Comprehensive strategy for management of posterior capsular rent (with or without vitreous disturbance) by the anterior segment surgeon

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Introduction
The outcome of uncomplicated cataract surgery performed by phacoemulsification in the present scenario is excellent. Posterior capsular rent, reported to occur in 0.5 to 7.5% of cases is a significant potential intraoperative complication of phacoemulsification. An improperly managed posterior capsular rent, with or without vitreous disturbance can mar this excellent outcome. Vitreous loss appears to be the crucial factor determining eventual clinical outcome. When the posterior capsule is broken without accompanying vitreous disturbance there is an increased risk of CME, vitreous prolapse into the anterior chamber and pseudophakic retinal detachment. Once vitreous is lost, the postoperative course is complicated in 30% of patients with an increased incidence of hyphaema, retained cortex, corneal edema, blurred vision and long term retinal problems including chronic CME, macular holes and retinal detachment. However, today, the control rendered through closed chamber modern surgical techniques may allow for a final outcome that is not much different from an uncomplicated case.

While each patient with a ruptured posterior capsule is unique, several basic surgical principles apply universally. Every cataract surgeon must understand these fundamental principles of how to diagnose and manage this complication in order to avoid long-term sequelae.

Common Predisposing factors for Posterior Capsular Rupture
Certain types of cataract may be at a higher risk for developing posterior capsular rent. They are 1) posterior polar cataract (PPC) and the cataract associated with posterior lenticous or lenti globus, 2) post vitrectomy cataract, 3) traumatic cataract, 4) white cataract, and 5) black cataract. Preoperative counseling of patients with these types of cataract should include a thorough discussion about the potential for a posterior capsular rent and its sequelae.

General Predisposing factors for the Torn Posterior Capsule
- Poor visibility secondary to physical problems: hand position, brow, fluid pooling, speculum, which does not provide adequate exposure.
- Poor visibility secondary to pathology; dense arcus, pterygium, band keratopathy, corneal scars. Long and short axial length
- Pseudoexfoliation
- Dense asteroid hyalosis
- Small pupil
- Previous Trauma
- Certain Types of Cataract
**Inadequate Visibility**

An important predisposing factor leading to posterior capsular rupture is the relationship of the surgeon's hand position to the patients' brow with ensuing visibility problems, irrigation fluid pooling, and torsion of the globe. If the brow is prominent (i.e., a deep set eye) a temporal approach will minimize the inferior torsion of the globe. If there is pooling of fluid, turning the head temporally will allow the fluid to drain. A specially designed speculum allowing easy access to the globe without getting in the way during phacoemulsification should be used. Poor microscope illumination or alignment is another cause of poor visualisation, which should be simple to remedy once recognised. Other factors, which impair visualisation, include dense arcus senilis, dense nasal or temporal pterygia, band keratopathy and old corneal scars. Faced with these challenges to visualisation, the surgeon should slow down, pay more attention to details and be more careful about focusing through the corneal problem to allow visualization of the anterior segment. Use of trypan blue dye to stain the anterior capsule helps to improve visualization in many of these cases.

**Long and Short Eyes**

In high myopia and eyes that have undergone previous vitrectomy, the anterior chamber is deeper with more trampolining of the posterior capsule, due to the thinner, more elastic tissues. Lowering the infusion bottle and machine vacuum and flow settings lessen this tendency. In contrast, in high hyperopia the anterior chamber is crowded, making the posterior capsule closer to the phaco needle and increasing the risk of posterior capsule rupture. In these situations, early use of pulsed phaco will assist in deepening the anterior chamber. Iris prolapse is more common as the infusion from the phacotip will flow behind the iris, forcing it out of the infusion. A slightly more anterior incision and careful attention to incision size are required in these eyes.

**Pseudoexfoliation**

This condition is known to be associated with both weak zonules and poor pupillary dilatation. These twin problems lead to an increased incidence of torn posterior capsules or dehiscence of the zonules.

