Surgical Management and Outcomes of Dislocated Intraocular Lenses

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Objective: To evaluate the surgical management and visual acuity outcomes in a large series of patients with dislocated intraocular lenses (IOLs).

Design: Retrospective consecutive noncomparative case series.

Participants: All patients who underwent surgical management of dislocated IOLs by two vitreoretinal surgeons at one institution between January 1, 1991, and March 31, 1998.

Methods: Demographic and clinical data were abstracted from patients’ medical records.

Main Outcome Measures: Visual acuity at final follow-up and surgical complications.

Results: The study population consisted of 110 patients, with a median follow-up interval of 50 weeks after dislocated IOL management. Surgical techniques included IOL repositioning in 93 (84.5%) eyes, IOL exchange in 16 (14.5%) eyes, and IOL removal in 1 (1%) eye. Final visual acuity was $20/40 in 63 patients (57%) patients, 20/50–20/200 in 34 (31%) patients, and <20/200 in 13 (12%) patients. Ninety-nine (90%) patients had stable or improved final vision. Observed complications included postoperative retinal detachment in 7 (6.3%) eyes, chronic cystoid macular edema in 19 (17%) eyes, and suprachoroidal hemorrhage in 1 (1%) eye.


Intraocular lens (IOL) dislocation has been reported to occur in 0.2% to 1.8% of patients after cataract surgery.1,2 The incidence may be increasing because of the widespread use of phacoemulsification in which central capsular rents in the setting of preserved peripheral capsule caused by capsulorhexis frequently allows placement of a posterior chamber IOL (PCIOL). A variety of therapeutic options is available. Accordingly, management decisions are based on the clinical features of an individual case.

The purpose of this study is to evaluate the visual outcomes and surgical complications of a large series of patients with dislocated IOLs managed with a variety of techniques by two surgeons at one medical institution.

Patients and Methods

The study protocol was approved by the Institutional Review Board of the University of Miami School of Medicine. The medical records of all patients who underwent surgical management of dislocated IOLs by two vitreoretinal surgeons (WES, HWF) at the Bascom Palmer Eye Institute between January 1, 1991, and March 31, 1998, were reviewed. Patients with <6 weeks postoperative follow-up data were excluded from most end point analyses. Although further complications may occur after the 6-week postoperative time point, the frequency is low and more difficult to differentiate from unrelated causes. Furthermore, the visual acuity (VA) often increases with longer follow-up intervals (for example, as some cystoid macular edema [CME] resolves). Also, follow-up intervals substantially beyond this time point were less numerous because such patients return to their primary eye care specialist sooner for other more exclusively retinal disorders.

Preoperative data collected included patient age, gender, involved eye, pre-existing ocular pathology, cataract extraction (CE) technique and complications, IOL type, and duration between CE and IOL dislocation. Patients not undergoing surgical repair were not included in this study.

Intraoperative data included surgical approach (limbal, pars plana, or combined), management technique (reposition with or without sutures, IOL exchange or removal), and additional procedures performed concomitantly.

Postoperative data collected included best-corrected VA, lens position, and complications.

Results

This study included 110 eyes of 110 patients (55 males, 55 females), with a median follow-up after dislocated IOL management of 50 weeks (range, 6 weeks–5.5 years). The mean age was 70 years (range, 6–90 years). Ocular pathologic conditions present at the time of cataract surgery included cataract only in 61 patients, glaucoma in 16, diabetic retinopathy in 13, age-related macular degeneration in 7, retinal detachment (RD) in 7, high myopia in 3, pseudoexfoliation in 3, and Marfan’s syndrome in 2 patients.

Preoperative best-corrected Snellen VA was $20/40 in 25
Patients, 20/50–20/200 in 54 (49%) patients, and <20/200 in 31 (28%) patients (Fig 1).

