Chapter - 8
ANTERIOR SEGMENT COMPLICATIONS OF CATARACT SURGERY

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Early                  Late
PBK                    IOL Decentration
PCO                    Fibrous ingrowth
Iris related           Epithelial ingrowth
Nucleus related        Glaucoma
Closure related         

With the advent of better instrumentation, microscopes and good training, cataract surgery has become a remarkably safe procedure. Nonetheless, complications can occur at any stage with any surgical procedure. It is very important to recognize them at the earliest and manage them appropriately, which will give the most satisfactory results in the end. Also, one must retrospectively take a critical look at every complication that has arisen to be able to identify the deficiency in the preparation of the patient, instrumentation, surgical technique or the post operative care that resulted in it. This will enable us to take care of the factor responsible and avoid a repeat mishap in the future. Also, a guarded disclosure to the patient, proper guidance for the future course of action, and a realistic projection of outcomes may save future litigation in cases where a serious sight threatening complication has occurred.

This chapter deals with the complications of cataract surgery according to the stage at which they occur during surgery. Anesthesia related complications have been dealt with in the chapter on ocular anesthesia.
BRIDLE SUTURE

Although there is a trend to omit a superior rectus bridle suture with modern cataract surgery, the suture offers good control of the eye position during surgery. Care must be taken to correctly hold the muscle and pass the suture under it. There have been reports of globe perforation during placement of this suture. Globe perforation is recognized by sudden hypotony, appearance of vitreous under the conjunctiva and vitreous hemorrhage. This complication requires immediate treatment and postponement of the surgery. A very small perforation may go unnoticed and may be recognized post operatively by presence of a localized choroidal hemorrhage, retinal detachment or hypotony associated with a vitreous hemorrhage. Prevention of this complication lies in using a round bodied needle to pass the bridle, directing it away from the globe and visual confirmation of the tissue held by the superior rectus forceps prior to passing the suture.

CONJUNCTIVAL DISSECTION

Sub conjunctival hemorrhage is common with dissection of the conjunctiva and the Tenon’s capsule from the incision site and is of no consequence other than rendering visualization of the wound problematic and possible alarm to the patient. Light directed cautery applied to the bleeding vessels will stop this. Heavy and blind cautery should be avoided as it results in shrinkage of scleral tissue and significant astigmatism may be induced. The conjunctiva may tear at the site it is held for globe fixation if blunt instruments necessitate the use of too much force while dissecting the tunnel in SICS or phaco. The use of sharp instruments for wound construction will prevent this.

WOUND RELATED COMPLICATIONS

Wound related complications can be classified depending on various aspects of wound. Complications can arise as a result of errors in the site, depth, length, width or the shape of the incision.