**Asteroid Hyalosis**

Dense asteroid hyalosis may make it difficult to visualize the posterior capsule during phaco. The surgeon must be careful and stay away from the posterior capsule, thus avoiding inadvertent tears.

**Miosis**

Intraoperative miosis or preexisting small pupil is an important predisposing factor for rupture of the posterior capsule. Attempt should be made to dilate pupil maximally by pharmacologic means and failing which surgical method(s) should be employed.

**Additional Factors**

Additional risk factors for posterior capsular rent could include 1) Inexperienced surgeons; (2) demented, disoriented or anxious patients with subsequent inadvertent patient movement; (3) equipment malfunction; and (4) preexisting trauma with unseen capsular rupture or zonular damage.

**Prevention**

The incidence of posterior capsular rent decreases with the increasing experience of the surgeon. The most severe tears occur during attempted emulsification of the nucleus. An intact capsulorhexis can greatly reduce this complication. The use of low-vacuum, low-aspiration phacoemulsification will also reduce the incidence of this complication by minimizing surge. Low-power phacoemulsification also adds to the safety by reducing the chance of piercing through the nucleus and rupturing the posterior capsule. However, with the current new generation phaco machines available safe phaco can still be performed with high vacuum parameters. During phacoemulsification, a second instrument of an appropriate design may be placed behind the remaining nucleus to hold the posterior capsule back and physically prevent it from contacting the phaco needle. Recently a silicone I/A tip has become available which may provide superior capsular protection compared to traditional metallic tip designs.
When does the posterior capsule tear?

The highest incidence of posterior capsular tear during phacoemulsification occurs 1) toward the end of phacoemulsification when the last pieces of nucleus are to be emulsified, 2) during polishing of the posterior capsule, and 3) during I/A. The next highest incidence of capsular rent is during early to mid phaco when the phaco needle is inadvertently passed through the nucleus and tears the posterior capsule or capsular equator. The least common times to tear the capsule are during hydrodissection and IOL insertion.

Early recognition of zonular or posterior capsular rupture

If a posterior capsular tear is not recognized in time intraocular maneuvers required for phacoemulsification (viz. nuclear rotation, sculpting, cracking) and fluctuations in anterior chamber depth will quickly enlarge the size of the tear. The risks of vitreous loss and dropped nucleus increase longer the rupture goes unrecognized. Early recognition of a posterior capsular tear and prompt prophylactic measures will prevent expansion of the tear size.

Signs of early posterior capsular tear or zonular dehiscence include the following.
- Sudden deepening of the anterior chamber with momentary dilatation of the pupil.
- Sudden transitory appearance of a clear red reflex peripherally
- Newly apparent inability to rotate a previously mobile nucleus
- Excessive lateral mobility or displacement of the nucleus and loss of nucleus followability.
- Excessive tipping of one pole of the nucleus
- Partial descent of the nucleus into the anterior vitreous space.

Some of these signs are transient. However if the surgeon is alert an early diagnosis of posterior capsular rent may be suspected even though the rent as such is not immediately visualized due to the overlying nucleus. If posterior capsule or zonular rupture is suspected the surgeon must decide whether to continue with phacoemulsification or convert to a safer and standard non phaco technique. The management decision is based upon the amount of nucleus remaining, the density of the nucleus, other accompanying risk factors (e. g; small pupil, loose zonules, etc.) and the individual surgeon’s level of confidence and experience.

Most tears in the posterior capsule are small when they first occur. The surgeon should try to keep them from enlarging or tearing anteriorly destroying the integrity of the anterior capsular rim.