Cataract surgery techniques included extracapsular cataract extraction with nuclear expression (ECCE) with PCIOL in 48 (44%) eyes, phacoemulsification with PCIOL in 46 (42%) eyes, intracapsular cataract extraction (ICCE) with anterior chamber IOL (ACIOL) in 6 (5%) eyes, combined ECCE with PCIOL and trabeculectomy in 3 (3%) eyes, and secondary PCIOL in 6 (5%) eyes.

At least one intraoperative untoward event occurred during cataract surgery and IOL placement in 104 of 110 (95%) eyes. These included peripheral or posterior capsular tear in 104 eyes, recognized vitreous loss in 39 eyes, retained lens material in 18 eyes, and zonular dialysis in 3 eyes.

Visual symptoms were present in all patients after the IOL dislocation and included decreased vision, glare, monocular diplopia, or pain. Associated ocular complications included inflammation (19 eyes), corneal decompensation (17 eyes), increased IOP to ≥25 mmHg (15 eyes), CME (13 eyes), and coexisting RD (11 eyes).

The median interval between cataract surgery and IOL dislocation was 14 weeks (range, 0 days–5 years). The median interval between IOL dislocation and surgical management was 6 weeks (range, 0 days–4 years).

The dislocation involved a PCIOL in 100 patients and an ACIOL in 10 patients. The IOL was luxated into the posterior segment in 72 (65%) eyes, subluxated with the optic covering less than half of the pupillary space in 21 (19%) eyes, or decentered with the optic covering more than half of the pupillary space in 17 (15%) eyes.

The surgical approach for managing the dislocated IOL was pars plana in 80 eyes, limbal in 3 eyes, and combined in 27 eyes. The surgical techniques for the 10 dislocated ACIOLs included repositioning in 7 eyes, removal only in 1 eye, exchange for another ACIOL in 1 eye, and exchange for scleral suture-fixed PCIOL in 1 eye.

The surgical technique for the dislocated PCIOL included repositioning in 86 eyes and removal or exchange in 14 eyes. Repositioning was into the capsular bag in 7 eyes and into the ciliary sulcus in 79 eyes (Figs 2A, B). Scleral sutures were used for repositioning the PCIOL into the ciliary sulcus in 44 eyes (including one in which a simple haptic was sutured) and were not used in 35 eyes. The PCIOL was exchanged for an ACIOL in eight eyes and for another PCIOL in six eyes. The new PCIOLs were sutured into the sulcus in two eyes and placed into the ciliary sulcus without sutures in four eyes.

Twelve patients had posterior dislocation of silicone plate haptic IOLs (five of these patients were included in a previously published series). The IOL was dislocated after Nd:YAG capsulotomy in seven of these eyes, immediately after CE with posterior capsular rupture in three eyes, after trauma in one eye, and after spontaneous capsular rupture in one eye. Surgical management included pars plana vitrectomy with IOL repositioning into the ciliary sulcus (10 eyes) (Fig 3A, B) and IOL exchange (2 eyes).

Four patients had recurrence of the IOL dislocation (Table 1). These occurred 4 weeks to 4 years after initial management. Two of these patients underwent two surgical procedures, and the other two patients underwent three surgical procedures because of yet a third dislocation. One of these patients had persistent foreign body sensation after trimming of an exposed suture from a scleral-fixed IOL; the IOL was dislocated after the remaining knot was loosened. Final VA was limited to ≤20/60 in two of these four patients because of CME but was ≥20/40 in the other two patients.

The IOLs remained well positioned throughout the follow-up interval in 107 (97%) eyes. The IOL was tilted in two (2%) eyes, but not severely enough to replace. One eye had been left aphakic.

Postoperative complications after management of dislocated IOLs included chronic CME (19 eyes), elevated IOP (14 eyes), RD (7 eyes), vitreous hemorrhage (7 eyes), monocular diplopia (1 patient), and massive suprachoroidal hemorrhage (1 eye). Phototoxicity was not recognized as a complication, but varying degrees of what was judged to be nonspecific retinal pigment epithelium macular alterations were not uncommon in the population.

