IOL Implantation After PCR

This complication can occur at any stage of cataract surgery.

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Posterior capsular rupture (PCR; Figure 1) is one of the most serious complications of cataract surgery. Even in the best of hands, its incidence is 1% to 4%.1-12 Some types of cataracts, such as posterior polar, are more prone to PCR. Regardless of what caused the rupture, subsequent IOL implantation can be difficult.

FIRST STEP

For a list of quick tips that can help avoid PCR, see Take Precautions to Prevent PCR. For a video demonstration of IOL implantation after PCR, visit eyetube.net/?v=asego.

When PCR is noticed. PCR can occur during any stage of cataract surgery, but management strategies differ from stage to stage. Regardless of when it occurs, as soon as PCR is identified the surgeon’s first actions should be to remove the second instrument from the sideport incision and inject a cohesive ophthalmic viscosurgical device (OVD) through the sideport to seal the PCR (Figures 2A through 2E). Next, the phaco probe or irrigating cannula can be safely removed. It is important to keep calm and take a few deep breaths before restarting the procedure. At this point, further management depends on the stage of cataract surgery at which PCR occurred.

PCR during fragmentation. When PCR occurs during phacoemulsification, the remaining nuclear fragment(s) should be moved away from the PCR and brought into the anterior chamber with the help of a chopper. Phacoemulsification can be completed with low bottle height and vacuum settings, and irrigation and aspiration performed slowly and away from the site of the PCR. If vitreous interferes with cortical aspiration, vitrectomy should be performed, followed by continued aspiration. Afterward, the IOL can be implanted in the bag using the surgeon’s standard technique. If the PCR is sizeable, the main incision can be enlarged to accommodate an irrigating vectis (Figure 2F), which can be used to remove the remaining nuclear fragments (Figure 2G). The next step is to clean vitreous from the PCR (Figures 2H and 2I).

VITRECTOMY AFTER VITREOUS PROLAPSE

The aim of anterior vitrectomy is to remove all vitreous strands from the anterior chamber, making sure that no vitreous is incarcerated in the incisions. Bimanual anterior vitrectomy is a simple procedure that every cataract surgeon should master (Figure 4). First, the vitrectomy cutter and irrigating cannula are passed through different sideport incisions. Flow from the irrigation cannula should be directed toward the angle of the anterior chamber. A low bottle height, high cut rate (600–1,000 cuts/sec), and low aspiration rate (150–200 mm Hg) will minimize vitreous traction.

The vitreous cutter is passed through the PCR into the vitreous cavity; its port is positioned just behind the posterior capsule to minimize the risk of PCR enlargement during vitrectomy. Most of the vitreous that has prolapsed into the posterior and anterior chambers can be easily drawn backward and removed. Preservative-free intracameral triamcinolone acetonide may be used to enhance vitreous visibility.

IOL IMPLANTATION

Protocol for a small PCR. After a small PCR, the remaining nuclear fragments and cortical matter are removed.
from the capsular bag. If any vitreous is present, vitrectomy should be used to clear the posterior chamber. The PCR is then sealed with a cohesive OVD, the capsular bag is inflated with a dispersive OVD, and the IOL is implanted in the bag with the leading haptic directed toward the capsular bag equator and the trailing haptic left outside of the bag. The IOL can then be dialed gently into the capsular bag.

A one-piece PMMA IOL is much easier to implant than a foldable IOL, as control over PMMA IOLs is easier. After the lens is implanted, it is important to remove OVD thoroughly, as residual OVD can produce a severe inflammatory reaction in the anterior chamber and vitreous cavity. OVD can be washed from the anterior chamber with the I/A cannula and cleared from behind the IOL with the vitrector.

**Take-home message**

- As soon as PCR is identified, the surgeon’s first actions should be to remove the second instrument from the sideport incision and inject a cohesive OVD through the sideport to seal the PCR.
- When PCR occurs during fragmentation, any remaining nuclear fragments should be moved away from the PCR and brought into the anterior chamber with a chopper.
- With a small PCR, the IOL can be implanted in the capsular bag with a large PCR, it is better implanted in the sulcus.

**Protocol for a large PCR.** After a large PCR, the best approach is to implant the IOL in the sulcus. First, the sulcus should be filled with a dispersive OVD around 360°. To do this, the anterior capsule is first identified, then OVD is injected from the center to the periphery over the anterior surface of the anterior capsule. This ensures proper filling of the sulcus (Figure 5). I prefer rigid PMMA IOLs in these situations, and this requires enlargement of the corneal incision to accommodate the IOL (Figure 6).

The IOL can then be inserted through the main incision, with the leading haptic directed toward the sulcus opposite from the entry incision and the trailing haptic resting on the anterior surface of the iris. After ensuring that the leading haptic is placed over the anterior surface of the anterior capsule, the IOL can be dialed into the sulcus; the IOL should not be tilted after dialing. Foldable IOLs can also be implanted in the sulcus. The leading haptic is directed toward the sulcus, the optic unfolds at the pupillary plane, and the trailing haptic is placed over the anterior surface of the iris. Before the IOL is dialed into the sulcus, the leading haptic should be well positioned in the sulcus.

The OVD is washed thoroughly from the anterior and posterior chambers and behind the IOL with the help of the I/A cannula (Figures 7A through 7C) and vitreous cutter (Figure 7G). Complete removal of OVD is mandatory to avoid development of complications such as severe inflammatory reaction, hazy media, exudative membranes, secondary glaucoma, and cystoid macular edema.

Intracameral miotic agents such as carbachol or pilocarpine can be used to constrict the pupil (Figures 7D through 7F) and prevent IOL destabilization after implantation. Any peaking of the pupil after constriction indicates that vitreous is incarcerated in that region. It should be immediately cleared with the vitreous cutter. The anterior chamber is formed with balanced saline solu-
tion, with or without air, and the main and sideport incisions are sealed with hydration (Figure 7H). I prefer to use 10-0 sutures for the main and sideport incisions, as vitrectomized eyes are prone to hypotony (Figure 7I).

Protocol after PCR with nucleus fragments dropped into the vitreous cavity. After PCR, sometimes the nucleus or nuclear fragments drop into the vitreous cavity. Management should be executed as discussed previously. If a vitreoretinal surgeon is available, the case should be transferred immediately for management. Otherwise, anterior vitrectomy is done, passing the vitreous cutter through the PCR and performing core vitrectomy under direct visualization. The IOL can be implanted in the capsular bag or sulcus, according to the size and extent of the PCR. The patient must then be referred to a vitreoretinal center for management.

Protocol after zonular dehiscence. Small zonular defects (up to 3 clock hours) can be treated using a capsular tension ring; however, large defects require suture fixation of the capsular bag to the scleral wall.

**POSTOPERATIVE MANAGEMENT**

Postoperative management in eyes with PCR can include four types of topical medication:

- Prednisolone acetate 1% eye drops should be prescribed six times a day for 1 week and tapered thereafter according to clinical assessment.
- A potent antimicrobial such as moxifloxacin 0.3% eye drops should be prescribed four times a day for 4 weeks.
- Atropine 1% eye drops should be prescribed twice daily for 8 weeks or longer.
- Antiglaucoma medication should be initiated depending up the patient’s postoperative intraocular pressure.
In some cases, the cycloplegic and steroid drops may be needed for an extended period.

CONCLUSION

Although posterior polar cataracts are more vulnerable to PCR, the complication can occur in almost any eye. Using the steps outlined above can help to safely and accurately manage the PCR and complete cataract surgery.

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