Every day, thousands of patients worldwide successfully undergo IOL implantation. In some cases, however, the sight-threatening complication of a malpositioned or dislocated IOL may occur. The popularization of multifocal IOLs in recent years has raised the bar regarding IOL centration following cataract surgery because these IOLs require perfect centration to maximize their function. Therefore, it is important for the anterior segment surgeon to anticipate, avoid, readily recognize, and manage the potential complication of IOL subluxation and/or dislocation.

ETIOLOGY AND SYMPTOMS

Malpositioning of an IOL can be a serious complication. It may happen intraoperatively, early postoperatively, or late postoperatively. With anterior chamber IOLs, uveitis-glaucoma-hyphema syndrome, glaucoma, cystoid macular edema, corneal decompensation, and monocular aphakia may present secondary to the malposition. Dislocated posterior chamber IOLs may cause diplopia due to prismatic image displacement, a large aphakic pupil opening, glare, and retinal detachment. Patients do not frequently complain about pain or discomfort, except in cases where part of the IOL is rubbing against the iris or ciliary body and inflammation results.

When IOL malposition occurs, the most common patient complaints include anisometropia resulting from effective miscalculation of IOL power, significant astigmatism due to IOL tilt, visual alterations including glare and diplopia, and decrease in visual acuity. Reasons for malpositioning and dislocation include the following:

- If the diameter of the IOL span is too short, it may be unable to maintain a central position within a large capsular bag. This occurs mostly with plate-haptic IOLs and sometimes with IOLs in which damage to the haptics occurred during implantation, making them functionally shorter;
- Off-center movement of the lens can result due to capsular fibrosis, which is a common complication when capsular fibrosis and phimosis of a small anterior capsular opening occur. This problem can sometimes combine with late zonulolysis, especially in patients with pseudoexfoliation syndrome;
- Zonular dehiscence can present preoperatively, occur during surgery, or be recognized postoperatively;
- Intraoperative capsular rupture can cause decentration

When malpositioning occurs, patients complain of anisometropia, glare, diplopia, and a decrease in visual acuity.

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Figure 1. This 32-year-old female high myope underwent phaco and IOL placement 7 years ago. Eventually, she developed capsular phimosis and marked zonulolysis. As a result, the capsular sac and IOL were subluxed pending dislocation. Her UCVA is 20/400 and BCVA is 20/200.
or displacement;

- Postoperative trauma can result in loss of zonular support and/or traumatic displacement of the IOL;
- Placement of an IOL in a compromised capsule with an unstable opening posteriorly, equatorially, or anteriorly may result in malposition following capsular fibrosis or inadvertent IOL movement;
- Implantation of one haptic into the bag and inadvertent implantation of the other into the sulcus will result in a tilted IOL and possibly significant postoperative astigmatism;
- With one-piece soft acrylic IOLs such as the AcrySof (Alcon Laboratories, Inc., Fort Worth, Texas), inadvertent twisting of one haptic during capsular fixation may result in a well-centered IOL in regard to the capsulorrhexis but significant tilt of the IOL within the capsular bag, and this may result in significant astigmatism and/or prism.

PREVENTING IOL DISLOCATION

Creating the optimal capsulorrhexis reduces the possibility of IOL subluxation. Sometimes an IOL becomes decentered as a result of an eccentric and/or ellipsoid capsulorrhexis and subsequent fibrosis of the capsule. During capsulorrhexis and the rest of the cataract procedure, any sign of weak zonular support should alert the surgeon to consider the placement of a capsular tension ring (CTR). In case of capsular rupture or compromise, be prepared to perform sulcus fixation of the IOL. If the capsulorrhexis is centered and round, placing the haptics into the sulcus and capturing the optic behind the capsulorrhexis may ensure good centration and minimize iris-IOL friction.

In the absence of good capsular support for IOL placement, there are several options for the surgeon. Either an angle-fixated or, to my preference, an iris-fixated anterior chamber IOL such as the Artisan aphakia IOL (Ophtec BV, Groningen, Netherlands), can be implanted. Another option is the use of McCannel sutures to fixate the originally planned posterior chamber IOL behind the iris. Lastly, scleral fixation of the IOL can be performed.

Implanting through an injector system may sometimes damage the IOL haptics. In this case, even perfect capsular placement may result in significant optic subluxation.

MANAGING THE MALPOSITIONED IOL

The approach that I follow in my surgical practice is individualized according to the needs of each patient and the cause of the malposition. There are three options: observe, remove and replace, or reposition the malpositioned IOL.