The postoperative RD occurred during the first month after surgery in five of the seven eyes (range, 10 days–2 months) (Table 2). All patients with postoperative RD underwent successful surgical repair. Only one patient did not experience improvement in VA, which was attributed to CME.

Twenty-three patients had PCIOL dislocation occur at least 3 months after CE with IOL placement in the capsular bag or ciliary sulcus. Refraction information before and after dislocated PCIOL management was available in 15 of these patients. In 10 of 15 patients, no change in refraction occurred, and the average change in refraction in the remaining five patients was 0.75 diopters; the latter five patients had undergone CE with PCIOL placement in the ciliary sulcus and underwent PCIOL repositioning in the sulcus.

Final VA was ≥20/40 in 63 (57%) patients, 20/50–20/200 in 34 (31%) patients, and <20/200 in 13 (12%) patients (Fig 1). The final vision and symptoms were stable or improved in 99 of 110 (90%) patients. Only 11 (10%) patients had decreased final vision compared with their VA before IOL repositioning (because of worsening of pre-existing ocular pathologic conditions in six patients, CME in three, RD in one, and massive suprachoroidal hemorrhage leading to phthisis in one patient) (Table 3).

The final visual acuity was not correlated with the interval between CE and IOL dislocation, the interval between dislocation to surgical management, the surgical technique used, or the age or gender of the patient. The final VA was ≥2/4 in 28 of 49 (57%) patients who underwent IOL repositioning without sutures, 25 of
44 (57%) who underwent IOL repositioning with scleral sutures, and 10 of 17 (58%) patients with IOL removal or exchange.

Discussion

This study represents the largest reported clinical series of management of dislocated IOLs, and illustrates the surgical management options available for dislocated IOLs: IOL removal, IOL exchange, and IOL repositioning techniques. The best approach must be determined individually for each patient and is based on factors such as clinical circumstances and coexisting complications.

The best management of patients with dislocated IOLs can be addressed by asking three questions: Is surgery indicated? What is the best timing for surgery? What is the best surgical technique? The most common indications for surgery included decreased VA, persistent CME, increased IOP, inflammation, and coexisting RD. Other less common, but troublesome, indications include monocular diplopia, halo phenomenon, and fluctuating vision caused by shifting IOL. Although selected cases with a dislocated (even freely mobile) IOL are managed with observation, most clinically significant IOL dislocations are repaired surgically. Distinct timing advantages in terms of outcome have not been demonstrable. However, the optimal time for intervention in the authors’ opinion is during the initial cataract surgery for cases in which intraoperative IOL dislocation occurs, within 2 weeks for cases with an IOL dislocation soon after cataract extraction and electively for dislocations occurring distantly.

Figure 2. A, Anterior segment photograph of a patient with a dislocated silicone three-piece IOL. B, Anterior segment photograph of the same patient as in Figure 2A with the silicone three-piece IOL repositioned into the ciliary sulcus. The VA returned to 20/20 postoperatively.

Figure 3. A, Fundus photograph of a silicone plate IOL resting on the surface of the retina. B, Anterior segment photograph of the same patient as in Figure 3A with the silicone plate IOL supported by residual capsule. The VA returned to 20/20 in the undilated state.
The surgical approach in this series is biased by the vitreoretinal specialty of the authors. The advantage of the limbal approach is that it avoids pars plana entry and its attendant complications. The pars plana approach has the advantage of not distorting the limbus during manipulations, offers more control by removing vitreous, allows easy retrieval if the IOL dislocates posteriorly, and affords better management of coexisting or intraoperative complications (e.g., RD).

