Management of Dislocated PC IOL

Dr. Meena Chakrabarti MS, Dr. Valsa T. Stephen MS, Dr. Sonia Rani John DNB, Dr. Arup Chakrabarti MS

Inadequate posterior capsular support or zonular rupture may allow IOL decentration or dislocation. Decentered IOLs may occur in 0.2 % to 1.2 % of cases postoperatively. The specific cause of the displacement may not be always evident.

Various mechanisms include the following

1. Inadequate posterior capsular support due to posterior capsular rent.
2. Zonular rupture.
3. Accidental placement of IOL through posterior capsular rent into the anterior vitreous face.
4. Late haptic rotation out of a zone of thin capsular remnant.

The cause of late spontaneous IOL rotation is unclear. It may follow accidental changes in position, gravitational effect, accidental finger rubbing or other contact with the eye. Late dislocation of the IOL can occur spontaneously or following trauma.

Generally posterior chamber IOL placement is safe if at least 180 degree of the capsular remnant is intact. More extensive support is necessary if the capsular remnant is missing inferiorly or if the capsular margin on which the haptics are to be positioned is inadequate.

Indications for subsequent surgery: The indications for surgical removal include decreased visual acuity, chronic intraocular inflammation, retinal detachment and vitreous in the cataract wound associated with cystoid macular oedema. Although a dislocated IOL may be well tolerated for a considerable period of time by some patients, visual rehabilitation is usually difficult and surgical intervention may become necessary.

Surgical Technique: For a subluxated IOL, associated with symptoms, surgery may be performed by a limbal or parsplana approach. In patients with less extensive subluxation and posterior capsule that is intact for most of its part, repositioning can be done via the limbal route, after minimal or no anterior vitrectomy. However, in the presence of a sizeable posterior capsular rent, or posterior dislocation of the IOL into the vitreous cavity, a parsplana approach is preferred to achieve the goals of surgery. A thorough preoperative assessment of the posterior capsular integrity is necessary to plan the surgical procedure.

The first step of the procedure is to bring the dislocated IOL into the anterior vitreous in the plane of the pupil.

Fig. 1. After completion of the vitrectomy, injection of perfluorocarbon liquid between the retina and the intraocular lens, floats the dislocated intraocular lens off the retina.
This is achieved after a complete vitrectomy and release of vitreous adhesions to the IOL. The IOL is then lifted off the retinal surface using foreign body forceps or with the help of perfluorocarbon liquids (fig 1).

Late spontaneous in-the-bag intraocular lens and capsular tension ring dislocation has been reported in pseudoexfoliation syndrome. Capsular tension ring implantation in “pseudoexfoliation associated zonular weakness” does not guarantee long term zonular stability and capsular bag / IOL positions. In these patients, parsplana vitrectomy, perfluorocarbon liquid injection to lift up the CTR-IOL-CB complex, grasping this complex with forceps and bringing it to the pupillary space transfer across pupil, and with a McPhersons forceps the complex can be explanted through the cornea scleral incision as a single unit.

Alternatively after PFCL injection, the vitrectomy cutter is used to cut the capsular bag after supporting it with an illuminated hook followed by removal of the CTR and IOL separately through a smaller scleral tunnel.

Once the PC IOL is in the pupillary plane depending on the integrity of the capsulozonular remnant there are three options available to the surgeon. These include 1,2

1. IOL repositioning.
2. IOL explanation
3. IOL exchange.

**IOL Repositioning**: is performed when adequate capsulozonular support is present. The lens may be repositioned without sutures on to the residual posterior capsule or fixed by sutures to the iris or the sclera. Surgical success depends on accurate placement of the haptics into the ciliary sulcus and this requires visualization of the residual posterior capsule.

In patients with insufficient pupillary dilatation iris hooks or retractors may be used to allow a more accurate assessment of the posterior capsule. Since the use of capsulorhexis has become wide spread, the peripheral anterior capsule is left intact and frequently serves as adequate support for the sulcus fixation of the dislocated PC IOL. Repositioning of a posterior chamber IOL into the anterior chamber has also been reported, but this approach is not recommended due to chronic chafing of the iris by the IOL.

