contrast sensitivity at 6 weeks post-operative period at light on, high contrast was 0.028, at light off, high contrast was 0.032, at light on, low contrast was 0.068 and at light off, low contrast was 0.94. Chang et al¹¹ demonstrated a mean UDVA, UIVA, and UNVA of Log MAR 0.10, 0.43, and 0.18, respectively, using a diffractive multifocal

IOL. Pedrotti et al¹² included patients who had bilateral cataract surgery with the implantation of 1 of 4 IOLs as follows: Tecnis 1-piece monofocal (monofocal IOL), TecnisSymfony extended range of vision (extended-range-of-vision IOL), Restor +2.5 diopter (D) (+2.5 D multifocal IOL), and Restor +3.0 D (+3.0 D multifocal IOL). Visual acuity, refractive outcome, defocus curve, objective optical quality, contrast sensitivity, spectacle independence, and glare perception were evaluated 6 months after surgery. The study comprised 185 patients. The extended-range-of-vision IOL (55 patients) showed better distance visual outcomes than the monofocal IOL (30 patients) and high-addition apodized diffractive-refractive multifocal IOLs ($P \leq .002$). The +3.0 D multifocal IOL (50 patients) showed the best near visual outcomes ($P < .001$). The +2.5 D multifocal IOL (50 patients) and extended-range-of-vision IOL provided significantly better intermediate visual outcomes than the other 2 IOLs, with significantly better vision for a defocus level of -1.5 D ($P < .001$). Better spectacle independence was shown for the +2.5 D multifocal IOL and extended-range-of-vision IOL ($P < .001$). The newest advent in IOL development are EDOF, also referred to as extended range of vision (ERV), IOLs which have the ability to create a continuum of foci through the implementation of spherical aberration and the presence of optically active transitional zones. Consequently, an extended area of focus is created, enhancing the quality of intermediate vision. The TecnisSymfony was the first EDOF-labeled IOL approved by the U.S. Food and Drug Administration in 2016. EDOF lenses exhibit similar results in terms of distance vision when compared to trifocal or bifocal IOLs. More specifically, Cochener et al¹² reported no statistically significant difference between the EDOF lens TecnisSymfony and the trifocal lenses AcrySof IQ PanOptix (Alcon Laboratories, Inc., Fort Worth, TX, USA) and FineVision Micro F (PhysIOL SA, Liege, Belgium) in either monocular ($P=0.717$) or binocular ($P=0.837$) uncorrected distance vision.

CONCLUSION

Authors found that both extended range of focus and achromatic design resulted superior outcomes in comparison to diffractive multifocal IOLs.

REFERENCES

1. Kasaby H. Clinical outcomes with a new trifocal intraocular lens. *Eur J Ophthalmol* 2014;24:501-8.
2. Mojzis P, Peña-García P, Liehneova I, Ziak P, Alió JL. Outcomes of a new diffractive trifocal intraocular lens. *J Cataract Refract Surg* 2014;40:60-9.
3. Mojzis P, Kukuckova L, Majerova K, Liehneova K, Piñero DP. Comparative analysis of the visual performance after cataract surgery with implantation of a bifocal or trifocal diffractive IOL. *J Refract Surg* 2014;30:666-72.
4. Schmickler S, Bautista CP, Goes F, Shah S, Wolffsohn JS. Clinical evaluation of a multifocal aspheric diffractive intraocular lens. *Br J Ophthalmol* 2013;97:1560-4.
5. Alió JL, Montalbán R, Peña-García P, Soria FA, Vega-Estrada A. Visual outcomes of a trifocal aspheric diffractive intraocular lens with microincision cataract surgery. *J Refract Surg* 2013;29:756-61.
6. Sheppard AL, Shah S, Bhatt U, Bhogal G, Wolffsohn JS. Visual outcomes and subjective experience after bilateral implantation of a new diffractive trifocal intraocular lens. *J Cataract Refract Surg* 2013;39:343-9.
7. Vryghem JC, Heireman S. Visual performance after the implantation of a new trifocal intraocular lens. *Clin Ophthalmol* 2013;7:1957-65.
8. Ramón ML, Piñero DP, Pérez-Cambrodí RJ. Correlation of visual performance with quality of life and intraocular aberrometric profile in patients implanted with rotationally asymmetric multifocal IOLs. *J Refract Surg* 2012;28:93-9.
9. Alió JL, Plaza-Puche AB, Piñero DP, Amparo F, Jiménez R, Rodríguez-Prats JL, et al. Optical analysis, reading performance, and quality-of-life evaluation after implantation of a diffractive multifocal intraocular lens. *J Cataract Refract Surg* 2011;37:27-37.
10. Sachdev GS, Ramamurthy S, Sharma U, Dandapani R. Visual outcomes of patients bilaterally implanted with the extended range of vision intraocular lens: A prospective study. *Indian J Ophthalmol* 2018;66:407-10.
11. Chang JS, Ng JC, Lau SY. Visual outcomes and patient satisfaction after presbyopic lens exchange with a diffractive multifocal intraocular lens. *J Refract Surg* 2012;28:468-74.
12. Pedrotti E, Carones F, Aiello F, Mastropasqua R, Bruni E, Bonacci E, Talli P, Nucci C, Mariotti C, Marchini G. Comparative analysis of visual outcomes with 4 intraocular lenses: monofocal, multifocal, and extended range of vision. *Journal of Cataract & Refractive Surgery*. 2018 Feb 1;44(2):156-67.
13. Cochener B, Boutillier G, Lamard M, et al. A Comparative Evaluation of a New Generation of Diffractive Trifocal and Extended Depth of Focus Intraocular Lenses. *J Refract Surg* 2018;34:507-14.