The site of the incision in terms of its distance from the limbus is important for all types of cataract surgery. An external incision farther away from the limbus will result in difficulty in manipulation of instruments in the AC. It will also place the incision over the ciliary body with the risk of inadvertent injury if the incision is deep.
The internal incision in ECCE should not be very posterior as the iris will tend to prolapse through the wound and make surgery difficult. Similarly, in SICS and phaco, a premature entry into the AC without adequate tunnel length in the cornea will result in repeated prolapse of the iris and potential for iris injury during nucleus delivery. All entry wounds into the AC must be made with sharp blades or keratomes. A blunt instrument has the potential to cause Descemet’s membrane detachment. If the detachment is limited, one may proceed with the surgery and tamponade the membrane with a large air bubble at the end of the procedure. If large, the membrane must be reposited into place with a large air bubble of air or isoexpansile mixture composed of air and SF₆ in a 1.5:1 ratio. Large tears may require enlargement of the wound, unrolling of the Descemet’s membrane and suturing it in place. Failure of the cornea to regain clarity after such an event will require a penetrating keratoplasty to restore corneal clarity. The ECCE wound should be enlarged with a scissors with the inner blade visible throughout between iris and the cornea. A tangential entry may separate the corneal lamella or strip the Descemet membrane. The length of the incision should be adequate to ensure safe delivery of the nucleus without much force. The valvular wounds of SICS and phaco must have adequate length. In the case of SICS, it should be enough to accommodate for passage of the nucleus. Difficulty at this stage will lead to endothelial damage and corneal edema. Too large an incision will require suturing for secure closure and will cause more astigmatic shift. Too small an incision in phaco limits sliding of the phaco handpiece and allows excessive movement of the eye with handpiece movements. It also limits proper irrigation by compressing the sleeve of the probe tip. A tight incision also causes problems in IOL implantation. Too large an incision will result in incisional leakage and repeated shallowing of the AC. This requires a suture to prevent this from occurring. The width of the wound is of importance in SICS and phaco as the self-sealing nature of the wound depends upon this characteristic. As we go posterior to the limbus in an attempt to increase width, there is an increased incidence of bleeding from scleral perforating vessels and an increase in the surgical difficulty. Adequate cautery of episcleral vessels before starting the dissection is important. If the width is small, the incision may not be self sealing and will require sutures. Depth of the incision refers to the thickness of the flap. If the incision is too superficial, the anterior flap of the tunnel incision will be thin and prone to button-holing. This can be prevented by starting the dissection at the
proper depth and maintaining the correct direction of the crescent. If the buttonholing has occurred, the incision can be deepened and a fresh tunnel made at a deeper plane or at a different site. Too deep a plane during dissection of a tunnel will result in premature entry into the AC and problems with iris tissue. Care must be taken to push back iris tissue with viscoelastic before delivery of the nucleus to ensure that it does not get damaged as the nucleus engages in the tunnel. A very deep incision may lead to disinsertion of the sclera if the incision cuts through the floor of the tunnel. The inferior sclera disinserts from the anterior wound. This results in large ATR shift postoperatively. The tunnel must be sutured with radial sutures to appose the two edges of the floor if this complication occurs. A very deep wound may also result in injury to the ciliary body and prolapse during phacoemulsification, which may require repair of the incision. A deeper dissection is also associated with increased incidence of postoperative hyphema.

Iris prolapse, if present, requires particular attention whichever technique is being performed. An improperly constructed wound and positive vitreous pressure are two factors responsible for the above. A wound that is very large or very close to the limbus or very deep is prone to have iris tissue prolapsing during the procedure. The solution lies in ensuring a soft eyeball prior to surgery, using a speculum of appropriate size, releasing the superior rectus bridle, and making an appropriate incision. The prolapsing tissue should be replaced with an iris repositor or viscoelastic and the wound length can be reduced with a suture. Reducing vitreous thrust by bolus hyperosmotic agents also has a role in managing the same. An iridectomy will help in reducing iris prolapse. A wire vectis or lens glide should be used for nucleus delivery in the presence of iris prolapse.

Side port incisions can be associated with bleeding if care is not taken to avoid vascular area. A large side port can cause repeated shallowing of the AC. Sudden entry while making the side port can result in injury to the iris and the lens. Descemet’s detachment can result from using a blunt instrument.
COMPLICATIONS RELATED TO ANTERIOR CAPSULOTOMY

Can opener capsulotomy

The creation of unequal capsular flaps is the most common complication encountered in this type of capsulotomy. These flaps have a tendency to be aspirated into the I/A cannula. Vigorous tension on entrapped tags during cortical aspiration can cause inadvertent tear towards the zonules. If this goes unrecognized, a large posterior capsular tear can occur rapidly or sometimes the whole capsular bag may be aspirated. The use of multiple fine punctures (upto 30-40 in number) to create the anterior capsulotomy eliminates capsular flaps.