**IOL removal and or exchange options** are usually exercised during surgery when the IOL has been damaged (e.g. broken haptic), when appropriate instrumentation to reposit the IOL is unavailable, or when highly flexible haptics make the IOL unsuitable for sulcus fixation. IOL exchange may sometimes be appropriate for plate haptic IOL which are slippery and difficult to grasp than PMMA lenses. Serrated or diamond dusted forceps are recommended when handling these IOLs. Repositioning may be particularly challenging with silicon plate haptic lenses because they are extremely floppy and difficult to manipulate. Also, since they are not expandable and sized for capsular fixation, centration with sulcus placement may be suboptimal because it requires a longer dimension. Implantation of a second IOL without removing the first IOL has been reported, but this approach is not generally recommended.

In patients for whom repositioning of posterior chamber IOLs proves problematic, an intraoperative decision may be made to remove or replace the lens with an anterior chamber IOL or a scleral suture-fixated posterior chamber IOL. Exchanging for a scleral sutured- IOL has been simplified by new IOL designs that incorporate positioning holes at the point of maximum haptic curvature. Alternatively, exchange for an anterior chamber IOL may be a faster, easier and less traumatic to the corneal endothelium.

Newer AC IOL designs avoid mechanical side effects that accompanied earlier designs.

Scleral fixed PC IOLs are technically more complex than AC IOL implants. They carry a high risk of intraocular hemorrhage because of penetration of the ciliary body. The major disadvantage of this technique is that it leaves a potentially permanent partial thickness fistula through the sclera, around the 10th prolene suture. This surgical technique requires a thorough anterior vitrectomy. IOL power calculation is difficult due to posteriorly placed optic of the IOL.

It is important to verify the position of the scleral fixed IOL because 2 prolene sutures are its sole support and the position of the lens is the most important factor contributing to post-operative refraction. A one piece,
all PMMA, 10° vaulted, 13.5 mm haptic spread IOL provides excellent optic centration and haptic stabilization, when the haptic positioning holes are placed at the point of greatest haptic spread and one trans-scleral suture pass per haptic is made. A scleral entry point 18,19,20 0.50 mm to 0.75 mm from the surgical limbus avoids the major arterial circle and the entire ciliary body and provides true ciliary sulcus placement of the IOL.

Scleral fixation sutures 21,22,23 were first introduced for implantation of secondary IOLs from the limbal or parsplana approach or even for placement of a primary PC IOL in the absence of adequate capsulozonular support. Although a wide variety of techniques have been described, all have the following common objectives:-

1. Proper suture attachments to the IOL haptic.
2. Proper scleral sutures positioned to avoid torsion, decentration or damage to intraocular structures.
3. Proper scleral flap sutures to avoid externalization of the fixation sutures and reduce the risk of endophthalmitis.

In any scleral suture fixation procedures, the IOL is first retrieved, then a suture loop is introduced through the pars plana region into the vitreous cavity and around the IOL and the suture is firmly secured to the sclera. The technique that is commonly used for repositioning the dislocated PC IOL with scleral sutures in given below 24,25 (Fig. 2)

IOL torsion and decentration can be avoided by accurate ciliary sulcus placement and adequate excision of bulky capsular remnant and cortical matter. Histopathological studies have shown little or no fibrosis around the

![Fig. 2 a-d Technique for scleral suture fixation. (2a) Suture is threaded through a 27-gauge straight needle with a hole in the bevel. Needle and suture are introduced into the vitreous cavity 1 mm posterior to the limbus through the bed of a partial thickness scleral flap. Slack is created in the suture along the shaft of the needle by withdrawing it slightly. Under direct visualization the haptic is threaded through the loop along the shaft of the needle, using an intraocular forceps to grasp the optic. (2b) The needle is withdrawn, and the suture is tied under the scleral flap. (2c) Similar procedure is performed for the other haptic (2d). Side view of 2c.](image)

![Fig. 3. 10-0 prolene suture on an STC6 plus (ethicon) needle. Is passed at 10'o clock, docked on a 30 guage needle at 4'o clock (a) and pulled out with the later diagonally (b). A Sinskey hook pulls out the suture from superior corneo-scleral section. The prolene suture is then tied to the PC IOL haptic(d). The PC IOL is then delivered into the posterior chamber with Mc Pherson forseps(e). The sutures are pulled at 4'o clock and 10'o clock meridians (f). A single posterior scleral bite is taken and sutures are tied to themselves (g)](image)
sutured PC IOL haptics. Therefore, a non dissolving suture material must be used since it provides the sole means of support at the ciliary sulcus. Iris fixation sutures requires passing a suture through the cornea, iris, around the IOL haptic and back through cornea and iris. Placement of the needle is not accurate making IOL centration a challenging task. Other disadvantage includes the increased risk of inviting a chronic iris mediated intra ocular inflammation.