Posterior capsule rupture - avoiding (or delaying) extension of the rent and vitreous loss

As soon as a problem is sensed one must exercise the discipline to stop working. This doesn’t mean abrupt removal of the instruments from within the eye though there is a reflex to suddenly withdraw the phaco or I/A tip. Sudden unplugging of the incision will result in emptying and collapse of the anterior chamber. If a sufficient portion of the nucleus has been removed the posterior capsule bulges forwards, the capsular tear enlarges and the anterior hyaloid face ruptures which will allow vitreous to prolapse through the defect towards the wound. Instead, the anterior chamber should be filled with viscoelastic through the side port incision to block vitreous prolapse and stabilize any remaining lens material prior to removal of the phaco or I/A hand piece. The surgeon should stay in foot pedal position 1, and as the viscoelastic is injected he should change to foot position (0) and the handpiece can then be safely removed after the anterior chamber is filled. A low viscosity, less cohesive and highly dispersive viscoelastic helps to form a better plug in a capsular break and tamponade the anterior hyaloid face. Subsequently the pathology should be carefully assessed which will then determine the subsequent surgical strategy.

Posterior capsular defect and retained Nuclear material without vitreous prolapse

When confronted with this situation, whether to continue with phacoemulsification or convert to a safe non phaco technique (manual small incision cataract surgery or standard extra capsular cataract extraction) depends on the bulk of the residual nucleus material, the degree of nuclear sclerosis, the size of the rent and
the surgeon's experience. The immediate goal is to prevent vitreous prolapse into the anterior chamber and losing the remaining nucleus into the vitreous. If the nucleus is soft, and particularly if only a small residual amount remains, continuing with phacoemulsification may be a reasonable option. The surgeon should use the second instrument to move the remaining nucleus away from the tear to complete the emulsification. The nucleus should not be rotated using the phaco tip. The procedure should be slowed down by reducing the aspiration flow rate, decreasing the vacuum (thereby reducing post occlusion surge) and by lowering the infusion bottle (to prevent increasing the pressure in the anterior segment and driving the nucleus back into the vitreous cavity). Short bursts of low energy ultrasound with low aspiration, effective vacuum, and reduced irrigation will decrease the risk of nuclear loss, chamber shallowing and vitreous prolapse. Another option developed by Mark Michelson is to introduce a trimmed Sheets glide between the nucleus and the capsular tear by enlarging the phaco incision by 0.5 mm. This maneuver will prevent small nuclear fragments from descending through the capsular defect. Once the nucleus has been emulsified, the phaco handpiece should be removed only after the anterior chamber has been stabilized by injecting viscoelastic through the side port.

Residual cortex and epinucleus removal can be safely accomplished without extending the rent by following several surgical principles. One method is to employ low flow, low vacuum, bimanual I/A through clear corneal incisions. The lack of incisional fluid leak will reduce fluctuation in chamber depth. The bimanual technique offers safer and better access to the subincisional area and allows the aspirating port to be positioned peripherally and aimed away from the rent or dehiscence. Lowering I/A flow and vacuum settings will reduce speed and post occlusion surge respectively. The cortex remote from the tear should be removed initially and should be stripped towards the rent because any force generated away from it will cause its extension. Heroic efforts to remove all cortex should be avoided since such attempts might extend the tear and further compromise the integrity of the capsular bag. An alternative method of cortical removal is manual aspiration using both a bent cannula and a J-shaped cannula under the protection of a viscoelastic material. This manual technique of “dry” aspiration of cortex is more time consuming but decreases the risk of extending the tear and vitreous loss.

