Management of pupillary seclusion and occlusion of an iris enclaved intraocular lens

The phakic intraocular lens (PIOL) is intended to treat large refractive errors of patients who are considered poor candidates for corneal refractive surgery.\textsuperscript{1,2} Phakic intraocular lenses (IOLs) are generally categorized into 3 types: angle-supported, iris-fixated, and posterior-chamber IOLs.\textsuperscript{2,3} The Artisan (Ophtec BV, Groningen, The Netherlands) and Verisyse (Abbott Laboratories, Lake Bluff, Ill) PIOLs are iris fixated and have a proven track record of safety.\textsuperscript{2,4} Tahzib et al conducted a 10-year retrospective study of the Artisan PIOL for moderate to high myopic correction and reported that it is stable, predictable, and safe under a strict selection criterion.\textsuperscript{2} Potential complications of iris-fixated PIOLs include pigment dispersion, cataract formation, and progressive loss of corneal endothelial cell count.\textsuperscript{1,5} Glares and halos have also been reported to be potential issues.\textsuperscript{2} Endothelial cell count loss, in particular, is associated with a shallower anterior chamber and smaller distance between the central and peripheral edge of the PIOL and the corneal endothelium.\textsuperscript{3} Jonker et al conducted a 5- and 10-year prospective, clinical cohort study in patients receiving an Artisan myopia and Artisan toric PIOLs and concluded that there is significant linear chronic endothelial cell count loss.\textsuperscript{3}

We describe a case of complete pupillary seclusion and occlusion secondary to iris-enclaved polymethyl methacrylate (PMMA) PIOL implantation (Artisan Aphakia Model 205, Ophtec BV, Groningen, The Netherlands) and the surgical techniques involved in addressing this unusual presentation.

A 51-year-old woman developed progressive, bilateral decrease in vision 1 year after bilateral Artisan PIOL implantation for the management of progressive hyperopia secondary to radial keratotomies. The bilateral radial keratotomies were performed 28 years before presentation. At presentation, her best-corrected visual acuity was 20/70\textsuperscript{-2} and 20/50\textsuperscript{-2} in the right and left eye, respectively. Intraocular pressure was 9 and 16 mm Hg in the right and left eye, respectively. Gonioscopic examination revealed grade 3 angles with 2+ pigment in the trabecular meshwork and mild peripheral anterior synechiae along the inferior quadrant in each eye. Anterior segment examination of the right and left eyes revealed 4 radial keratotomy incisions with an optical zone of 3.0 mm and a single arcuate keratotomy incision. Central corneal flattening and significant higher-order aberrations of the cornea were found in both eyes. The Artisan PIOL in each eye was well positioned with patent peripheral iridotomies. However, there was evidence of aggressive enclavation temporally and nasally of the iris stroma and the iris pigment epithelium (Fig. 1A, C). Bilateral pigment deposition was noted over
the entire pupil, resulting in complete pupillary seclusion and occlusion (Fig. 1B, D). Preoperative biometric measurements of the right eye revealed an anterior chamber depth of 3.07 mm and an axial length of 25.48 mm. Biometric data of the left eye revealed an anterior chamber depth of 3.19 mm and an axial length of 25.51 mm.

Surgical management was conducted under general anesthesia. Two paracentesis incisions were constructed at the 12 and 6 o’clock positions and the anterior chamber was filled with DisCoVisc (Alcon, Fort Worth, Tex). A 23-gauge microholding forcep from Microsurgical Technology (Redmond, Wash) was used to hold and stabilize the Artisan PIOL while a Kuglen hook was used to de-enclavate the iris at the 3 and 9 o’clock positions. A temporal conjunctival peritomy was made, followed by a scleral tunnel 1.5 mm from the surgical limbus. The Artisan PIOL was extracted uneventfully with the 23-gauge microholder. Extensive posterior synechiae was addressed manually with a Kuglen hook and with viscodilation. Five Grieshaber iris retractors (Alcon, Fort Worth, Tex) were used to dilate the iris to enhance visualization. The dense, thick iris pigment plaque on the central capsule was evacuated en-bloc with the anterior capsulotomy. A 2.4 mm clear cornea incision was made, uneventful phacoemulsification was performed, and an aspheric IOL was implanted into the capsular bag.