Observation is usually recommended for IOLs with simple decentration. If aphakic contact lens correction is satisfactory, if systemic or ocular problems prohibit further surgery, or if the patient simply elects not to pursue further surgery, observation is a reasonable option. Although some

<table>
<thead>
<tr>
<th>Patient No.</th>
<th>Interval from CE and IOL Dislocation</th>
<th>Best-Corrected VA before Management of IOL Dislocation</th>
<th>First Procedure</th>
<th>Interval Between Procedures (1st to 2nd)</th>
<th>Second Procedure</th>
<th>Interval Between Procedures (2nd to 3rd)</th>
<th>Third Procedure</th>
<th>Final Best-Corrected VA</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5 yrs</td>
<td>20/400</td>
<td>PCIOL reposition into ciliary sulcus</td>
<td>4 wks</td>
<td>PCIOL removal and exchange for an ACIOL</td>
<td>—</td>
<td>—</td>
<td>20/60</td>
<td>CME developed after last surgery and limited final VA</td>
</tr>
<tr>
<td>2</td>
<td>2 mos</td>
<td>20/200</td>
<td>PCIOL reposition into ciliary sulcus</td>
<td>6 wks</td>
<td>PCIOL reposition into ciliary sulcus with scleral sutures fixation</td>
<td>—</td>
<td>—</td>
<td>20/40</td>
<td>RPE changes in macula at last visit</td>
</tr>
<tr>
<td>3</td>
<td>7 days</td>
<td>20/25</td>
<td>PCIOL reposition into ciliary sulcus with scleral sutures fixation</td>
<td>1.5 yrs</td>
<td>PCIOL reposition into ciliary sulcus with scleral sutures fixation</td>
<td>6 mos</td>
<td>PCIOL removal and exchange for an ACIOL</td>
<td>20/20</td>
<td>First redislocation caused by trimming an exposed suture scleral knot</td>
</tr>
<tr>
<td>4</td>
<td>24 days</td>
<td>20/40</td>
<td>PCIOL reposition into ciliary sulcus with scleral sutures fixation</td>
<td>4 yrs</td>
<td>PCIOL reposition into ciliary sulcus</td>
<td>2 wks</td>
<td>PCIOL removal and exchange for an ACIOL</td>
<td>20/100</td>
<td>Chronic CME limited final VA</td>
</tr>
</tbody>
</table>

ACIOL = anterior chamber intraocular lens; CE = cataract extraction; CME = cystoid macular edema; IOL = intraocular lens; PCIOL = posterior chamber intraocular lens; RPE = retinal pigment epithelium; VA = visual acuity.

The surgical approach in this series is biased by the vitreoretinal specialty of the authors. The advantage of the limbal approach is that it avoids pars plana entry and its attendant complications. The pars plana approach has the advantage of not distorting the limbus during manipulations, offers more control by removing vitreous, allows easy retrieval if the IOL dislocates posteriorly, and affords better management of coexisting or intraoperative complications (e.g., RD).

Observation is usually recommended for IOLs with simple decentration. If aphakic contact lens correction is satisfactory, if systemic or ocular problems prohibit further surgery, or if the patient simply elects not to pursue further surgery, observation is a reasonable option. Although some