**Conversion To ECCE**

If a posterior capsular rent is suspected or discovered during hydrodissection or early phacoemulsification and if there is a significant amount of residual nucleus, and particularly if it is brunescent, or if other surgical risk factors are present, it is advisable to convert to a large-incision ECCE. The first step would be to prevent the loss of the nuclear fragment(s) into the vitreous. The nucleus should be secured by injecting a dispersive viscoelastic underneath it. A hook, passed through a fresh paracentesis opposite the incision may be used to loosen and manipulate nuclear material into the anterior chamber. If a temporal clear corneal incision is used it may be sutured and abandoned. A fresh sclero-corneal tunnel incision may be constructed temporally or superiorly. If a sclero-corneal incision had been utilized it can be extended after appropriate conjunctival peritomy and cautery. The size of this incision is dependent on the size of the residual nuclear fragment. Once an adequate wound has been created an irrigating vectis and/or secondary lens manipulator should be used to extrude the lens nucleus with the help of a generous amount of viscoelastic. While expelling the nucleus the vectis should apply pressure against the posterior lip of the wound, rather than lifting and dragging the nucleus against the cornea. Bimanual pressure counter pressure technique should never be employed. Once the lens nucleus has been removed, anterior segment surgery should proceed as per the guidelines suggested in the succeeding sections. The wound is sutured with interrupted or running 10-0 nylon suture.

**Extra capsular Cataract Extraction Over the Sheets Glide**

The nucleus is secured with dispersive viscoelastic, which will also create space between the nucleus and vitreous. A Sheets’ glide is positioned under the nucleus. Sometimes a hook may have to be used to guide the advancing glide into proper position. Once in position
the nucleus is extruded over the glide. The glide acts like a pseudo-posterior capsule and prevents the nucleus from dropping into the vitreous. At the same time the glide acts as a relative barrier to prevent the forward displacement of the vitreous into the anterior chamber. When using the Sheets glide technique, several precautions should be taken. The viscoelastic should be injected under the superior pole of the residual nucleus to create a cleavage plane so the glide can be safely inserted under the nucleus. The glide should be inserted under the posterior surface of the nucleus gently so that the capsular bag is not damaged. Caution should be exercised to avoid pushing the glide too far to prevent further damage to the residual capsule or even the ciliary body.

Posterior capsular defect with residual nucleus and vitreous prolapse

The goal is to remove the remaining lens matter (nucleus, epinucleus and as much cortex as possible) without causing vitreoretinal traction. The strategies which help the surgeon to achieve the goal are 1) rescuing a partially descended nucleus, 2) an appropriate anterior vitrectomy technique and 3) removal of the residual lens matter.

Rescuing a Partially Descended Nucleus

Posterior capsule or zonular rupture should be recognized early enough to avoid a dropped nucleus. Without timely recognition of the capsular rent, the continued phaco maneuvers and forces will expand the initial defect thereby creating a big hiatus to permit the nucleus to drop. A brunescent nucleus may abruptly and rapidly sink through the liquified vitreous without antecedent vitreous loss. However if enough supporting vitreous is present the nucleus will descend only partially, allowing for rescue maneuvers.

No attempt should be made to chase and spear the descending nucleus with the phacotip. The posteriorly directed fluid infusion will flush more vitreous out, expanding the rent and propelling the nucleus away. Additionally, vitreous may be snagged into the phacotip, potentially leading to giant retinal tears and detachment. An alternative strategy is to levitate the nucleus into the pupillary plane or anterior chamber for subsequent management either by extraction through a standard ECCE incision (or rarely by careful phacoemulsification over Sheets glide). The nucleus may be rescued by injecting viscoelastic behind the nucleus and / or manipulating it with a hook using a limbal approach. However, this technique may be inadequate if the capsulorhexis is small and intact, if the pupil is small, if vitreous has already prolapsed around the nucleus or it has subluxated laterally or posteriorly. The “PAL” technique (posterior assisted levitation), first developed by Charles Kelman utilizing a cyclodialysis spatula through a pars plana stab incision to push the nucleus up into the anterior chamber from below, is preferred by many. Richard Packard modified this technique by inserting a Viscoat cannula through a parsplana stab incision located 3.5 mm behind the limbus. Through a combination of injecting Viscoat and maneuvering the cannula tip itself, the nucleus can be elevated through the capsulorhexis and pupil and into the anterior chamber. This minimizes iatrogenic vitreous traction and reduces the chance of touching the retina with a metal spatula tip. If the nucleus fragment has totally disappeared from view the surgeon should not blindly fish for it with the phaco or vitrectomy instruments.