Continuous curvilinear capsulorrhexis

The most common complication occurring while a capsulorrhexis is in progress is 'rhexis escape', an inadvertent perpendicular peripheral extension into the zonular area. This is more common if the AC is shallow or there is positive pressure on the globe. The tendency arises because of the anterior bowing of the anterior capsule which encourages the tear to 'run downhill'. The solution lies in deepening the AC with liberal amount of viscoelastic to push the iris lens diaphragm posteriorly and flatten the anterior capsule. After this, one of the following techniques to recover the rhexit may be used. Change over to forceps if initially a needle was being used for the rhexit. Forceps ensure a safer and firmer hold. Catch hold of the flap near the split point and exert controlled force towards the centre of the pupil. Alternatively, after deepening the chamber with viscoelastic, a very curved microscissors is used to cut the capsule right at the escape point to redirect the opening back to the initial route. Yet another solution involves starting a new rhexit in another position working in the opposite direction and attempting to join the first rhexit at the escape point. In
the event that the progress is blocked by one or more zonular fibers and these are visible, the surgeon can lacerate 2-3 fibers involved with the cystotome under very high magnification and the continue with the rhexis. The last alternative is conversion of the rhexis to a can-opener capsulotomy. One may have to modify the surgical technique based on the final status of the anterior capsulotomy achieved. It is dangerous to perform phacoemulsification if peripheral extension or notching of the rhexis exists. SICS can be safely performed even if the rhexis is inadequate.

Another problem encountered with capsulorrhexis is the creation of a small rhexis. This creates problems in subincisional I/A in phaco and possible later capsular bag contraction. This problem is much more important in SICS as luxation of the nucleus into the AC is difficult (and unsafe) with a small rhexis. It places excessive stress on the zonules and can result in zonular dialysis and avulsion of the bag into the AC. Relaxing incisions are therefore required if the rhexis is small. Otherwise, the rhexis can be enlarged by continuing a spiral tear initiated in the existing rhexis.

A large rhexis though desirable, is usually difficult to achieve. It may however, lead to premature prolapse of the nucleus into the AC and difficulty in IOL placement in the bag. An eccentric rhexis may result in late decentration of the IOL.

COMPLICATIONS DURING HYDROPROCEDURES

Hydroprocedures should be carried out gently, with the minimum fluid possible and with gentle pressure on the posterior lip of the wound to prevent sudden rise in AC pressure. Vigorous injection of a large amount of fluid will lead to peripheral extension of notches or radial tears in the anterior capsulotomy margins, leading to posterior capsule rupture and vitreous loss and occasionally, posterior dislocation of the nucleus. An intact rhexis is more resistant to such forces. The incidence of this complication is more in mature or hypermature cataracts and hard nuclear cataracts where the posterior capsule is thinned out or there is very less cortex between the nucleus and the capsule. In posterior polar cataracts, hydrodissection is to be avoided as there may be a preexisting posterior capsular defect. Such a defect has a tendency to enlarge because of the hydrostatic
pressure of the fluid wave. The nucleus may be dislocated into the vitreous cavity in such a scenario. Only hydrodelineation is to be performed in these cases.

The nucleus may not rotate freely after hydroprocedures. This can be due to inadequate hydrodissection or corticocapsular adhesions. Too much force in trying to rotate the nucleus is to be avoided as it is transmitted to the zonules and may result in zonular dehiscence. The solution lies in repeating hydro carefully from another site.

Certain general principles must be adhered to while performing hydroprocedures. The hydrodissection must be carried out as fast as possible. A small amount of fluid should be used. The number of injections should be minimal. The bag should be decompressed by tapping the nucleus before every injection. The amount of time the cannula stays in the AC must be minimal. The nucleus should be loosened as much as possible and as much as possible of the capsule and superficial cortex separated from the inner layers.

COMPLICATIONS RELATED TO IRIS AND THE PUPIL

Iris prolapse and its relation to improper wound construction has been discussed above.

A small pupil can cause a myriad of problems, ranging from difficulty in capsulorrhexis, hydroprocedures, nucleus prolapse and delivery, cortical clean up and IOL implantation. This is especially true for phaco and SICS. A small pupil results from an inability of the pupil to dilate due to intrinsic pathology, or from constriction of a well dilated pupil due to intraoperative iris manipulation. Conditions like pseudoexfoliation, senile miosis, diabetes, old uveitis with posterior synechiae, chronic ACG, chronic miotic usage, etc. might be associated with small pupils and can be recognized preoperatively. Surgical planning to tackle this is a must. If insufficient dilation is achieved, one of the following techniques should be utilized to enlarge the pupil. Posterior synechiolysis will increase the pupil size by 1-2mm. It should be done in a viscoelastic filled chamber with a blunt tipped spatula inserted under the pupillary plane and swept around the entire circumference, trying to reach the peripheral zones and freeing as much of the posterior iris surface as possible. A little intracameral adrenaline at this stage will further increase the mydriasis. One can
proceed with surgery if satisfactory mydriasis is achieved. Otherwise, **pupillary stretching** with the help of two Sinskey hooks or Lester lens manipulators can be tried. This involves engaging the iris near the pupil or at its edge at two points diametrically opposite to each other and pulling the two instruments radially, away from the centre of the pupil in opposite directions. This maneuver is performed from the 3 o’clock – 9 o’clock position and then 90° away along the 6 o’clock – 12 o’clock positions. Mydriasis obtained by this procedure depends on residual elasticity of the iris. Failure to achieve proper mydriasis will necessitate another procedure.