Table 2. Patients with Postoperative Retinal Detachment

<table>
<thead>
<tr>
<th>Patient No.</th>
<th>Age (yrs)</th>
<th>Sex</th>
<th>Surgical Management Technique for IOL Dislocation</th>
<th>Interval Between IOL Dislocation Management and RD</th>
<th>VA before RD</th>
<th>Macular Status</th>
<th>Final VA</th>
<th>Retina Attached?</th>
<th>Surgical Procedure</th>
<th>Complications after RD Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>69</td>
<td>M</td>
<td>PCIOL reposition into ciliary sulcus</td>
<td>30 days</td>
<td>20/400</td>
<td>On</td>
<td>20/20</td>
<td>Yes</td>
<td>SBP + gas</td>
<td>—</td>
</tr>
<tr>
<td>2</td>
<td>70</td>
<td>F</td>
<td>PCIOL reposition into ciliary sulcus with scleral sutures fixation</td>
<td>67 days</td>
<td>20/80</td>
<td>On</td>
<td>20/200</td>
<td>Yes</td>
<td>SBP + PPV + EL</td>
<td>CME</td>
</tr>
<tr>
<td>3</td>
<td>68</td>
<td>M</td>
<td>PCIOL reposition into ciliary sulcus with scleral sutures fixation</td>
<td>31 days</td>
<td>LP</td>
<td>Off</td>
<td>20/40</td>
<td>Yes</td>
<td>Pneumatic retinopexy</td>
<td>—</td>
</tr>
<tr>
<td>4</td>
<td>66</td>
<td>M</td>
<td>PCIOL reposition into ciliary sulcus</td>
<td>10 days</td>
<td>20/70</td>
<td>On</td>
<td>20/25</td>
<td>Yes</td>
<td>SBP + PPV + EL + Gas</td>
<td>Diplopia</td>
</tr>
<tr>
<td>5</td>
<td>84</td>
<td>F</td>
<td>PCIOL removal and exchange for another PCIOL</td>
<td>41 days</td>
<td>20/40</td>
<td>On</td>
<td>20/40</td>
<td>Yes</td>
<td>SBP + PPV + Cryo</td>
<td>—</td>
</tr>
<tr>
<td>6</td>
<td>72</td>
<td>M</td>
<td>PCIOL reposition into ciliary sulcus with scleral sutures fixation</td>
<td>26 days</td>
<td>HM</td>
<td>Off</td>
<td>20/200</td>
<td>Yes</td>
<td>SBP + PPV + MP + EL + SO</td>
<td>ERM</td>
</tr>
<tr>
<td>7</td>
<td>84</td>
<td>M</td>
<td>PCIOL reposition into ciliary sulcus</td>
<td>21 days</td>
<td>20/300</td>
<td>Off</td>
<td>20/200</td>
<td>Yes</td>
<td>SBP + PPV + EL</td>
<td>—</td>
</tr>
</tbody>
</table>

CME = cystoid macular edema; EL = endolaser; ERM = epiretinal membrane; HM = hand motions; IOL = intraocular lens; LP = light perception; MP = membrane peeling; PCIOL = posterior chamber intraocular lens; PPV = pars plana vitrectomy; RD = retinal detachment; SBP = scleral buckle procedure; SO = silicone oil; VA = visual acuity.
complications with retained IOLs occur with substantial frequency, these do not occur in most cases. In a series of 15 patients with dislocated IOLs managed by observation, a visual acuity of ≥20/40 was reported in 9 (60%) patients; CME limited the final vision in 3 of the 6 remaining patients.5

IOL removal with or without exchange is usually performed for IOLs with damaged haptics, small optics, or highly flexible haptics unsuitable for suture support. In addition, IOL removal is considered for eyes with coexisting complex RD. The surgical option of PCIOL removal and ACIOL insertion in selected cases has been reported.6 IOL removal rates have possibly decreased,7 perhaps because of improved IOL repositioning techniques. By avoiding a limbal incision for IOL removal or exchange, trauma to the corneal endothelium and postsurgical astigmatism may be reduced.

Repositioning of dislocated IOLs into the ciliary sulcus using residual capsule for support is the most commonly used surgical technique in two large reported series.8,9 The authors’ preferred technique is to retrieve the IOL from the vitreous or retinal surface and bring it anteriorly with forceps. Usually one haptic is brought anterior to the iris and one haptic is directly placed into the sulcus over the capsular remnants. Depending on capsular anatomy and pupillary dilation, a pick is used to rotate the second haptic into the sulcus or into position for using the forceps to grasp and “bury” the second haptic. This nonsuturing technique for IOL repositioning is the least surgically complex, is relatively quick, and is the least traumatic to the ciliary body or sclera. It is the preferred approach in eyes with at least six clock hours of residual peripheral capsular support (most of which should be in the inferior quadrant). Repositioning of a PCIOL into the anterior chamber is an option that should be reserved for carefully selected patients10,11 (e.g., those with other intraocular complications such as RD) because posteriorly vaulted PCIOL haptics may induce chronic iritis, inflammation, and corneal decompensation.