After a thorough anterior vitrectomy and residual lens matter removal (with the vitrector or 1/A instruments) an IOL can be implanted or the patient can be left aphakic (depending upon the size and hardness of the dropped nucleus). If patient has been left aphakic, IOL can be implanted at the conclusion of the second stage three-port vitrectomy and dropped nucleus removal by fragmatome or anterior route.

Managing residual nucleus with vitreous loss

The rescued nucleus, the residual epinucleus and as much cortex as possible should be removed without causing vitreoretinal traction. If the nucleus has been levitated largely intact into the anterior chamber, converting to an ECCE (as described in the previous section) is called for. Smaller fragments may be removed by phacoemulsification. It is advisable to use Sheets glide as a vitreous barrier and a safety support. If there is not much of vitreous in the anterior chamber and if it can be accomplished safely, an attempt can be made to remove cortex and epinucleus by employing
some bimanual I/A or ‘dry technique’ prior to vitrectomy. This maneuver may decrease the chance of lens matter loss into the vitreous, as the supporting vitreous is surgically excised. However once vitreous gets ensnared in the phacotip or aspiration port, it must be suitably addressed (described in the subsequent section).

Phacoemulsification over the Sheets Glide

The rescued nuclear fragments may be safely emulsified in the presence of a Sheets glide. A Sheets glide (either preordered at 3 mm or cut to size) is carefully inserted through the wound into the cleavage plane between the superior pole of the nucleus and the posterior capsule and advanced towards the opposite side. A second instrument may be used to guide the glide to the proper position under the nucleus. Occasionally the large bulk of the nucleus and adherent cortex may obscure the view of the glide as it is advanced under the nucleus. The Sheets glide may be inadvertently advanced through the posterior capsular rent into the vitreous thereby severely compromising the integrity of the capsular bag. Careful guidance of the glide beneath the nucleus with the assistance of adequate viscoelastic and a second instrument through the paracentesis should prevent this complication.

Once the glide is in proper place the phacotip can be reintroduced into the anterior chamber and the remaining nucleus emulsified over the glide. The glide acts as a barrier to discourage further advance of vitreous into the anterior chamber with subsequent aspiration by the phaco tip. The barrier function of the glide also prevents the nucleus or nucleus fragments from dropping into the vitreous cavity. Anterior vitrectomy should be performed as and when the vitreous presents into the anterior chamber.

After the nucleus is emulsified, I/A and vitrectomy can be performed over the glide. The glide is removed, final vitrectomy, if necessary, is completed and the IOL is implanted into the capsular bag or ciliary sulcus. Alternatively, after removing the glide, dispersive viscoelastic is injected into the residual capsular bag and the IOL is implanted at an appropriate location. I/A and vitrectomy can than be performed using the IOL as a barrier to further vitreous movement.

Vitrectomy for anterior segment surgeons

All surgeons perform cataract surgery employing methods to prevent vitreous loss from occurring. Nevertheless despite our vastly improved technical expertise, our sophisticated equipments and our heightened awareness that vitreous loss can strike at any moment, this complication continues to haunt us on a regular basis.

Every anterior segment micro surgeon must have vitrectomy techniques and equipment at his or her fingertips and should be aware of
1. Vitrectomy Instrumentation
2. Infusion Options
3. Basic Principles and Technique of Anterior Vitrectomy.

Vitrectomy Instrumentation:

Microsurgical (20G) advanced vitrectomy cutter with high performance proportional linear suction control is a necessity for anterior segment surgery.

Using the phacoemulsifier to remove the vitreous is dangerous as the phaco probe liquefies hyaluronic acid alone but does not cut the collagen fibres. Similarly use of a large bore needle to aspirate the fluid vitreous pockets should not be done because it will aggravate vitreoretinal traction. The theoretical pockets of liquid vitreous are more difficult to locate than the fountains of youth.