**Multiple sphincterotomies** are a very good option and will result in good mydriasis and very acceptable post-operative appearance. 6-8 mini-sphincterotomies 0.5-0.7 mm in length are performed in a viscoelastic tamponaded environment (to prevent iris bleeding) all round the pupillary margin with a long armed Vannas scissors.

4 **iris hooks** inserted from stab incisions at the limbus, hitched under the pupil margin and pulled taut with silicone buttons can ensure a good pupillary opening to perform surgery, especially phaco. A last, simple option is creation of a small iridectomy in
the periphery near the incision and performing a **radial iridotomy** through this. The microscissors are introduced through the iridectomy and the iris cut to the pupil. A 10-0 prolene suture can be used to reconstruct the pupil after cataract surgery is done with, or the pupil left as it is if the patient is a sedentary elderly individual.

**Intraoperative miosis** can be prevented by using 1:1,000,000 adrenaline in the infusion fluid. If it occurs at the capsulotomy stage, a can opener kind of capsulotomy can still be completed with ease. A capsulorrhesis may however need to be converted into a can opener capsulotomy, if difficulty is encountered in safe completion of the rhesis. Hydrodissection must be performed with utmost care in a small pupil. If the edge of the rhesis is visible, there is no difficulty. If that is not the case, then either hydro must be attempted without visual control with care, or alternatively (and safely) hydro procedures may be abandoned and an ECCE performed. Nuclear prolapse becomes difficult with a small pupil in SICS. Also, phaco maneuvers become unsafe. It is better to use an AC technique or the nuclear fracture with the cross technique as these procedures employ maneuvers performed in the central visible area. Aspiration of cortex is best done with a bimanual technique in a small pupil as this offers better access and control.

**COMPLICATIONS DURING NUCLEAR MANAGEMENT**

In ECCE, nucleus removal can be associated with vitreous loss and posterior subluxation of the nucleus. **Vitreous loss** during nuclear extraction is usually caused by a too much pressure on a wound that is too tight. Presence of loose zonules predisposes to this complication. The best way to avoid this complication is to enlarge the wound at the first sign of difficulty in nucleus passage. Placing an instrument below the nucleus during delivery can also rupture the posterior capsule if adequate space has not been created with viscoelastic below the nucleus. Nucleus extraction is more difficult where a capsulorrhesis has been performed. In the event of a small rhesis, **inadvertent ICCE or total lens dislocation**, i.e. the nucleus with the bag, with vitreous loss may occur. There is also a possibility of **posterior dislocation of the nucleus**. Hence relaxing cuts are essential when doing an ECCE with a rhesis. Posterior dislocation of the nucleus during expression should be immediately recognized if the nucleus appears to be sinking posteriorly. The nucleus should be immediately supported with a lens loop, elevated anteriorly and delivered
out. This situation indicates that vitreous loss has occurred and this has to be managed appropriately.

