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Original Article

Long-term outcome of combined vitrectomy and transscleral suture fixation of posterior chamber intraocular lenses in the management of posteriorly dislocated lenses

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Abstract

Background: There is no general consensus on the optimal choice of intraocular lenses (IOLs) or fixation methods in eyes with inadequate capsular support. The purpose of this study was to determine the long-term safety, efficacy and refractive status of combined vitrectomy and transscleral suture fixation of posterior chamber (PC) IOLs in the management of posteriorly dislocated lenses in Taiwan.
Methods: We conducted a retrospective interventional study at our medical facility. The posteriorly dislocated crystalline lenses (or dislocated IOL) were removed with pars plana vitrectomy followed by transscleral suture fixation of PC IOLs at the same setting. Additionally, preexisting ocular condition, postoperative visual acuity (VA) and refraction were recorded.
Results: Fifteen patients were enrolled for analysis, including traumatic posteriorly dislocated IOLs in seven cases, and traumatic posteriorly dislocated crystalline lenses or retained lens nuclei after cataract surgery in eight cases. The end result of our study showed that best-corrected VA of 6/12 or better was achieved in 13 patients (87%) after a mean 45 months follow-up. The mean VA significantly improved from 0.98 logarithm of the minimum angle of resolution (logMAR) at baseline to 0.14 logMAR at last follow-up ($p < 0.01$). The refractive status after suture fixation of PC IOL revealed a mean myopic shift of -1.18 ± 1.47 D from the predicted spherical equivalent. Overall, most complications were minor. Ciliary body hemorrhage occurred during operation in one case and was cleared without visual compromise. Erosion of prolene suture through conjunctiva was noted in three patients. Elevated intraocular pressure was well controlled by topical antiglaucoma medications in three cases. No suture breakage or IOL dislocation was noted in any of the patients. There were no serious adverse events of retinal detachment, corneal compromise, or endophthalmitis in any of the patients.
Conclusion: Our data showed that use of combined vitrectomy and transscleral suture fixation of PC IOLs is a safe and efficient technique to correct aphakia in eyes without adequate capsular support. Our study demonstrated good long-term visual outcome with only minor complications. Furthermore, we recommend that the IOL power should be adjusted 1.00 D less for transscleral suture fixation.

Keywords: intraocular lenses; lens dislocation; pars plana vitrectomy; scleral fixation

1. Introduction

Posterior dislocation of crystalline lenses or intraocular lenses (IOLs) is a serious, sight-threatening complication. Significant intraocular inflammation, elevated intraocular pressure (IOP), cystoid macular edema (CME) and retinal detachment have led to the development of a variety of

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vitreoretinal techniques for its management.[1–4] Following pars plana vitrectomy surgery, patients have numerous available options for secondary visual rehabilitation arising from aphakia. The lens may be repositioned in the ciliary sulcus if there is adequate capsular support. If capsular support is insufficient, IOLs may be sutured to the sclera (transscleral suture fixation) or iris, exchanged for an anterior chamber (AC) IOL, or aphakic spectacle or contact lens correction may be utilized. A review of the literature conducted by the American Academy of Ophthalmology supports the effective use of sclera-sutured posterior chamber (PC) IOL, open-loop AC IOL and iris-sutured PC IOL in the correction of aphakia in eyes without adequate capsular support.[5] However, there is insufficient evidence to demonstrate the superiority of one lens type or fixation technique.[5] Modern open-loop AC IOL may still result in some complications, such as endothelial cells loss, glaucoma, uveitis, hyphema and CME.[5–7]

Theoretically, sclera-suture fixation of IOL in the posterior segment will result in less corneal decompensation, glaucoma and CME than with use of open-loop AC IOL. Most reports involved secondary implantation of PC IOL with transscleral fixation in aphakic patients, and short follow-up periods.[8,9] Furthermore, the procedure of sclera-sutured PC IOL has some potential risks, such as vitreous hemorrhage, retinal break and retinal detachment.[5,8,9] There is little information in the literature regarding the long-term safety and outcome of combined pars plana vitrectomy and transscleral suture fixation of PC IOLs at the same setting after removal of posteriorly dislocated lenses.[10,11] The aim of the current study was to evaluate the long-term safety, efficacy and refractive outcome of this combined therapeutic option in our institute over a 10-year period. Special emphasis is placed on the investigation of the functional outcome, spherical equivalent and any postoperative adverse events, including suture breakage, IOL subluxation or dislocation, corneal edema, elevated IOP, or retinal detachment.