Cellulose sponge vitrectomy developed by Kasner has been an obsolete and dangerous method for 2 decades in spite of the important role it played before the advent of the vitrectomy machines.

A cellulose sponge causes significant traction on the retina as the sponge is lifted to transect the adherent vitreous. Marked inflammation is the rule after sponge vitrectomy due to the mechanical damage to the iris caused by contact with the sponge as it swells and is lifted up. Retained cellulose material on the anterior vitreous cortex after sponge vitrectomy may add on to the inflammation in addition to that caused by iris trauma.

Settings for Anterior vitrectomy: Use of the maximum possible cutting rate, lowest vacuum and flow rates reduces traction on the retina. The vitrectomy
cutter should be advanced or held stationary during anterior vitrectomy and never pulled away while cutting.

Testing for vitreous in anterior chamber can be accomplished by

1. Injecting air into anterior chamber side port incision and looking for fragmentation of the bubble. Air if used instead of infusion fluid prevents vitreous from hydrating and coming forwards. Air helps to delineate the surface of vitreous and keeps it confined by surface tension.

2. Using triamcinolone acetonide (preservative free) to stain the vitreous in the anterior chamber

**Infusion Options**

1) Coaxial Infusion Cannula for vitrectomy by slipping the infusion sleeve over the vitrectomy tip. There are several disadvantages and dangers of using a coaxial infusion cannula for anterior vitrectomy.

a) Enlargement of posterior capsular tear: The force of the infusion is in the same direction as the direction in which the vitrector tip is pointing. This means that the infusion will be directed towards the deep areas of the eye. As the tip approaches the torn posterior capsule, the infusion flow will strike the capsular flaps and force them apart. This extends the capsular tear and enlarges the opening resulting in prolapse of more vitreous.

b) Hydrates the Vitreous: The infusion fluid hydrates the vitreous increasing its volume and causing it to expand. The only direction in which the vitreous is able to expand is towards the anterior chamber through the opening in the posterior capsule.

c) Flushing the Vitreous: The force of the infusion acts like a high-pressure hose flushing out the vitreous from the eye into the anterior chamber.

All these factors act together to increase the amount of vitreous that needs to be removed. (Fig 1, 2, 3)

1) **Bimanual Technique with Separate Infusion Line**

The coaxial sleeve around the vitrector is removed and replaced by a separate infusion line. The AC maintainer or the irrigation port of the I/A hand piece can be used. The vitrector tip becomes less bulky and able to pass through a paracentesis wound. This facilitates vitrectomy in a closed chamber away from the main phaco wound. The appropriate strategy for vitrectomy following vitreous loss during cataract surgery is to use the bimanual technique.
The vitrectomy tip is inserted through the opening in the posterior capsule and placed a mm or two behind the posterior capsule. The aspiration port is directed upwards towards the cornea. (Fig. 4 & 5)

The strategy is to pull the vitreous in the anterior chamber down to the vitrectomy tip until no more vitreous is there in the anterior chamber. The offending vitreous in the anterior chamber should be removed down to the level of and just below the posterior capsule. The rest of the vitreous in the vitreous cavity should not be touched. (Fig: It is advisable to begin the vitrectomy dry and then infuse BSS gently, if the chamber tends to collapse, thought the side port. More vitreous will prolapse if the pressure in the anterior chamber is low when the aspiration continues.

The vitrectomy tip should not be placed through the primary phaco incision because the incision is the wrong size for it. Instead the eye should be made firm with viscoelastics and a new 1 mm incision be made a few millimeters away from the main phaco incision. The incision is the right size for the phaco tip and the original side port incision, the correct size for the chamber maintainer. The pressure in the anterior chamber from the viscoelastics or chamber maintainer irrigation will close off the self ealing corneal or corneoscleral incision previously used for phacoemulsification.