**Zonular dehiscence** is seen commonly in beginners doing SICS. This happens when too much force is applied during nuclear rotation and delivery into the AC. To avoid this, pressure should not be applied posteriorly, but more in the horizontal plane. When it has occurred, early recognition will prevent multiplication of the surgeon’s woes. A freely rotating nucleus not prolapsing into the AC, a nucleus tilting towards the side, or vitreous in the AC demand attention. The management depends on the presence and extent of vitreous loss. If vitreous is not disturbed and there is no vitreous in the AC, increase the size of incision in SICS and phaco, enlarge the capsulotomy, gently do a hydro and deliver the nucleus into the AC with minimal use of force so that the area of dehiscence does not increase. After nucleus delivery, which should be with a vectis below, I/A should be done with low flow. Ensure minimal manipulation while implanting the IOL, which should be implanted away from the area of dehiscence. If, however, there is vitreous in the AC, automated vitrectomy to clear the AC of vitreous should precede the above steps. If the amount of dehiscence is large, convert to ECCE, deliver the nucleus, free the AC of vitreous and implant the IOL into the sulcus or use scleral fixation.

Various complications can arise during nucleus management in phaco. **Tears of the posterior capsule** can occur at any stage and need to be handled carefully. The principles for the prevention and management of a posterior capsular tear remain the same. Prevent undue and repeated shallowing of the AC. Never release the footswitch (position 0) while the probe or any instrument is in the AC. Exercise caution while in the periphery or when using sharp instruments. Avoid the use of force if nucleus does not rotate. Do not exert any lateral or torsional force in the presence of a defect as it will lead to enlargement of the same.
The presence of nuclear material and the status of the anterior hyaloid face dictate future steps when a break in the posterior capsule has been detected. Prime importance is attached to delivering nuclear fragments out of the AC and ensuring that posterior dislocation is avoided. Always use a lens loop or vectis. Do not use pressure to express the nucleus. Use viscoelastic below the nucleus to tamponade the vitreous. Use support and posterior levitation if sinking is incipient. Never chase the nucleus with the wire vectis or the phaco probe if it is in the vitreous. Use viscoelastic to float up the nucleus or anterior vitrectomy. Wherever doubt exists, use the help of a vitreoretinal surgeon rather than being over aggressive. The next important concern is clearing the AC of vitreous and cortical matter in that order. This should be done with the automated vitrectomy handpiece. A much less acceptable alternative is manual I/A and weck cell-scissors vitrectomy. I/A should be done with minimal flow. If manual I/A is being performed, it should be done using the dry aspiration technique with the AC being maintained by liberal viscoelastic. Cortical matter should be stripped from the periphery towards the tear. Implant the IOL into the bag over the rent if it is small taking care to use minimal manipulation. If the defect is large, sulcus implantation or scleral fixation is employed. AC IOLs can be implanted if the PC rent is very large and an intact rhexis is not available, but an iridectomy must be performed in such cases.

The whole or part of the **nucleus may be dislocated into the vitreous** cavity through a posterior capsular defect. This is a disaster in the true sense and must be managed likewise. Details are given in the chapter on posterior segment complications.

Another serious complication that can occur during this phase of surgery is an **inadvertent iridodialysis**. This is more common when the lens loop is being used to deliver the nucleus in the presence of a small pupil. The 6 o’clock pupillary edge can get caught between the nucleus and the loop and be pulled out creating a large
iridodialysis. The superior iris can also be caught with the nucleus in the wound and be pulled out. This happens more frequently in SICS, especially with the instrumental delivery techniques. Viscoelastic tamponade should be done immediately to prevent bleeding. Rest of the surgery may be carried out as planned, though with increased difficulty due to the floppy iris tissue. At the end of surgery, one may choose to repair the iridodialysis with 10-0 prolene sutures between the torn iris root and the posterior scleral lip of the wound or at a later date using McCannel sutures.

**Damage to corneal endothelium** is an important complication seen if one does not take care to protect the endothelium with viscoelastic during nucleus delivery. It is more common with large hard nuclear cataracts. Inadvertent touch with instruments may also occur. An adequate incision size and constant vigilance as to the position of instruments in the AC is required to prevent this from happening.

