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Visual and Refractive Outcomes of the Extended Depth of Focus Intraocular Lens: A Prospective Clinical Study

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Abstract: ***Purpose: To evaluate the visual and refractive outcomes of a hydrophobic foldable extended depth of focus (EDOF) intraocular lens (IOL) following phacoemulsification. Methods: This prospective study included patients who underwent phacoemulsification with implantation of the extended depth of focus (EDOF) intraocular lens (IOL) between January 2023 and December 2023 at RGK Eye Care Center. Preoperative and postoperative visual acuity, refraction, and spectacle independence were assessed. The primary outcome measures were uncorrected distance visual acuity (UDVA) and uncorrected near visual acuity (UNVA). Postoperative follow-up was conducted at 1 month. Statistical analysis was performed using paired t-tests and chi-square tests to assess significance. Results: A total of 111 eyes from 111 patients (57 males, 54 females) were included. The mean age was 63.7 ± 9.6 years (range: 38–95). The mean UDVA improved significantly from preoperative values to postoperative values ($p < 0.05$). Postoperative UDVA outcomes were: 6/6 in 33.3% of patients, 6/9 in 31.5%, and 6/12 in 3.6%. Postoperative UNVA outcomes were: N5 in 10.8%, N6 in 71.2%, and N8 in 3.6%. Spectacle independence was achieved in 63.1% of patients for distance and 39.6% for near vision. Mean postoperative astigmatism was 0.38 ± 0.33 D. No significant complications were observed. Conclusion: The extended depth of focus (EDOF) intraocular lens (IOL)demonstrated excellent visual outcomes, with significant improvement in UDVA and UNVA, and a high rate of spectacle independence. These findings are consistent with previous studies evaluating EDOF IOLs [1,2].***

Keywords: EDOF intraocular lens, phacoemulsification, visual acuity, spectacle independence, refractive outcomes

1. Introduction

Extended depth of focus (EDOF) intraocular lenses (IOLs) provides a continuous range of vision with reduced dependence on spectacles [1]. They are designed to minimize visual disturbances such as halos and glare while improving contrast sensitivity [2]. The extended depth of focus (EDOF) intraocular lens (IOL) is a hydrophobic, foldable lens designed to optimize postoperative visual performance. Several studies have demonstrated the efficacy of EDOF IOLs in achieving spectacle independence and maintaining intermediate and near visual acuity [3,4]. This study evaluates its efficacy in terms of uncorrected visual acuity and spectacle independence.

2. Methods

This prospective study was conducted at an eye care center from January 2023 to December 2023. Patients undergoing phacoemulsification with implantation of the extended depth of focus (EDOF) intraocular lens (IOL)were recruited.

Inclusion Criteria:

- Patients undergoing routine cataract surgery.
- No pre-existing ocular pathologies affecting visual potential.

Exclusion Criteria:

- History of prior ocular surgery or retinal pathology.
- Significant corneal astigmatism (>1.5 D).

Preoperative and Postoperative Assessments:

- **Visual Acuity:** UDVA and UNVA were measured preoperatively and postoperatively at 1 month.
- **Refraction and Keratometry:** Measured using autorefractors and manual techniques.
- **Spectacle Independence:** Evaluated using patient-reported outcomes.
- **Statistical Analysis:** Data were analyzed using paired t-tests and chi-square tests. A p-value <0.05 was considered statistically significant.

3. Results

Baseline Characteristics:

- **Mean Age:** 63.7 ± 9.6 years (range: 38–95)
- **Axial Length:** 22.96 ± 0.95 mm (range: 20.76–26.40 mm)
- **Mean IOP:** 14.66 ± 2.99 mmHg
- **Keratometry:** K1 = 43.96 ± 1.52 D, K2 = 44.76 ± 1.52 D
- **Mean Preoperative Astigmatism:** -0.057 ± 0.63 D

Postoperative Visual Outcomes:

1) **UDVA:**
   - 6/6: 37 patients (33.3%)

- 6/9: 35 patients (31.5%)
- 6/12: 4 patients (3.6%)
- 6/18 or worse: 10 patients (9%)

2) **UNVA:**
- N5: 12 patients (10.8%)
- N6: 79 patients (71.2%)
- N8 or worse: 16 patients (14.4%)

Spectacle Independence:
- **For Distance:** 70 patients (63.1%) achieved spectacle independence.
- **For Near:** 44 patients (39.6%) achieved spectacle independence.

Postoperative Astigmatism:
- **Mean postoperative astigmatism:** 0.38 ± 0.33 D

4. Discussion

The extended depth of focus (EDOF) intraocular lens (IOL) demonstrated favorable visual outcomes, with significant improvement in both distance and near visual acuity. Similar results have been reported with other EDOF IOLs, showing a balance between maintaining high-quality vision and minimizing photic phenomena [2,3]. Studies have demonstrated that EDOF IOLs provide improved intermediate vision compared to traditional monofocal IOLs, while reducing visual disturbances such as halos and glare [4,5].

One limitation of this study is the relatively short follow-up period of 1 month. Long-term studies evaluating contrast sensitivity, patient satisfaction, and visual stability over extended periods are needed [5].

5. Conclusion

The extended depth of focus (EDOF) intraocular lens (IOL)provides satisfactory visual outcomes across various distances, with a significant proportion of patients achieving spectacle independence. It serves as a viable alternative to existing EDOF IOLs, with favorable postoperative performance and minimal complications.

References

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