

CLINICAL EVALUATION OF OPTIVIS MULTIFOCAL PROGRESSIVE DIFFRACTIVE IOL IN TERMS OF VISUAL OUTCOMES IN POST- PHACOEMULSIFICATION PATIENTS

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Abstract

Objectives:

To assess the clinical outcomes of OptiVis IOL and visual acuity at distance, intermediate, and near points, also the spectacle independence and satisfaction of patients in Pakistan.

Study Design:

Clinical descriptive case series.

Place and Duration:

The Ophthalmology Department of WAPDA Hospital, 05-03-2025 to 04-07-2025.

Methodology:

Sixty eyes of 45 patients who were affected with a senile cataract were scheduled for phacoemulsification combined with in-the-bag IOL implantation. The inclusion criteria were a corneal astigmatism of < 1.0 D and normal macular profiles. Visual acuity was measured at the 1 month and 3rd month, using Snellen and N-notation charts, converted to logMAR. At 3 months, subjective visual quality was assessed with the Quality of Vision Questionnaire. Data collected and analyzed in SPSS version 24.

Results:

The patients' ages ranged from 35 to 75 years. 58% of the patients were older than 60 year. There were gender differences: 40% males and 60% females. Mean UCVA remained stable at 1 and 3 months (0.18 ± 0.12 and 0.18 ± 0.09 logMAR, respectively). At 1 month, the BCVA was 0.13 ± 0.10 logMAR and at 3 months it was 0.08 ± 0.05 logMAR (20/20), with 92% of patients detecting BCVA of 0.2 logMAR (20/20) or better. Intermediate vision (DCIVA at 80 cm) was improved in this study from 63% to 81% (≈ 0.4 logMAR) at 3 month. 75% patients were N.6 (DCNVA at 40 cm) at 1 months and 90% at 3 months (≈ 0.3 logMAR). 84% of patients achieving spectacle independence, and bothersome halos reduced from 18 percent after 1 month to < 4 percent after 3

months. An increase in visual acuity was seen in all time points and was statistically significant ($p < 0.05$). No significant differences were observed between subgroups ($p > 0.05$), and 92% of patients were complication-free, indicating excellent safety and efficacy of the IOL.

Conclusion:

This study showed that OptiVis IOL provides marked improvement in best-corrected visual acuity (BCVA), Distant-corrected intermediate visual acuity (DCIVA), and distant-corrected near visual acuity (DCNVA) $p < 0.05$. The outcomes were similar, with no difference in age, gender, or eye side, showing safe and effective rehabilitation

INTRODUCTION:

Distributed worldwide, cataracts are still the leading cause of reversible blindness and are primarily associated with age related changes in the lens.¹ Over the past 20 years, cataract surgery has completely changed from restorative surgery to an incredibly precise refractive surgery. The current goal is not just the restoration of sight but independence from spectacles for a wide range of functional visual tasks.²

For many years, monofocal intraocular lenses (IOLs) were seen as the gold standard for being effective and reliable in the restoration of clear uncorrected distance vision; however, it has been observed that cases receiving monofocal IOLs generally require reading glasses to perform near tasks, due to the lack of accommodation in these IOLs.³ A solution has been proposed with 'monovision' – correction for distance vision in one eye and near correction in the other. This approach not only minimises the need for spectacles, but it also typically involves a decrease in stereopsis and binocular contrast sensitivity (BCS), and some patients may have a hard time adapting to the brain for suppression of blur between the two eyes.⁴

To overcome these limitations, innovative premium IOL technologies have been developed, including multifocal and extended depth of focus (EDoF) IOLs. Older multifocals, however, had various side effects (such as glare, halos, starbursts, and decreased contrast sensitivity).^{6,5} These phenomena are primarily connected to the loss of light energy and blurriness of the retinal image encountered after the surgery, and are still

among the top causes of post-implantation patient dissatisfaction.⁷

Optivis™ Multifocal Progressive Diffractive Lens (MpDL) is a new generation of ophthalmic hydrophilic acrylic multifocal IOL for the reduction of earlier generation multifocal lens glare and distortions. It is designed on a distance-dominant platform with five special diffractive zones for increased intermediate and near vision benefit and maintains the same contrast level typically seen with monofocal designs,¹⁰ while its helical haptic design helps ensure long-term stability in the capsular bag, a critical aspect of any diffractive optic.⁸

These higher levels of IOL technology are widely used all over the globe, but there is yet little clinical data to study the Optivis™ MpDL in Pakistani patients. There are lifestyle and ocular biometry differences that may exist between Western populations and local populations; therefore, local data would be required to understand the efficacy and patient satisfaction in this population.¹⁰

Materials and Methods:

The study was conducted as a prospective, clinical descriptive case series at the Department of Ophthalmology, WAPDA Hospital, Lahore, during the time period of 5th March 2025 to 4th July 2025. Before giving written informed consent, all participants were extensively counseled about the characteristics of the multifocal optics, the expected photic phenomena, and the surgical procedure. The study was conducted using non-probability

convenience sampling wherein 60 eyes of 45 patients were included. A previous trial with the multifocal IOL had demonstrated 95% confidence intervals with a 5% margin of error; the sample size was validated using the WHO online calculator under these assumptions: absolute precision (d) = 0.01 (validated by a previous trial using the multifocal IOL), 95% confidence interval, and 5% margin of error.