**COMPLICATIONS DURING CORTICAL ASPIRATION**

A complete cortical cleanup prevents many a complication in the postoperative period. **Retained lens material**, if little, does not result in any major sequelae other than opacification of the part of the optical axis in which it is left. It is absorbed slowly over a period of time. It does however prome posterior capsular opacification. A larger amount will give rise to a variety of problems due to inflammation (**uveitis, corneal edema, secondary glaucoma, CME, PCO**, etc.). Residual cortical matter is usually found in cases with some operative difficulty - a small pupil, a small rhexis, PC rent, or subincisional cortex in SICS. In cases of difficulty, it is better to avoid blind aspiration and to use a ‘water jetting’ technique with irrigation only. If automated I/A is being used, another instrument through the side port can be used to retract the iris to enable visualization and aspiration of cortex in the capsular fornices. It is wise to leave a small amount of cortical matter rather than risk a PCR in pursuit of perfect cortical cleanup. Retained lens material may be aspirated after 3-4 weeks of observation if found to cause problems. It is much easier to do this at a later date as
the material becomes loosened and fluffy. Till that time medical control of complications is tried.

**Posterior capsular dehiscence** occurs most commonly during cortical aspiration in ECCE and SICS as compared to phaco (where it is more common during nucleus management). The presence of large capsular tags and positive vitreous pressure with a large unguarded incision are important factors. It is recognized as sudden appearance of an abnormally good glow, a deepening of the AC, an alteration of AC fluidics or the defect itself may be visible. Presence of vitreous in the AC is hinted by alteration in the fluid flow in the AC, inability to engage cortex with the cortical material receding on attempts to approach it, and a fluid or viscoelastic ‘front’ visible on entering the AC and injecting the same. Usually the tear occurs when part of the posterior capsule is aspirated into the aspiration port. This can be recognized as striae radiating from the part caught and demands immediate reversal of flow to release the capsule. The management of a posterior capsular defect depends on its size and vitreous disturbance. With a small defect and an intact vitreous face, it is possible to remove remaining cortex without a vitrectomy. It is safer to use manual I/A as precise control of flow is possible. The bag is filled with viscoelastic and with minimal flow, cortex is removed in a stripping manner towards the rent. It is safer to leave a little cortex when the size or position of the rent does not allow complete removal. If the hyaloid face is ruptured, a vitrectomy with an automated cutter should be performed prior to cortical removal to prevent
traction on the retina and vitreous base while aspiration is being performed. Then
cortex is aspirated under viscoelastic with the technique described earlier.

**Positive vitreous pressure** is encountered sometimes during cortical
removal, more so in ECCE. The signs are a bulging posterior capsule, shallowing of
the AC and iris prolapse. Usually it is due to pressure on the globe from a speculum
or the superior rectus bridle, unrecognized RBH, a suprachoroidal hemorrhage or
simply an inadequate massage after the regional block. Release the bridle suture,
readjust the speculum and inject viscoelastic to deepen the chamber. Intravenous
mannitol helps in reducing vitreous volume, but remember to wait for 10-15 min to
allow for its action. Partially closing the chamber with 2-3 sutures before I/A also
gives better control and maintains a deep chamber during aspiration.

**COMPLICATIONS DURING IOL PLACEMENT**

Most surgeons aim to implant the IOL in the bag and IOL power calculations
are done accordingly. The most common complication which occurs at the time of
IOL placement, especially with a can opener capsulotomy is **inadvertent sulcus
placement**. This results in a post-operative refractive error. Also encountered is the
situation in which one haptic is in the bag and the other in the sulcus. This **tilt** will
cause astigmatism.

**Decentered IOLs** are encountered more commonly with improper placement
of IOLs or with the co-existence of a PCR or zonular dialysis. Later on they may
occur due to capsular fibrosis. If the amount of aphakic part is minimal and the IOL
covers the visual axis, no treatment is required. If it is causing problems,
repositioning and sulcus or scleral fixation may be required. This should be done
with care to prevent a posterior dislocation of the IOL. A large subluxation is best
dealt with removal of the IOL and replacement with an ACIOL or scleral fixated IOL.

Attempts to implant an IOL in the presence of little capsular support may
result in **posterior dislocation of the IOL**. IOLs are inert and generally do not cause
problems. However, these cases need to be followed up and if the IOL is in the
visual axis or there is fibrous proliferation with bands developing in the vitreous,
there is a risk of retinal detachment which justifies removal through a PPV.
COMPLICATION RELATED TO WOUND CLOSURE

The aim during wound closure is to minimize induced astigmatism. Each surgeon must determine which suturing technique will provide the best results in his or her hands. General principles are to take sufficient depth of tissue in each bite, equidistant spacing, adequate number of sutures, tissue approximation without force, including the floor of the tunnel with such incisions and burying the knots to avoid irritation.