Another portal of entry for the vitrectomy instrument is the pars plana through a sclerotomy 3 mm behind limbus. Infusion is performed using the AC maintainer. The vitrector is used to cut the vitreous at and behind the posterior capsule taking care to retain as much of the posterior capsule as possible.

Performing Vitrectomy Without Irrigation (Dry Vitrectomy)

This is a useful technique in performing a small vitrectomy. If the eye softens the pressure in the eye can be equalized by putting more viscoelastic in to the anterior chamber. This has the added advantage of pushing vitreous towards the back of the eye and reducing the amount of vitrectomy that has to be performed.

When irrigation is used, the irrigating fluid might hydrate the vitreous in the anterior chamber, but this is acceptable because the vitreous in the anterior chamber is going to be removed anyway. We do not want the fluid to hydrate much of the vitreous below the vitrectomy tip. This is avoided by keeping the infusion cannula parallel to the iris so that the infusion is directed towards the AC and the vitrectomy tip can remove the fluid before it escapes into the body of the vitreous. The force of the infusion can act as a high power hose flushing out the vitreous from the eye. All this movement causes the vitreous to be flushed out of the back of the eye into the AC. This increases the amount of vitreous that needs to be removed. This is what happens when what looks like a small amount of vitrectomy turns into a large one. This is therefore not
surprising that vitrectomy following vitreous loss in cataract surgery has a postoperative complication rate of 30% to 50%.

The best strategy when performing a vitrectomy is to avoid violating more vitreous than is actually needed. If you can remove the vitreous from the AC, without disturbing the rest of the vitreous especially that which overlies the vitreous base, you should have very few postoperative problems.

**Intraocular Lens Placement**

Prior to IOL implantation the exact anatomy of the tear should be determined and the capsulozonular anatomy should be clearly understood. To understand the integrity of the capsular support the iris is gently retracted under viscoelastic cover at multiple locations. This will provide guidelines as to the most desirable location and orientation of the posterior chamber IOL, its design and the optimal insertion technique.

When the posterior capsular rent is small with well-defined borders the tear can be converted into a posterior continuous curvilinear capsulorhexis. The tear is then less likely to extend if the bag is stretched during IOL implantation. It is important to remember that IOL implantation using a dialling technique may exert more force in the capsular bag than a superior haptic compression maneuver or a slowly unfolding IOL in the capsular bag.

If the tear is large with peripheral extensions and poorly defined borders posterior capsulorhexis is not possible and the IOL should be implanted in the ciliary sulcus after appropriate power adjustment from the capsular bag calculation. The IOL optic may be captured in the capsulorhexis opening.

Regardless of where the IOL is implanted, within the bag or into the ciliary sulcus it should be positioned 90° away from the axis of the tear. After the IOL is centred, its fixation and stability should be evaluated. If the IOL shows signs of poor fixation it can be repositioned from the capsular bag into the ciliary sulcus, sutured into the ciliary sulcus or exchanged for an anterior chamber IOL if there are no contraindications to it. It is recommended to suture fixate a PC IOL or not to implant a PC IOL if the surgeon is unsure of the anatomy of the posterior capsular rent rather than to rely on chance alone for proper fixation and enduring centration.

Once the IOL is well centred the pupil should be constricted by injecting acetylcholine into the anterior chamber since miosis will both retard late vitreous prolapse and make any residual vitreous easy to visualize. If the posterior capsule was torn and no vitrectomy was performed a prophylactic peripheral iridectomy should be considered.

At the conclusion of the procedure residual viscoelastic material can be removed manually or with an irrigation-aspiration tip. Anterior chamber should not be allowed to collapse to prevent further vitreous loss.

**Conclusion**

The incidence of posterior capsular rent can be significantly decreased by identifying the presence of predisposing factors and appropriate modification of the surgical plan. Early recognition and treatment of capsular tear and vitreous loss should help prevent serious complications and improve postoperative outcomes. The surgeon should have a proper game plan ready to face all kinds of posterior capsular rent scenarios.

**Suggested Reading**