The surgical technique described can be divided into 3 elements. First, the PIOL was de-enclaved and removed through a scleral tunnel. The iris pigment plaque was then removed en-bloc, and the iris was mechanically retracted. Finally, phacoemulsification and insertion of an IOL into the capsular bag was then completed. The removal of the PIOL was performed first in order to create more space for surgical manoeuvres and promote normal fluidics during phacoemulsification. A scleral tunnel is recommended in order to minimize surgically induced astigmatism. The mechanical release of iris pigment plaque allowed for en-bloc removal of the iris pigment plaque within the anterior capsulotomy.

The described surgical technique enabled safe removal of the PIOL and iris pigment plaque and restored the pupil, thereby allowing for cataract surgery with minimal surgically induced astigmatism.

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References
Opacification of hydrophilic acrylic intraocular lens following vitreoretinal surgery: a clinicopathological report

Intraocular lens (IOL) opacification is a rare complication following cataract surgery. IOL opacification has been reported in various types of IOL, including polymethylmethacrylate, hydrophobic acrylic, and hydrophilic acrylic lenses. This increasingly recognized clinical entity could result in a range of symptoms, such as reduced or foggy vision, glare, and halos around bright light. Not uncommonly, IOL exchange is necessitated to improve visual function. Over the past decade, there is a growing literature on IOL opacification following intracameral gas during lamellar corneal transplantation. However, only a few cases with IOL opacification following vitrectomy have been described. In this paper, we report 2 cases of late postoperative opacification of hydrophilic acrylic IOL following vitrectomy with intraocular silicone oil tamponade. Clinical, microscopic, and histological findings are discussed.

Case Description

Case 1

A 75-year-old man was referred to our ophthalmology unit with deteriorating vision in his left eye (OS). On examination, the best-corrected visual acuity (BCVA) was counting fingers OS. Examination revealed IOL opacification with otherwise unremarkable ocular findings. The patient had previous uncomplicated phacoemulsification with hydrophilic acrylic IOL (Rayner Intraocular Lenses, Ltd, Hove, U.K.) OS followed by YAG capsulotomy. After that, he had 3 vitreoretinal surgeries OS in our unit, which included vitrectomy with silicone oil tamponade for retinal detachment followed by removal of silicone oil in 2013. He developed a redetachment and underwent further vitrectomy with perfluoroethane gas tamponade. He was found to have IOL opacification in the left eye. After discussion of risks and benefits, he was scheduled for IOL exchange in 2016. However, due to significant fibrosis of the IOL-bag complex, the IOL was explanted and a planned secondary scleral fixated IOL was scheduled for a later date.

Each explanted IOL was immersed in balanced salt solution in a universal bottle and sent to laboratory for further analysis.

Histological and Optical Bench Analyses

On gross examination and detailed gross examination, the optic of IOL was partly opacified (Fig. 1). Each of the OS. His BCVA was 6/36 OS, and intraocular pressure was 16 mm Hg. Slit-lamp microscopy showed IOL opacification in the left eye. The patient had primary phacoemulsification with hydrophilic acrylic IOL (Rayner Intraocular Lenses, Ltd) in another ophthalmic unit. After that, he had multiple vitreoretinal surgeries OS in our unit, which included vitrectomy with silicone oil tamponade for retinal detachment followed by removal of silicone oil in 2013. He developed a redetachment and underwent further vitrectomy with perfluoroethane gas tamponade. He was found to have IOL opacification in the left eye. After discussion of risks and benefits, he was scheduled for IOL exchange in 2016. However, due to significant fibrosis of the IOL-bag complex, the IOL was explanted and a planned secondary scleral fixated IOL was scheduled for a later date.

Each explanted IOL was immersed in balanced salt solution in a universal bottle and sent to laboratory for further analysis.

**Fig. 1—Optic of intraocular lens was partly opacified.**