POST-OPERATIVE COMPLICATIONS

Early

Wound leak is a common problem seen when wound construction in phaco and SICS and wound closure in ECCE has not been adequate. A large incision in the clear cornea may not be self sealing and may require suture support. An irregular tunnel dissection will lead to a tunnel that is not self sealing and requires sutures. Side port leakage can result in a shallow AC if it is too large (in which case a single suture will be required). Excessive cautery and incarceration into the wound also prevents adequate closure and promotes wound leak.

A shallow AC with a low IOP encountered postoperatively may be due to a wound leak or choroidal detachment. Initial treatment includes a pressure bandage given for 24 hours. Medical treatment includes systemic steroids and local mydriatics. Rarely, drainage of the suprachoroidal space may be required, after which an air bubble is left in the AC to keep it formed.

Iris prolapse is another important complication encountered if the wound has not been secured well. It is less frequent with SICS and phaco. A sudden rise in intraocular pressure due to straining or coughing or blunt trauma in the face of a compromised wound will lead to egress of AC contents – aqueous and uvea from the wound. This complication places the patient at an increased risk of endophthalmitis and glaucoma. Treatment needs to be immediate especially if the prolapsed iris is not covered by conjunctiva. A fresh prolapse without signs of epithelization or exudate should be reposited and the wound secured properly after forming the AC. If the prolapse appears to have been there for some length of time and has epithelization on its surface, or is covered with exudate, the prolapsed tissue is best
abscissed and the wound sutured. Care should be taken to make the wound free of uveal tissue as there is a tendency for the iris to adhere to margins of the wound. The IOL may also need to be dialed into position in some cases as iris prolapse may be associated with a shift in the IOL position.

**Corneal complications** include corneal edema from endothelial dysfunction, which may be temporary as in endothelial shock or due to permanent loss of cells. Direct contact of nuclear fragments or instruments, ultrasound energy in phaco and prolonged irrigation with AC instability have been implicated in the causation of endothelial dysfunction. A preoperative corneal degenerative condition, a higher grade of the nucleus, greater infusion volume, large nucleus, and some IOL types have been associated with endothelial loss. Striate keratopathy is characterized by folds in the Descemet’s membrane and corneal edema. Prevention of these complications lies in exercising care during surgery to protect the endothelium with high molecular weight viscoelastics, preventing repeated shallowing of the AC, and generally maintaining a distance from the endothelium – working in the iris plane or below. Management of corneal edema includes frequent steroid drops to reduce inflammation which may affect endothelial function, mydriatics, topical antiglaucoma agents, and in severe cases, hypertonic solutions (5% sodium chloride). Hypertonic agents may be used topically for short periods. Severe cornea edema not responding to this treatment will require penetrating keratoplasty.

**Iritis** can be worrisome postoperatively if there has been too much handling of uveal tissue during surgery or cortical material or viscoelastic has been retained or vitreous loss has not been managed appropriately. Intensive local steroids and mydriatics supplemented in severe cases by systemic steroids are warranted.

**Hyphema** can result from bleeding from the scleral tunnel, or from injury to the iris intraoperatively. Improper cauterization of episcleral vessels can lead to blood in the AC. A small hyphema will resolve within 4-5 days. A severe hyphema may need to be drained. Medical management includes keeping a watch on the IOP and instituting topical antiglaucoma drugs if the IOP rises. Systemic vitamin C can be beneficial.
IOL decentration may occur postoperatively in cases where there had been a posterior capsular tear with vitreous disturbance during surgery, or where an irregular capsulotomy has lead to improper positioning of the IOL. Capsular fibrosis can also lead to IOL decentration. Management of this situation depends on the degree of displacement and the visual complaints. Gross malposition may require repositioning by dialing the IOL and fixation if the positioning does not hold.

