# Comparison of Clinical Outcomes Between A Pseudophakic Mini Monovision Technique And A New Monofocal with Enhanced Intermediate Function Intraocular Lens

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## Introduction

Cataract is one of the main causes of visual impairment worldwide, and cataract surgery using phacoemulsification and intraocular lens (IOL) implantation is one of the most commonly performed surgical procedures today. Over recent years, many improvements in intraocular lenses have allowed for the development of a wide-spectrum of lenses beyond the traditional monofocal lens implants. Extended depth of focus (EDOF) IOLs are a newer category of IOLs that aims to give an elongated focus of vision and eliminate the overlapping of near and far images caused by traditional MF IOLs, thus eliminating the halo effect; ideally, these IOLs should enhance intermediate and near visual performance, while minimally affecting distance vision. Mini-monovision using traditional monofocal IOLs is a surgical option that corrects distance vision in the dominant eye; the non-dominant eye focuses intentionally for near to mid-range vision to achieve a wider range of functional vision.

## Aim of the work

The aim of the work was to compare between visual outcomes in patients after phacoemulsification with pseudophakic mini monovision technique and a new aspheric Tecnis Eyhance IOL (ICB00).

## Patients and Methods

This retrospective study enrolled forty eyes of twenty patients who were scheduled for phacoemulsification cataract surgery at private eye hospital in the city of Alexandria between january2024 and June 2024 **Inclusion criteria:**

•Patients with uneventful phacoemulsification surgery.
•Patients with complete data and correct records.
•Potential visual acuity of 0.0 log Mar.
•Patients with axial lens between 22 and 24 mm. **Exclusion criteria:**
•Corneal astigmatism over -1.00 D cylinder.
•Pupil abnormalities (non-reactive, tonic pupils, abnormally shaped pupils, or pupils that do not dilate at least 3.5 mm under mesopic/scotopic conditions).
•Capsule or zonular abnormalities that would affect postoperative centration or tilt of the lens and pseudo exfoliation syndrome.
•Previous refractive surgery.
•Traumatic cataract.
•Corneal pathology.
•Dry eye or any other ocular surface disease.
•Any Posterior segment pathology resulted in post-surgery visual function.

This retrospective cohort study included 40 eyes of 20 patients (12 males and 8 females) who had cataract surgery between January 2024 and June 2024 at private eye hospitals. All patients in this study have complete data files before the operation and was recalled after three months' post-operative in final visit to evaluation and fill a visual satisfactions questionnaire. All patients underwent phacoemulsification and posterior chamber foldable IOL implantation using White Star Signature Phacoemulsification System (Johnson & Johnson Vision, USA) or Centurin® Vision System (Alcon, USA) in all the procedures All surgeries of the first group were performed by the same surgeon using a similar 2.4 incision technique with bilateral implantation of a hydrophobic acrylic AcrySof IOLs in the bag in 20 eyes with mini mono vision technique. The second eye was implanted 1 month after the first. All the operations were uneventful. In the second group, a Tecnis Eyhance ICB00 (Johnson and Johnson Vision, Jacksonville, FL) IOL lens was bilateral implanted targeting emmetropia in both eyes. All patients received topical antibiotic for 1 week, topical steroid in a tapering dose for 4 weeks and topical Nonsteroidal anti-inflammatory drug (NSAID) for 4 weeks. After 3 months postoperatively all data records were collected and all patients were recalled for final visit and examined and the following measures were done: 1. Distance (6 m), intermediate (66 cm) and near (35 cm) uncorrected and corrected visual acuities by log MAR was measured. 2. Subjective quality of vision and visual satisfactions assessment using the Visual Function Questionnaire which is among the most prevalent instruments used with patient post-operative.

## Results

Table 1 summarizes the postoperative refractive outcomes using modified refraction at 3 months after cataract surgery. The Eyhance group had a mean postoperative SE of $-0.18 \pm 0.21$ D, whereas the Mini-monovision group had a mean postoperative SE of $-0.19 \pm 0.18$ D in the dominant eye and $-0.95 \pm 0.19$ D in the non-dominant eye. As mini-monovision was performed, the difference between the postoperative SE of the Emmetropia group and that of the dominant eye of the Mini-monovision group was not statistically significant ($p = 0.84$). However, the difference between the postoperative SE of $-0.18 \pm 0.21$ D in the Emmetropia group and that of $-0.95 \pm 0.19$ D in the non-dominant eye of the Mini-monovision group was statistically significant ($p < 0.001$*).

**Table (1): The distribution of all pathologies among studied knees:**

| | Group1 Eyhance | Group2 AcrySof | | p |
|---|---|---|---|---|
| Postoperative spherical equivalent refraction (D) | $-0.18 \pm 0.21$ | Dominant eye | $-0.19 \pm 0.18$ | 0.84 |
| | | Non-dominant eye | $-0.95 \pm 0.19$ | < 0.01* |

The Eyhance group showed better far UCDVA with mean log MAR visual acuity of $0.07 \pm 0.11$ log MAR in comparison to a mean of $0.10 \pm 0.11$ log MAR with the AcrySof group. The difference showed no statistical significance. The Eyhance group had a statistically significant better uncorrected intermediate visual acuity (UIVA; $0.15 \pm 0.09$ vs $0.12 \pm 0.09$, $p = 0.17$), with no statistically significant differences between the two groups. However, binocular uncorrected near visual acuity (UNVA; $0.33 \pm 0.13$ vs $0.06 \pm 0.06$, $p \leq 0.001$*) was significantly greater in the Mini-monovision group than in the Eyhance group.

**Table (2): Comparison of the two groups analyzed based on UCVA**

| Postoperative (UCVA) | Eyhance groups | AcrySof groups | P value |
|---|---|---|---|
| Far UDVA | | | |
| Mean ± SD | 0.07 ± 0.13 | 0.10 ± 0.11 | 0.18 |
| Intermediate UIVA | | | |
| Mean ± SD | $0.09 \pm 0.15$ | $0.12 \pm 0.09$ | 0.17 |
| Near UNVA | | | |
| Mean ± SD | 0.33±0.13 | 0.06±0.06 | ≤ 0.001* |

## Conclusion

In conclusions, the authors found the premium EDOF Tecnis Eyhance ICB00 (Johnson and Johnson Vision, Jacksonville, FL) IOLs provide better far vision, intermediate vision compared to other standard monofocal IOLs. Depending on several factors including the age of patients, visual needs of patients with different life style and the higher cost of premium EDOF IOLs. According to these factors we can choose between the different IOLs and different Technique. The rates of spectacle independence and patients' satisfaction in the Eyhance group are likely higher than the first group especially for intermediate vision. Unlike the near vision both groups became spectacle dependent in fine near works, but more satisfied with Mini- monovision strategy. And also we can improve the near vision by using mini monovision technique with premium EDOF IOLS by target mild myopia post-operative in the independent eye.