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Outcomes of Anterior Chamber Intraocular Lens Implantation in Patients Undergoing Pars Plana Vitrectomy

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Purpose: To assess outcomes and complication rates in patients undergoing pars plana vitrectomy (PPV) and implantation of an anterior chamber intraocular lens (ACIOL).

Design: Retrospective chart review.

Participants: A total of 50 eyes that underwent secondary ACIOL placement in the setting of concurrent PPV from October 2000 to August 2016 were included.

Methods: A retrospective chart review was conducted.

Main Outcome Measures: The primary outcome measure was the occurrence of postoperative complication including persistently elevated intraocular pressure, persistent or recurrent hyphema, persistent or recurrent vitreous hemorrhage, persistent corneal edema, or persistent uveitis, macular edema, epiretinal membrane, lens dislocation, retinal tear, or retinal detachment. The secondary outcome measure was best-corrected visual acuity (BCVA).

Results: Postoperative complications occurred as follows: persistently elevated intraocular pressure in 4 eyes (8%), persistent corneal edema in 1 eye (2%), persistent postoperative uveitis in 1 eye (2%). Seven eyes (14%) had new macular edema and 2 eyes (4%) had new epiretinal membranes after combined PPV and ACIOL surgery. No patient had persistent postoperative hyphema, vitreous hemorrhage, retinal tear, retinal detachment, or lens dislocation after ACIOL placement. Mean preoperative BCVA was 20/200 (logarithm of the minimum angle of resolution 0.96) and improved to 20/40 (logarithm of the minimum angle of resolution 0.28, $P \leq 0.0001$) at 1 year postoperatively.

Conclusions: Whereas there is a recent emphasis on new intraocular lens placement techniques in the setting of PPV including sutured and scleral-fixated intraocular lenses, ACIOL placement in the setting of concurrent PPV is a safe procedure, with few eyes developing long-term complications if careful case selection is employed. *Ophthalmology Retina 2018;■:1–5 © 2018 by the American Academy of Ophthalmology*

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Placement of a secondary intraocular lens (IOL) in patients undergoing pars plana vitrectomy (PPV) to address significant posterior segment pathology concurrent with lens placement is a surgically complex procedure. It often requires both anterior and posterior segment instrumentation and care by multiple subspecialists within ophthalmology. Such a procedure is often undertaken in patients with a history of complicated cataract extraction with retained lens material in the posterior segment, IOL dislocation, or patients left aphakic at the time of prior vitrectomy. In these cases, there is often inadequate capsular support, requiring placement or fixation of the lens outside of the capsular bag. Secondary IOL options in these cases include the placement of an anterior chamber intraocular lens (ACIOL), a scleral-fixated posterior chamber intraocular lens (SFIOL) that is either sutured or sutureless, or an iris-fixated intraocular lens (IFIOL).

Historically, ACIOLs have been associated with a higher rate of complications, including bullous keratopathy, glaucoma, uveitis, hyphema, and cystoid macular edema (CME); however, these complications were primarily associated with the use of rigid, closed-loop ACIOLs.[1] More recent studies have shown a decreased incidence of complications associated with redesigned, flexible, open-loop ACIOLs that were introduced in the 1990s.[2–6] Utilizing these lenses with careful surgical technique may minimize complications such as uveitis-glaucoma-hyphema syndrome, postoperative intraocular inflammation, and corneal edema. Additionally, studies have shown that endothelial cell loss in ACIOL placement is more often the result of surgical trauma than the presence of an ACIOL.[7] In our experience, correct surgical technique may minimize ocular trauma and improve postoperative results in patients undergoing ACIOL placement.

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With the arrival of flexible, open-loop ACIOLs, there have been many large studies showing excellent outcomes with these lenses when placed correctly.[2–5,8] However, many of these studies involve patients undergoing anterior segment surgery alone. Chan et al[9] showed there are no long-term differences in the visual outcomes and complication profiles after primary ACIOL or secondary SFIOL implantation in a complicated cataract operation when capsular support is inadequate, although they excluded all patients undergoing combined surgery or vitrectomy. Recently there has been an emphasis on scleral fixation of IOLs, and several studies have presented safety and outcome data on SFIOLs including both sutureless and sutured techniques. However, prior studies investigating the outcomes of ACIOL placement in vitrectomized patients have been small with limited follow-up.[10–13] In this study, we sought to retrospectively evaluate the longer-term outcomes and postoperative complications through a large series of eyes undergoing combined PPV with ACIOL placement.

Methods

A retrospective chart review was conducted to evaluate consecutive patients who underwent ACIOL placement in the setting of concurrent vitreoretinal surgery with PPV from October 2000 to August 2016. The Duke University institutional review board, following the tenets of the Declaration of Helsinki, approved this study.

