# Pars Plana Vitrectomy Combined With Either Secondary Scleral-Fixated or Anterior Chamber Intraocular Lens Implantation

ALEXANDER MELAMUD, JAMES S. TOPILOW, LING CAI, AND XIN HE

• PURPOSE: To compare visual outcomes among eyes that underwent pars plana vitrectomy (PPV) in combination with either anterior chamber intraocular lens implantation (ACIOL) or scleral suturing of posterior chamber lens (PCIOL).

• DESIGN: Retrospective comparative case series.

• METHODS: All eyes presented with aphakia or luxated or subluxated posterior chamber intraocular lens (IOL) following complicated cataract surgery, trauma, or spontaneous dislocation. Eyes involving visually significant macular pathology, past retinal detachment, follow-up of less than 6 months, and surgeries requiring the removal of an ACIOL were excluded. The main outcomes measured were final best-corrected visual acuity (BCVA) and surgical complication rates.

• RESULTS: Fifty-seven eyes met inclusion criteria; median follow-up was 13.2 months. Initial median BCVA for ACIOL patients was logMAR 1.301 (Snellen equivalent 20/400, range 20/20 to light perception); final median BCVA was logMAR 0.477 (Snellen equivalent 20/60, range 20/20 to light perception, $P < .001$). Initial median BCVA for PCIOL patients was logMAR 1.239 (Snellen equivalent 20/347, range 20/60 to light perception); final median BCVA was logMAR 0.301 (Snellen equivalent 20/40, range 20/20 to hand motions, $P < .001$). The change in BCVA between the 2 groups over the course of the study was similar ($P > .05$). More epiretinal membrane (ERM) formations occurred postoperatively in the ACIOL group ($P = .011$). Other complication rates were similar between both groups.

• CONCLUSIONS: PPV with secondary IOL placement is safe and effective, resulting in improved visual outcomes regardless of the technique used. Patients undergoing ACIOL placement have a higher incidence of ERM formation. (Am J Ophthalmol 2016;168:177–182. © 2016 Elsevier Inc. All rights reserved.)

SECONDARY IMPLANTATION OF AN INTRAOCULAR lens (IOL) is a complex surgical procedure performed to achieve maximum visual rehabilitation. In the absence of capsular support, the most common anatomic locations to position the lens implant are in the anterior chamber (AC) and with scleral fixation at the surgical sulcus.[1–4] A number of studies have looked at the pros and cons of anterior chamber intraocular lenses (ACIOLs) vs scleral-sutured posterior chamber intraocular lenses (PCIOLs).[5–15] Traditionally the most common problems associated with ACIOL implantation include inflammation, cystoid macular edema (CME), glaucoma, and hyphema.[16–22] Complications associated with scleral-sutured IOLs include lens tilt, suture erosion, and IOL dislocation.[20–22] Both surgeries have been associated with epiretinal membrane (ERM) formation and retinal detachment (RD).[21]

Secondary implantation of an IOL may be performed in the setting of pars plana vitrectomy (PPV) in those cases where posterior segment pathology needs to be surgically addressed. PPV may be required to rescue a dislocated primarily implanted IOL or to remove pieces of crystalline lens that have fallen into the vitreous cavity, causing inflammation.[23,24] Surgically, secondary implantation of an IOL is a more complex procedure in the setting of PPV, requiring the use of both vitreoretinal and anterior segment instrumentation.

A number of studies have demonstrated that secondary IOL placement in the anterior chamber or surgical sulcus may be efficacious in the setting of vitrectomy.[25–32] However, very little literature exists directly comparing visual outcomes between these 2 surgical approaches. The 2 notable studies on the subject come to differing results. One study, albeit focusing on a population suffering from traumatically dislocated crystalline lenses, suggested that postoperative vision is better in those that undergo ACIOL placement.[33] Another study found that final vision was similar in both groups but the mean change in vision was greater for the ACIOL group.[34] We set out to conduct a large retrospective analysis comparing visual outcomes and complication rates in patients undergoing

AJO.com Supplemental Material available at AJO.com.

Accepted for publication May 9, 2016.

From the Washington National Eye Center, Washington Hospital Center, Washington, DC (A.M.); The Retina Group of Washington, Fairfax, Virginia (A.M.); and Georgetown University School of Medicine (J.S.T.) and Department of Biostatistics, Bioinformatics and Biomathematics (L.C., X.H.), Georgetown University Medical Center, Washington, DC.

Inquiries to Alexander Melamud, The Retina Group of Washington, 8505 Arlington Blvd #300, Fairfax, VA 22031-4621; e-mail: melamudalex@gmail.com

0002-9394/$36.00
http://dx.doi.org/10.1016/j.ajo.2016.05.006

combined pars plana vitrectomy with secondary intraocular lens implantation.