2. Methods

This study followed the guidelines of the Helsinki Declaration, and informed consent was obtained from each patient. The chart records of all patients of posteriorly dislocated crystalline lenses or dislocated IOLs who were referred and managed at our institute (Taipei Veterans General Hospital) over a 10-year period from February 2005 to February 2015 were reviewed. The general characteristics of patients were recorded, including age and sex, preexisting ocular diagnosis, onset duration of lens dislocation, preoperative visual acuity (VA), IOP, operations performed, postoperative best-corrected VA (BCVA) and IOP, and duration of follow-up. The calculation of IOL power was based on the SRK-T formula preoperatively. Thereafter, the predicted refraction was chosen for each individual patient. The postoperative final refractive status, spherical equivalent and any complications after combined vitrectomy and transscleral suture fixation of PC IOLs were also recorded.

The general surgical approach of conventional standard three-port pars plana vitrectomy was performed to remove the dislocated lenses in all patients. A 6-mm infusion cannula was sewn into the sclera at 3.5 mm posterior to the limbus in the inferotemporal quadrant with a 6-0 silk suture. Superotemporal and nasal sclerotomies were also placed 3.5 mm posterior to the limbus. The vitrectomy probe and a fiberoptic light pipe were used to remove all vitreous surrounding the dislocated crystalline lenses or IOLs until it was freely mobile. The vitrectomy probe was frequently used to remove dislocated softer lens material. Intravitreal fragmatome lensectomy was necessary to manage hard nucleus fragments. The dislocated IOL was grasped with an intraocular forceps and brought into the AC. In three cases, perfluorocarbon (PFC) liquid was used to float the dislocated crystalline lens up to the pupillary plane, or to elevate the dislocated IOL off the retinal surface prior to grasping it with intraocular forceps. A limbal incision was prepared and opened to remove the dislocated lens or IOL via limbus.

After vitrectomy, the visual rehabilitation procedure for aphakia was then performed using the technique of transscleral suture fixation of the PC IOLs at the same setting. Two scleral grooves, 3.0–4.0 mm in length, were created 1.5 mm to the limbus at the 3 and 9 o'clock positions. A double-armed 10-0 polypropylene (prolene) suture on an Ethicon CIF-4 needle and a bent 25-gauge needle were inserted through opposite scleral grooves. The CIF-4 needle was pushed as far as possible into the barrel of the 25-gauge needle. The 25-gauge needle was first withdrawn slightly to examine whether it was able to carry the suture needle safely without slipping out before being completely withdrawn from the globe. A 10-0 prolene suture was extended from the 3 to 9 o'clock positions behind the iris. The thread was retrieved with a hook or forceps and cut in half. The preferred IOL type was the single piece PMMA with haptic suture eyelets. Two IOL brands, Alcon CZ70BD and Bausch & Lomb P366UV, have been used in this study, consistent with the general hospital supply. The free ends of the sutures were tied to the eyelets of the haptic of the poly(methyl methacrylate) (PMMA) posterior chamber IOL. The alternative IOL type was single piece PMMA IOL (Alcon MC50BD or MZ60BD) when the above particular type of IOL was not available in our hospital at the time of surgery. The IOL was slowly inserted into the ciliary sulcus. The suture was pulled as necessary during implantation until the IOL was secured in a central position. The corneoscleral wound was closed using a 10-0 nylon suture. The needles of the prolene were passed through the bottom of the sclera grooves, and sutures were tied to each other at both sides. The first suture was tied in a releasable knot on one side. After the tension of the sutures and the IOL position were carefully adjusted, both sutures were tied permanently using 3-1-1-1 surgeon's knots. The threads were trimmed exactly above the knots, and the knots were buried into the sclera grooves. The infusion cannula was withdrawn and the sclerotomy was closed. The other two sclerotomies and conjunctival wound were closed in a conventional manner. In addition, subconjunctival antibiotics and corticosteroids were injected.

Statistical analysis of the data was performed using SPSS version 15.0 (SPSS Inc., Chicago, IL, USA). Preoperative and