The study included patients aged 35 to 75 years who had a senile cataract that affected their daily activities. Patients should have corneal astigmatism not to exceed 1.0 D, clear ocular media other than the cataract, and normal macular functions. Patients having cataract secondary to ocular trauma, chronic anterior uveitis, glaucoma with intraocular pressure (IOP) >22 mmHg, or retinal changes including age-related macular degeneration (AMD) and diabetic retinopathy (DR) were excluded from the analyses. To ensure a stable intraocular lens position, patients with intraoperative complications - namely posterior capsular rupture or zonular instability were also excluded.

To reduce variability, all surgeries were carried out by a single experienced surgeon using the same technique. The 2.8 mm incision was made through the temporal clear cornea, which was followed by continuous curvilinear capsulorhexis. Nucleus removal was performed by phacoemulsification, and thorough aspiration of the cortex was performed. A specially designed injector was then used to implant the intraocular lens into the capsular bag directly.

All patients received similar postoperative treatment. Four times daily topical antibiotic-steroid combination (Moxifloxacin

0.5% and Dexamethasone 0.1%) was prescribed and gradually phased out over a course of four weeks. Follow up visits were performed at 1 and 3 months.

The data were analyzed using SPSS software version 24. These were measured, and the results were calculated as descriptive statistics (mean $\pm$ standard deviation) for age, best corrected visual acuity (BCVA), and uncorrected visual acuity (UCVA). Visual acuity was tested using Snellen charts and N-notation charts, which were both converted to logMAR for statistical analysis. Repeated measures ANOVA was used to determine the difference in visual acuity between follow up intervals, with a statistically significant value being $P < 0.05$. Data were also stratified by age and sex. The independent t-test was used to make comparisons in the groups, and a value of $p \leq 0.05$ was regarded as statistically significant. The frequencies of postoperative complications, such as corneal edema and posterior capsular opacification, were reported. At the 3-month follow-up, subjective visual quality was assessed by administration of the Quality of Vision (QoV) questionnaire, which included photic phenomena, including the subjective perception of glare, halos, and starbursts.

Results:

In this clinical study, female predominance was observed with 40% male and 60% female. The study population's mean age was 60.23 ± 7.3 years (range: 35–75 years). Preoperative logMAR was 0.60 ± 0.22 , IOL power was 20.5 ± 1.44 , and laterality was balanced: 48.1% left and 51.9% right eyes. Shown in Table 1.

Table 1	
Demographic Characteristics of Patients Included in the Study	
Age (years)	60.23 ± 7.3 years
➤ Up to 60	42%
➤ More than 60	58%
Eye Side	
➤ Right	51.9%
➤ Left	48.1%

Gender	
➤ Female	60%
➤ Male	40%
Pre Operative BCVA	0.60 ± 0.22 logMAR
IOL power	+ 20.5 ± 1.44 D
Axial length	23.33 ± 0.60 mm

Visual outcomes in all ranges of vision had a progressive and consistent improvement, as illustrated in Table 2. Distant vision was progressively improved: mean results of UCVA were 0.18 ± 0.12 (LogMAR, 1-month), 0.18 ± 0.09 (LogMAR, 3-months). Similarly, best corrected visual acuity (BCVA) improved from 0.13 ± 0.10 logMAR at 1 month to 0.08 ± 0.05 logMAR at 3 months. Follow up at the end of the study, 89% of the patients attained 0.2 logMAR (20/20) or better. Vision at follow up intervals was assessed using repeated measures ANOVA with statistical significance at $p < 0.05$. This forward shift not only indicates the stability of the eye's optics but also the adaptation of the nerves, playing a key role in achieving better and more consistent visual acuity.

Early functional recovery occurred at an intermediate distance (80cm). 63% of patients could read N8 at 1 month, 81% could read it at 3 months (≈0.4 logMAR). This is evidence of

immediate adaptation to intermediate tasks (computer and routine tasks) over time.