Patients were included in this study if they underwent concurrent vitrectomy and ACIOL placement with a minimum follow-up period of 1 year. Patients of 5 different retinal surgeons and 3 different corneal surgeons were included in the study. Patients were excluded if they had significant corneal endothelial disease or corneal edema preoperatively; a corneal transplant at the time of or prior to ACIOL placement; prior glaucoma filtering surgery; or a history of severe trauma resulting in ocular sequelae such as corneal scar, angle recession, prior hyphema or vitreous hemorrhage, lens dislocation, or retinal detachment. Eyes were also excluded if they were left aphakic after prior complex retinal-detachment repair requiring lensectomy or if they required silicone oil at the time of retina surgery, as these patients could have iris defects, synechiae, silicone oil–related complications, or other complications due to the retinal-detachment surgery that may confound the results of ACIOL placement. Patients were not excluded if they had prior retinal disease, retina surgery including retinal-detachment repair (without lensectomy or silicone oil placement), or any other retinal or macular pathology.

All study patients were evaluated at the Duke University Eye Center in Durham, North Carolina, and all underwent a complete ophthalmic examination that included measurement of best-corrected visual acuity (BCVA) as determined on the Snellen visual acuity chart, measurement of intraocular pressure (IOP), slit-lamp examination, and fundus assessment by slit-lamp biomicroscopy and indirect ophthalmoscopy. Preoperative data collected included BCVA and prior ocular history of glaucoma, corneal disease, retinal detachment, uveitis, trauma, diabetic retinopathy, vascular occlusion, macular edema, or epiretinal membrane. Postoperative OCT results were obtained and reviewed at each visit in all patients; however, preoperative OCT results were not available for all patients.

The primary outcome measure was the occurrence of a postoperative complication after ACIOL placement. Postoperative complications were classified as *late* or *persistent* if they developed or persisted >3 months after ACIOL placement. These included persistently elevated IOP, persistent or recurrent hyphema, persistent or recurrent vitreous hemorrhage, persistent corneal edema, or persistent uveitis. The following complications were documented if they occurred ≤1 year into the postoperative period: new macular edema, new epiretinal membrane, lens dislocation, retinal tear, retinal detachment, or endophthalmitis. BCVA was reported as a secondary outcome. To standardize the follow-up period for all eyes included, postoperative visual acuity and *P* value calculations were assessed at 1 year. Similarly, postoperative complications were assessed up to 1 year postoperatively, as this was the maximum period of follow-up available for all eyes. Beyond this period, it was also felt complications could potentially be unrelated to the ACIOL surgery.

Descriptive statistics were computed separately for each of the comparison groups. Chi-square analyses were used to compare categorical variables, and a paired *t* test was used to compare BCVA preoperatively and at last follow-up. A *P* value of <0.05 was considered statistically significant.

Surgical Technique

All surgeries were performed by a vitreoretinal surgeon in conjunction with a corneal surgeon (a supplemental video of the technique is available at http://www.ophthalmologyretina.org). The following procedure was performed: A standard infusion line is placed inferotemporally followed by superotemporal and superonasal cannulas. In cases of complicated cataract extraction, retained lens fragments are removed using the vitreous cutter or fragmatome for dense nuclear fragments. In cases with a dislocated lens, a vitrectomy is performed to free the lens of any vitreous adhesions, and the lens is subsequently delivered to the anterior chamber. PPV and lensectomy is performed in the case of subluxed natural lens and/or bag complex. A corneal paracentesis is made, and acetylcholine (Miochol-E; Bausch and Lomb, Rochester, NY) is injected into the anterior chamber. A peripheral iridotomy is made with the vitreous cutter. The infusion pressure is lowered to 10 mmHg. A dispersive viscoelastic is injected into the anterior chamber to protect the cornea.

The horizontal white-to-white dimensions of the cornea should be verified, and the ACIOL length is sized at 1 mm greater than the horizontal white-to-white dimension. Our preference is then to create a superior scleral tunnel-based incision for the placement of the ACIOL as this incision allows for greater control of the anterior chamber and less postoperative astigmatism. A 7-mm peritomy is created superiorly. Calipers are then used to mark a scleral incision 6-mm long, 1 mm from the limbus. A linear or slightly frowned scleral tunnel is created using a bent crescent blade and carried forward to the limbus. The anterior chamber is entered using a keratome blade. A lens glide may be placed across the pupil to aide in lens placement, and McPherson forceps are used to grasp the lens including the trailing haptic and about halfway across the optic and the lens is inserted into the anterior chamber. The trailing haptic is then tucked into the angle under the wound.

The scleral tunnel is closed using 2–3 sutures (10-0 nylon). After the wound is partly closed and the chamber is better maintained, a Sinskey hook is used to rotate the ACIOL counterclockwise to that the haptics are oriented 90° away from the scleral tunnel incision at the 3 and 9 o'clock orientation. The ACIOL should ideally be positioned in the iridocorneal angle with the footplates in contact with the scleral spur. Care is taken to assure the pupil is round and there is no pupil peaking. Additional 10-0 nylon sutures are placed in the scleral tunnel as needed until the wound is watertight, and the peritomy is closed with 8-0 Vicryl