In eyes with inadequate capsular support, transscleral suture fixation is often a good surgical option. Numerous modifications of this technique have been described,9,12-14 but the authors’ preferred technique15,16 was used successfully in 44 (40%) eyes in this study without significant complications. Some patients may require suturing only one IOL haptic when suitable capsular support remains for the second haptic.

Table 3. Causes of Decreased Final Visual Acuity

<table>
<thead>
<tr>
<th>Causes of Decreased Final Visual Acuity</th>
<th>No. of Eyes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-existing ocular pathology</td>
<td></td>
</tr>
<tr>
<td>(ARMD = 3, PDR = 2, glaucoma = 1)</td>
<td>6</td>
</tr>
<tr>
<td>Cystoid macular edema</td>
<td>3</td>
</tr>
<tr>
<td>Retinal detachment</td>
<td>1</td>
</tr>
<tr>
<td>Phthisis bulbi after suprachoroidal hemorrhage</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>11</td>
</tr>
</tbody>
</table>

ARMD = age-related macular degeneration; PDR = proliferative diabetic retinopathy.

The main complications of transscleral sutures include suture knot exposure, endophthalmitis, intraocular hemorrhage, IOL torsion or malposition, and broken suture causing repeat dislocation. The use of a scleral flap (which should be at least 50% scleral thickness) minimizes complications of transscleral suture fistulas,17 suture knot erosion through the conjunctiva, and inadvertent cutting of the scleral suture during subsequent procedures. This study documents that 45 of 47 (96%) of the patients who had scleral flaps for transscleral suture placement presented with sutures not visible on follow-up examinations; only 1 patient complained of suture-associated discomfort.

Needles and sutures passed through the ciliary body increase the risk of hemorrhage during surgery. Care must be taken to avoid piercing the ciliary body and, especially, the major arterial circle. This is done by passing the needle through the ciliary sulcus perpendicular to the sclera.

Anatomic studies demonstrate that the ciliary sulcus is located approximately 1.0 mm posterior to the limbus.18 IOL torsion and decentration are minimized by accurate ciliary sulcus placement and adequate excision of bulky capsular remnant.

This study includes 12 eyes with dislocated silicone plate haptic IOLs. Previous reports describe dislocation of silicone plate IOLs after Nd:YAG capsulotomy or primary capsular defect.3,19 The management of dislocated silicone plate IOLs requires special consideration because they are slippery and difficult to grasp in the vitreous and more difficult to manipulate. By lifting the IOL from the retinal surface with an illuminated pick or hook, the IOL optic can be grasped with serrated or diamond-dusted forceps and repositioned into the ciliary sulcus in eyes with adequate anterior capsular support (10 eyes in this study). Dislocated silicone plate IOLs were exchanged for polymethylmethacrylate IOLs in eyes with poor capsular support in this study (two eyes). A recent report has described a scleral suture technique for this circumstance.20

In this series, the incidence of postoperative RD (6.3%) was greater compared with other reports.9,21-22 No reason for this increase is apparent; although the follow-up interval is longer in this series, most cases occurred within a few weeks of repositioning surgery. Careful intraoperative and postoperative examinations of the retinal periphery are necessary to look for retinal tears or localized retinal detachment, especially in the first 2 months postoperatively, which is the time period during which the RDs in the current series occurred. In some eyes, further surgery may be avoided by identifying and treating peripheral breaks and doing an in-office fluid-gas exchange.

Dislocated IOLs represent a serious complication of cataract surgery. Many treatment options are available, but IOL repositioning is usually the ideal approach. By evaluating both the remaining capsular support and the IOL characteristics, the best surgical option for an individual patient can be selected. VA outcomes after management with vitrectomy are usually good, but coexisting diseases and secondary complications may limit final vision.
References