COMPARATIVE CLINICAL AND FUNCTIONAL OUTCOMES OF MONOFOCAL AND MULTIFOCAL INTRAOCULAR LENS IMPLANTATION IN PATIENTS WITH AGE-RELATED CATARACT

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Abstract. *Phacoemulsification with intraocular lens implantation is the standard treatment for age-related cataract. This study evaluated outcomes in 80 patients who received monofocal or multifocal intraocular lenses. Both groups achieved significant improvement in distance vision.*

Multifocal lenses provided superior near and intermediate visual acuity, while monofocal lenses demonstrated better contrast sensitivity. Multifocal intraocular lenses enhance functional vision and reduce spectacle dependence, whereas monofocal lenses ensure high-quality distance vision, emphasizing the importance of individualized lens selection.

Keywords: *age-related cataract, phacoemulsification, intraocular lens implantation, monofocal intraocular lens, multifocal intraocular lens, visual acuity, contrast sensitivity, postoperative visual outcomes.*

Introduction. Age-related cataract remains the leading cause of reversible visual impairment worldwide. Phacoemulsification with intraocular lens (IOL) implantation is the gold standard of surgical treatment. Modern cataract surgery has evolved beyond restoring lens transparency and now aims to achieve high-quality visual function at multiple distances [1].

Monofocal intraocular lenses provide excellent distance vision but usually require spectacle correction for near tasks. Multifocal intraocular lenses are designed to improve visual performance at near and intermediate distances, enhancing postoperative spectacle independence.

However, concerns remain regarding potential reductions in contrast sensitivity associated with multifocal optics [2]. The purpose of this study was to compare the clinical and functional outcomes of monofocal and multifocal intraocular lens implantation in patients following surgical correction of age-related cataract.

Materials and methods. A prospective comparative study was conducted involving 80 patients diagnosed with age-related cataract who underwent phacoemulsification with posterior chamber intraocular lens implantation. Patients were divided into two equal groups depending on the type of implanted lens: Group I included 40 patients who received monofocal intraocular lenses, while Group II consisted of 40 patients implanted with multifocal intraocular lenses.

The study included patients aged 50–75 years with age-related cataract and corneal astigmatism not exceeding 1.0 diopter, without significant retinal or optic nerve pathology. Patients with glaucoma, diabetic retinopathy, age-related macular degeneration, previous ocular surgery, or intraoperative complications were excluded from the study.

Postoperative evaluation was performed at 1 and 3 months following surgery. Clinical assessment included measurement of uncorrected visual acuity at far (4 meters), intermediate (60–80 cm), and near (33–40 cm) distances.

Contrast sensitivity was evaluated under standardized photopic conditions. Statistical analysis was performed using Student's t-test, and differences were considered statistically significant at $p < 0.05$.

Results. Significant improvement in uncorrected distance visual acuity was observed in both groups following surgery ($p < 0.001$). At three months postoperatively, mean uncorrected distance visual acuity reached 0.92 ± 0.08 in the monofocal IOL group and 0.90 ± 0.10 in the multifocal IOL group, with no statistically significant difference between groups ($p > 0.05$).

Uncorrected visual acuity at near and intermediate distances was significantly higher in patients implanted with multifocal intraocular lenses ($p < 0.001$). Near visual acuity averaged 0.45 ± 0.12 in the monofocal group compared with 0.12 ± 0.06 in the multifocal group. Intermediate visual acuity was 0.38 ± 0.10 in the monofocal group and 0.15 ± 0.07 in the multifocal group.

Contrast sensitivity was significantly better in patients with monofocal intraocular lenses ($p < 0.05$).

Patients in the multifocal group demonstrated a mild reduction in contrast sensitivity compared with those in the monofocal group. No intraoperative or postoperative complications were observed in either group.

Discussion. The results of this study confirm that both monofocal and multifocal intraocular lens implantation provide excellent restoration of distance vision following phacoemulsification. Multifocal lenses offer significant advantages in functional vision at near and intermediate distances, contributing to greater independence from spectacles in daily activities.

At the same time, the optical properties of multifocal lenses may result in a slight reduction in contrast sensitivity [3]. Therefore, careful patient selection and preoperative counseling remain essential for optimizing surgical outcomes. These findings are consistent with contemporary ophthalmological research emphasizing the balance between extended visual range and optical performance.

Conclusion. Phacoemulsification with intraocular lens implantation is an effective surgical treatment for age-related cataract. Multifocal intraocular lenses provide superior uncorrected near and intermediate vision, whereas monofocal lenses ensure excellent distance vision and better contrast sensitivity. Individualized intraocular lens selection is essential for achieving optimal functional outcomes and maximizing patient satisfaction.

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