Distance corrected near vision (DCNVA) at 40cm was effective from the outset. At 1 month, 75% of patients had N6 or better, rising to 90% by the 3-month follow-up (≈0.3 logMAR). These findings are based on real independence for activities involving fine print, such as reading newspapers or text messages on a mobile phone. Continued growth in near vision is a testament to how well the lens performs the basic function of everyday tasks. Because of their stratification by age, sex, and laterality, all variables did not show significant differences between age, sex, and laterality at any follow-up interval ($p > 0.05$). This means the visual outcomes were the same across different patient demographics and eye sides. The general visual recovery with the OptiVis™ IOL was found to be smooth, ending with good vision at distance, intermediate, and near at 3 months with high spectacle independence and high levels of patient satisfaction.

Table. 2

Variable	1 Month (logMAR)	3 Months (logMAR)
BUCVA	0.18 ± 0.12	0.18 ± 0.09
BCVA	0.13 ± 0.10	0.08 ± 0.05
DCIVA	63% N.8	81% N.8
DCNVA	75% N.6	90% N.6

Celebratory patient-reported outcomes were excellent and stable at 3-month follow up. The incidence of bothersome glare and reduction of

secondary rings decreased significantly from 18% at 1 month to less than 4% at 3 months, indicating good adaptability. There was a

progressive increase with time in the incidence of posterior capsular opacity—5% at 1 month, 7% at 3 months, of which 5% needed capsulotomy with the YAG laser. No lens deposits, no lens discoloration, or decentration of IOLs were found in all of them. Independence for spectacles was very high, with 84% of patients commenting

that they “never” need spectacles for near work or other tasks they would face in their day-to-day routine. These objectives were reflected in satisfaction – 81% of patients said they felt “completely satisfied with their vision all the time” by 3 months.

Table 1	
Complications at the 3rd month	
• Posterior Capsular Opacification (PCO)	7%
• Dysphotopsia (glare, halos)	4%
• Dry Eye Symptoms	2%
• No Complication	92%

Discussion:

The findings of our study showed that OptiVis™ IOL offers excellent uncorrected vision across distance, intermediate, and near range vision, has high spectacle independence, and has a low prevalence of dysphotopsias. These findings are in line with previous studies, with Piovella and Bosc reporting that more than 90% of patients flew with UDVA of +20/25 or so, and that almost 88% were able to achieve spectacle independence.¹¹ Also, Cochener and colleagues' study points to the reliability of diffractive multifocal IOL, but reports an acquired decrease in contrast sensitivity.¹²

The intermediate vision results were very promising, satisfying the needs of today's computer and mobile device users, limited in older bifocal designs.¹³ There was also clear evidence for near vision, as did the Cochrane 2024 meta-analysis, which showed that multifocal lenses and EDOF lenses had comparable near and intermediate vision outcomes, but that there was an overall decrease in the need for reading glasses with multifocal lenses.^{14,15} Notably, only 16% of individuals reported having glare and/or halos, and these occurrences were not severe, suggesting that neuroadaptation is a key contributor to reducing dysphotopsia.¹⁶

When compared with Alió et al., who reported 66% of eyes achieved UDVA ≤ 0.10 logMAR, with peak distance vision at 0.02 ± 0.07 logMAR (0.0 D), and only mild decline at intermediate (0.11 ± 0.08 logMAR, -1.5 D) and near (0.12 ± 0.12 logMAR, -2.5 D). There was no change in contrast sensitivity ($p \geq 0.06$). Subjective halos and glare were minimal, non-objectionable, and non-interfering with daily activities; scores on NAVQ demonstrated high satisfaction with near vision tasks. Our study resulted in equally good distance and near visual acuity. The results indicate that the OptiVis™ design, which is based on the five focal progressive diffractive rings, may provide a more well-rounded optical profile than preexisting multifocal designs.¹⁷

In conclusion, OptiVis™ exhibited results similar or superior to those of other multifocal IOLs studied, solidifying its place as a reliable choice in modern cataract surgery. It provides a clear picture at all focusing distances, without causing many problems for the patient, and contributes to the quality of their life.

Limitations and Future Directions:

There are some limitations to this study. The number of subjects was small compared with large meta-analysis studies^{6,15}, and the follow-up

period was relatively short (threemonths), as long-term studies have demonstrated that neuroadaptation and up to 30% of comorbidities can change visual performance and patient satisfaction in years¹⁶. Further, contrast sensitivity testing and standardized patient-reported outcome measures were not included; are important to add to assess overall visual quality^{7,12}.

Further studies should include larger, multicentre trials with extended follow up, direct comparisons with other multifocals and EDOF designs^{13,17}. These studies will help prove the durability of the new roofs.

Authors Contribution:

Author1

Substantial contributions to study design, acquisition of data Analysis & Interpretation of Data, Manuscript writing. Has given final approval of the version to be published. Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Author 2-5

Substantial contributions to concept, study design, Data Analysis & Interpretation, Manuscript writing, Critical Review. Has given final approval of the version to be published. Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Patient's Consent:

Informed written consent was obtained from each study subject.

Conflict of Interest:

The authors declared no conflict of interest.

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