## METHODS

THIS INVESTIGATION WAS CONDUCTED WITH THE approval of the Georgetown University Institute review board. A retrospective observational case series was performed of 57 eyes of 57 patients who were referred for retinal consultation with the complication of a subluxed, dislocated, or absent PCIOL after primary cataract surgery or trauma. Searching through a surgical database at a large retina-only subspecialty practice identified patients who might qualify for the study. The following Current Procedural Terminology (CPT) codes associated with lens replacement surgery and vitrectomy were used to identify potential cases; 66985, 66986, 67121, 67120, 66825, 66983, 66984, 66982, 66852, 66920, and 66930. A total of 1124 charts were reviewed for patients who underwent surgery between January 1, 2006 and December 31, 2014. Patients were included if they underwent secondary IOL placement in combination with pars plana vitrectomy. Exclusion criteria included the following: follow-up of less than 6 months, history of retinal detachment, surgeries requiring the removal of an ACIOL, and cases involving a history of visually significant macular pathology.

All relevant data from each patient's progress notes, surgical records, and ancillary testing were abstracted into a standardized data collection sheet that was used in a structured database program for analysis. Patient data recorded from office charts on initial presentation included the following: patient age, sex, involved eye, lens status (pseudophakic or aphakic), and history of pseudoexfoliation syndrome, glaucoma, diabetes, uveitis, corneal disease, and trauma. The indication for vitrectomy and the cause of primary PCIOL dislocation were also carefully noted, as was presurgical best-corrected visual acuity (BCVA). Details of the surgical procedure were abstracted from the operative report and included the following: surgeon, IOL location, surgical technique, gauge of vitrectomy, and the indication for pars plana vitrectomy. Finally, postoperative findings were recorded, including the following: BCVA at several time points, suprachoroidal hemorrhage, intraocular pressure (IOP) increase above 25 mm Hg, vitreous hemorrhage (VH), retinal detachment (RD), hyphema, ERM formation, persistent corneal edema of duration greater than 1 month, IOL decentration, IOL capture, iatrogenic retinal breaks, persistent inflammation requiring topical corticosteroid use, and all follow-up surgeries.

For all subjects visual acuity measurements were taken using a Snellen chart and were converted to logarithm of the minimal angle of resolution (logMAR) for comparison. For analysis, counting fingers vision at 1 foot was assigned a Snellen equivalent of 20/4000, at 2 feet was 20/2000, and at 3 feet was 20/1333. Hand motions was assigned 20/8000 and light perception 20/16 000.

• **STATISTICAL ANALYSIS:** Medians were used to describe continuous data, as they are more robust against extreme values than means. Fisher exact test was used for comparing categorical variables between 2 groups. Wilcoxon signed rank test and Wilcoxon rank sum test were used for 1-sample and 2-sample comparisons, respectively. Here nonparametric tests were chosen to compare visual acuities, as they are robust to extreme values and need not make the assumption that the data arose from a normal distribution.[35] $P < .05$ was considered statistically significant.

## RESULTS

FIFTY-SEVEN EYES OF 57 PATIENTS WHO UNDERWENT SECondary IOL implantation combined with PPV surgery were enrolled in the study. The series included 31 female and 26 male subjects ranging in age from 36 to 92 years, with a median age of 70.5 years. Patients were followed for a median of 13.2 months (range 6–20 months).

All surgeries were performed by 1 of 13 retina surgeons and included vitrectomy followed by implantation of a secondary IOL. Thirty-three patients received an anterior chamber lens (Alcon Laboratories, Inc, Fort Worth, Texas, USA; Model MTA3UO or MTA4UO). Twenty-four patients received a posterior chamber lens sutured to the sclera at the ciliary sulcus (Alcon Laboratories, Inc; Model CZ70BD). Vitrectomy packs used in the surgeries consisted of the following; 20 gauge (n = 8), 23 gauge (n = 19), 25 gauge (n = 29), and 27 gauge (n = 1). In the ACIOL group patients had a mean age of 74 years, with 14 eyes preoperatively aphakic and 19 pseudophakic. In the sutured PCIOL group the average age was 65 years, with 9 eyes being aphakic and 15 pseudophakic preoperatively. The differences in the 2 groups with regard to age and preoperative lens status were not statistically significant ($P > .05$).

Pertinent past ocular history for patients in each of the 2 groups was compared. Patients who underwent ACIOL implantation had the following findings: 7 had a history of glaucoma, 1 had a history of uveitis, and 1 had a history of corneal disease. In the sutured PCIOL group the following findings were recorded: 5 patients had a history of glaucoma, 1 had a history of uveitis, and none had a history of corneal disease. There was no statistically significant difference in past ocular history between individuals in the 2 surgical groups ($P > .05$).

The indication for secondary lens implantation was recorded. In the ACIOL group 17 eyes presented after complicated cataract surgery, 13 presented after spontaneous IOL dislocation, and 3 presented after traumatic IOL dislocation. In the sutured PCIOL group 12 eyes presented after complicated cataract surgery, 10 presented