![IOL Decentration](image)

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<td>Sunrise syndrome</td>
<td>Sunset syndrome</td>
<td>Sunset syndrome post YAG capsulotomy</td>
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Pupillary capture occurs postoperatively when a part or whole of the IOL optic moves anterior to the iris to get entrapped at the pupil. The pupil should be dilated first to allow the IOL to fall back and then the pupil must be constricted to maintain the status. IOL dialing may be required to correct the same.

A ‘windshield wiper’ syndrome occurs when the IOL is too small for the eye and the superior haptic moves with head movements. It may need fixation with a McCannel suture if troublesome.

Iris chafing and UGH syndrome are seen much less commonly nowadays.

A postoperative rise in IOP may be due to the presence of viscoelastic or air in the AC, uveitis secondary to retained cortical matter, pupillary block glaucoma, a suprachoroidal hemorrhage, or malignant glaucoma. Treatment lies in identification of the cause and appropriate management. Local steroids, AC wash if amount of cortical matter is quite large, peripheral iridectomy, and in some cases surgical drainage of suprachoroidal blood may be required.
Pseudophakic bullous keratopathy presents as long standing corneal edema not responding to medical management. It is due to corneal decompensation as a result of inadequate endothelial function. Patients are usually symptomatic, with pain, redness, foreign body sensation, tearing and diminished vision. The ultimate treatment is a penetrating keratoplasty, though time can be bought by medical management. This includes topical antiglaucoma medication, hypertonic solutions, steroids and tear substitutes. Anterior stromal puncture with a 26 G needle under biomicroscopic control can also impart some degree of relief.

One of the most important and vision affecting complication is the occurrence of posterior capsular opacification after surgery. This is seen in upto 50% of pseudophakes after extracapsular procedures. There are mainly two morphologically distinct types of aftercataract – fibrosis-type and the pearl-type. The fibrosis-type appears between 2-6 months of ECCE and may be clinically insignificant. Epithelial cells differentiate into fibroblasts which have contractile properties. This is seen clinically as numerous fine folds and wrinkles on the posterior capsule. Advanced stages result from further proliferation and multilayering of cells on the posterior capsule. This results in further wrinkling and visual distortion and capsular contraction which can cause IOL decentring. In cases with an intact rhexis anterior capsular shrinkage can cause capsular phimosis or contraction syndrome. The pearl type of PCO represents an aberrant attempt of remnant epithelial cells to form lens fibers. Another type seen occasionally is the Soemmerring’s ring. It results from apposition of the anterior capsule flap to the posterior capsule by fibrosis and the production of lens fibers within this sealed structure.

Prevention of the PCO from occurring is of prime importance. A good cortical cleanup is essential. Polishing the posterior capsule does not prevent the development of PCO. Anterior capsular cleaning is more important. The size of the anterior capsulorrhexis is important. The anterior capsular rim should just cover the optic edge. A posterior capsulorrhexis is recommended in children where the
occurrence of PCO is very high. IOL design has proven to be a very important factor in preventing the incidence of PCO. Tight apposition between the IOL optic and posterior capsule prevents any migration of lens cells onto the posterior capsule. A biconvex or posterior convex optic results in firm apposition of the posterior capsule and the optic. The edge design is also very significant. A square edge of the optic presents a mechanical barrier to the migration of lens cells and reduces PCO significantly. Some difference has been found in the PCO rates between various IOL materials, with acrylic hydrophobic implants faring the best. Pharmacological agents are being tried intraoperatively to lyse anterior capsular cells and reduce the rate of PCO, though these are at an experimental stage.

The treatment of a PCO causing visual loss is a posterior capsulotomy. This used to be achieved surgically earlier. Nowadays, Nd-YAG laser capsulotomy is the method of choice. It is an OPD procedure. Details of this procedure can be found in specialized texts. Basics to be remembered are the use of minimal energy, accurate focusing, use of a contact lens, and post laser antiglaucoma treatment. Thick PCOs not manageable by laser will need surgical capsulotomy with a 26G needle or even Vannas scissors.

**IOL decentration** has been discussed in an earlier section.

**Fibrous ingrowth** and **epithelial downgrowth** are rare complications seen primarily due to faulty incision closure and improper wound sealing. Treatment of these is fairly specialized and needs referral to a centre with requires experience and expertise.