Fig 3 a-g describes the technique of two point scleral fixator that we have been using for several years and it has given us predictable results. Alternatively a 4-point scleral fixation can be performed where the suture passage is made twice, ensuring adequate anchorage, centration and eliminating torsion.

Boris Malyugin et al described a technique for repositioning and trans scleral fixation of a dislocated plate - haptic foldable collamer posterior chamber intraocular lens. The displaced IOL was positioned in the anterior chamber, and a double armed suture or a curved needle was fixed to the sclera at 10.30 O’clock position. The needle then entered the globe and passed through the superior haptic eyelet of the IOL and was withdrawn through the scleral wound on the opposite side. The inferior haptic was fixed at 4.30 and 7.30 o’clock and provided the mirror reflection of the suture path of the upper fixed haptic. This technique may be an useful alternative to lens removal and exchange.

Richard Hoffman et al described a technique of scleral fixation without conjunctival dissection. The scleral tunnel technique for scleral fixation utilizes a scleral pocket initiated through a peripheral clear corneal incision. Full thickness passage of a doubled arm suture through scleral pocket and conjunctiva with subsequent retrieval of the suture ends through the external corneal incision for tying avoids the need for conjunctival dissection, and a sutured wound closure.

A new technique that relies on glue to implant IOLs in eyes that lack posterior capsular support was described by Agarwal et al. They used biological glue (a quick acting surgical fibrin sealant derived from human plasma with both hemostatic and adhesive properties) to perform scleral fixation in a case of dislocated IOL. Using microrhexis forceps the haptic of the PMMA non-foldable IOL is grasped and externalized under the previously prepared scleral flap. Fibrin glue is applied on the bed of the flap and the flap is closed in position. In the 12 eyes in their series there were no notable postoperative complications such as postoperative inflammation, hyphema, decentration, glaucoma or corneal oedema on regular follow up. However a long term follow up is necessary to validate the efficacy of the procedure.

**Surgical Results:** The incidence of retinal detachment following vitrectomy for dislocated PC IOLs is given in Table 1. In recent series, approximately 70 % of patients achieved a final visual acuity of 20/40. But surgical series are difficult to compare accurately due to nonhomogeneity of the variety of management techniques used.

<table>
<thead>
<tr>
<th>Study</th>
<th>Total (Year)</th>
<th>RD before PPV</th>
<th>RD after PPV</th>
<th>Cumulative PPV</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Blodi et al (1992)</td>
<td>32</td>
<td>4 (12.5 %)</td>
<td>3 (9.3 %)</td>
<td>7 (21.9 %)</td>
</tr>
<tr>
<td>2. Scott (2003)</td>
<td>343</td>
<td>25 (7.3 %)</td>
<td>19 (5.5 %)</td>
<td>44 (12.8 %)</td>
</tr>
<tr>
<td>3. Smiddy (2003)</td>
<td>100</td>
<td>4 (4.0 %)</td>
<td>4 (4.0 %)</td>
<td>8 (8.0 %)</td>
</tr>
</tbody>
</table>

**References**

2. William E Smiddy; Gonzalo V Ibanez; Eduardo Alfonso; Harry Flynn Surgical Management of dislocated IOLs: JCRS; Vol 21; Jan 1995, 64-69.
4. Harry W Flynn Jr MD; Delyse Buus MD; William W Culbertson MD. Management of Subluxated and Posteriorly Dislocated IOLs using Pars plana Vitrectomy Instrumentation. JCRS; Vol 16, Jan 1990; 51-56
12. Hilel Lewis. MD; German Sanchez MD. The use of PFCL in the repositioning of posteriorly dislocated IOLs. Ophthalmol 1993;100; 1055-1059.