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CLINICAL STUDY

Aberration-correcting effect of ThinOptX IOL

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Abstract

Purpose To evaluate spherical aberration and visual function after microincision cataract surgery using the ThinOptX rollable intraocular lens.

Design Prospective, comparative, and interventional case series.

Methods: Setting Single-centre institutional practice. This prospective study evaluated 58 patients with cataracts who underwent bimanual microphaco cataract surgery in both eyes. A ThinOptX lens was introduced into one eye and an Alcon Acrysof lens, as a control, into the other. One month after cataract surgery, the corneal, whole-eye, and internal spherical aberration, and contrast sensitivity in both eyes were measured. We also measured the spherical aberration in artificial model eyes bearing Acrysof and ThinOptX lenses. Two-sided paired *t*-test was used for assessing all data.

Results The root mean square (RMS) for both whole-eye and internal spherical aberrations was smaller in eyes bearing ThinOptX ($P=0.03$ and $P=0.07$, respectively). Although there was no statistically significant difference in the RMS for internal spherical aberration between ThinOptX- and Acrysof-bearing eyes, according to the Zernike polynomial expansion, all human and model eyes bearing ThinOptX registered negative internal spherical aberration in Z(4,0) and Z(6,0). On the other hand, all human and model eyes bearing Acrysof registered positive internal spherical aberration in Z(4,0) and Z(6,0). The ThinOptX lens yielded slightly higher contrast sensitivity in all cycles.

Conclusion As the ThinOptX lens is designed for negative spherical aberration, we encountered smaller whole spherical aberrations and higher contrast sensitivity than with the Acrysof lens. The implantation of ThinOptX IOL after microincision cataract surgery yielded good visual function.

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Introduction

Sleeveless bimanual microincision cataract surgery (MICS), as reported by Alio,[1,2] Agarwal,[3,4] or Tsuneoka,[5,6] employs an irrigation chopper, a sleeveless tip, and the bimanual phaco technique, which is supposed to be safer and less invasive than the conventional coaxial phaco method. A 2004 survey by the American Society of Cataract and Refractive Surgery indicated that 40% of eye surgeons in the United States planned to use the bimanual microincision phaco technique. To implant intraocular lenses (IOL), the phaco incision must be 2.2–3.0 mm. In 2003, Dogru[7] reported performing MICS with the ThinOptX rollable IOL (ThinOptX Inc., Abingdon, VA, USA) and discussed the feasibility of IOL implantation via a 1.6-mm incision. They found that ThinOptX IOL implantation resulted in the best-corrected visual acuity and postoperative corneal endothelium density when compared to those seen in the AcrySof (Alcon Inc., Fort Warth, Texas, USA) implantation. Thus, we examined visual function after MICS with ThinOptX rollable IOL implantation. Aberrometry has been applied recently to evaluate visual quality after cataract or refractive surgery.[8–11] Most reports related to high-order aberrations of an IOL-implanted eye measure whole-eye aberration, and yet measurements are affected by front corneal aberration, which may disrupt on-target evaluation of the IOL. We measured, compared, and evaluated whole-eye, corneal, and internal spherical aberrations of ThinOptX IOL- and Acrysof IOL-implanted eyes. We also measured

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