The course of action should always reflect the type and location of the lens; age, symptoms and visual acuity of the patient; presence and severity of inflammation; and status of the fellow eye. When the patient's symptoms are infrequent and limited to the evening (e.g., night halos, glare), then use of pharmacologic pupil miosis or scotopic pupil dilation agonists (e.g., Alphagan [Allergan, Inc., Irvine, California], Iopidine [Alcon Laboratories, Inc.]) may be sufficient.

When surgical intervention is indicated, I usually prefer iris fixation of the existing lens or lens exchange with iris fixation of a new lens, as this the least invasive, preserves the conjunctiva, and is a closed-chamber technique. I have explanted IOLs in several patients and implanted a new iris-fixated IOL (Artisan; Ophtec BV, Groningen, Netherlands, marketed in the United States as the Verisyse; Advanced Medical Optics, Inc., Santa Ana, California) with successful results. Iris suturing techniques include the McCannel and Siepser methods. In the McCannel technique, a sharp needle is passed through the cornea, under the iris and the posterior chamber IOL.

Figure 2. The same 32-year-old woman after IOL exchange with an Artisan aphakia lens, anterior vitrectomy, iridectomy, and 2 mg prophylactic intravitreal triamcinolone (Kenalog; Bristol-Myers Squibb, Princeton, New Jersey) administration to reduce the chance for macular edema. Her UCVA is 20/20.

Figure 3. This 75-year-old woman underwent complicated cataract surgery 2 years ago. She never achieved good postcataract vision. She has a posterior chamber IOL placed in the anterior chamber, no capsular support, and secondary glaucoma with IOP of 32 mm Hg. Her UCVA is 20/200 and BCVA is 20/50.
loop, and out through the cornea in a second puncture. Through a common paracentesis, the suture loops are captured, externalized, and then tied together. Lastly, the ends are cut. Another option is scleral fixation. There are several scleral suturing techniques, including the double-knot transscleral fixation for sunset or sunrise syndrome, working through sclerotomies made in the pars plana, or lassoing the loops to the sclera.

IOL removal may be necessary if the haptics are severely damaged or have separated from the optic. Furthermore, some IOLs such as one-piece AcrySof IOLs may not be well suited for iris or scleral fixation. In cases of IOLs dislocated posteriorly through a ruptured posterior capsule, a partial vitrectomy may be performed to free as much of the lens from the vitreous as possible, and then the IOL can be explanted or manipulated with heavy liquids such as perfluorocarbon liquids. If the IOL is dislocated posteriorly during the procedure, a possible approach is to inject viscoelastic and push the lens forward to retrieve it with a lasso suture.

FREEING FIBROSED IOLs

For a fibrosed IOL, I usually use a combination of blunt dissection and viscodissection. Additionally, I use intraocular scissors to create a new anterior capsulorhexis and insert a CTR. If the IOL still will not center, the optic can be buttonholed inside the bag. This allows suturing of one or both haptics to the iris.

These steps can usually be performed with success in the early postoperative period. Within 3 to 6 months, most IOLs become quite attached to the capsular bag as it fibroses, making it challenging to remove the IOL without causing significant zonulolysis. If this is the case, another option is to amputate both haptics, remove the optic of the old IOL after folding or cutting in the eye, and then place a foldable replacement IOL into the sulcus.

If the surgeon notices signs of zonular weakness during cataract surgery, it is a smart choice to place a CTR. It is also highly recommended to look closely for subtle signs of zonular laxity during surgery (ie, behavior of capsule during capsulorrhexis, unusual capsulorrhexis shape such as ovalization before and after phaco, capsular fragility, obvious displacement). Additionally, a capsular tension segment can be added after dislocation in the areas where support is needed.

CONCLUSION

Experience teaches us that IOL dislocation is best treated as soon it is recognized. It is always best to manage the problem during the initial procedure. If the IOL does not look well centered in the OR, it will probably get worse when the patient stands up and resumes normal activity. Some dislocations may damage the cornea and/or result in retina complications. They should be treated promptly.

Finally, mastering iris fixation, transcorneal suturing, and thorough vitrectomy techniques may provide the anterior segment surgeon several good options for optimal management of these challenging cases.

TAKE-HOME MESSAGE

- Patient complaints related to a malpositioned IOL include anisometropia, glare, double images, and decreased visual acuity.
- An optimal capsulorrhexis reduces the future possibility of IOL subluxation.
- Choose from three management methods: observe, remove and replace, or reposition the IOL.

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