Small Pupil, IFIS and Compromised endothelium

Small pupils:

- Surgery difficult due to reduced working space and visualization
- Various causes
- Try all possible medical ways to dilate using drugs
- Classically stretch pupilloplasty and small multiple sphincterotomies can be tried along with viscoadaptive OVD
- Many safe pupil dilating devices like the iris retractor hooks and Malugin ring are very useful to retain pupil dilated stably till end of the surgery.

Iris retractors:

- Can be applied to the pupillary margin at any stage of surgery. Additional intracameral preservative free 1% lignocaine can be used to augment anaesthesia to the iris.
- Four or five hooks can be used with one behind the incision too to pull iris tissue away from the subincisional area to avoid accidental injury to iris while introducing instruments and probes through the incision.
- According to the size of the hooks 0.25 to 0.50 mm stab entries can be made close to limbus, with minimum track through the corneal stroma
- Need not pull the iris till the limbus (more pull - more sphincter tears)
- Try to make just enough space available to create a 5 to 5.5 mm CCC
- Remember to wash thoroughly under the bunched up iris tissue under the hooks where nucleus, epinucleus and cortical bits can remain trapped.
- After removal of hooks, wash well under the iris to clear the AC off all the dispersed iris pigments

Malugin ring:

- More friendly pupil expander causing lesser sphincter damage
- While inserting the ring, place a little OVD under the iris to raise the pupillary margin off the anterior lens capsule for atraumatic placement of the ring
- Make sure the injector is introduced well into the anterior chamber before commencing injection of the ring.
- After engaging the first eyelet on the pupillary margin opposite to the incision, the two other eyelets can be engaged directly on the pupillary margin by gently tilting the injector tip to either side. If not successful in this maneuver, the ring can be introduced into the anterior chamber and the eyelets engaged to the pupillary margin with a sinskey hook or a Y hook.
- To engage the proximal eyelet, the pupillary margin can also be retracted towards the eyelet using a Y hook to make the final eyelet fixed to the pupillary margin.
The whole ring can be moved so that more areas under the iris comes into view which especially helps in complete cortex wash.

After IOL implantation, with the AC filled with OVD, the ring can be explanted, after disengaging the proximal eyelet, with the same injector or the ring can be disengaged and pulled out with a forceps.

**IFIS**

- Patients on Tamsulosin having poor mydriasis post this intraoperative difficult situation of floppiness of iris with billowing and progressive constriction of pupil and iris prolapse through paracentesis and main incision.
- The effect on the iris persists even if the drug is stopped pre operatively.
- Taking history of Benign prostatic hypertrophy and treatment for the same especially with Tamsulosin is very important during pre op workup and necessary counseling has to be done for the patient regarding the possible intraoperative problems which can complicate the surgery.
- Usually a well dilated pupil has a lesser tendency to show much floppiness.
- The progressive pupil constriction can start during CCC if the capsule edge touches the iris or during hydroprocedures when the nucleus lifts up and touches the iris.
- During phaco, fluid movement and chopped nucleus pieces touching iris can again initiate pupil constriction.
- During phaco take care not to let fluid-jet pass under the iris to avoid billowing. Retaining the irrigating ports of the phaco probe at or just above the iris plane and exposing the needle tip a little more than usual can achieve this.
- Better to chop the whole nucleus into small pieces initially and after completion of chopping start emulsification of the pieces so that even if pupil constricts the pieces are free and separated and can be approached and emulsified much more easily.
- The incision and paracentesis wounds have to be just adequate size to avoid leak. Having the internal corneal entry of the incisions slightly more into the cornea is also helpful.
- Be prepared to abandon leaky wounds (and suture them) and create new incisions to continue the procedure.
- Have lesser bottle height, lower vacuum and flow parameters.
- Use viscoadaptive OVD to keep back the iris.
- While probes exit the AC, have irrigation off.
- Bimanual I/A can help in keeping the irrigation above the iris plane.
- Be ready to use pupil dilating devices (technique same as detailed above) at any stage of surgery if pupil gets too small.
- Personally I use pupil dilators right from the beginning if the pupil is mid dilated or lesser to begin with.
Compromised Endothelium

- Pre op specular microscopy, pachymetry and assessment of both eyes critical
- Counseling regarding possible decompensation and later corneal procedures
- Soft shell technique of good dispersive OVD under endothelium and cohesive OVD over the anterior lens capsule very important.
- Slow motion phaco procedure with all fluidic parameters kept low.
- Using BSS plus is better
- Never let nucleus pieces fly in the AC and hit the endothelium.
- Chop to very small pieces and emulsify them very close to the central CCC area
- If there is central corneal haze, the use of endo illuminator (used in VR surgery) after switching off the microscope light gives a much better view
- Have enough dispersive OVD so that the AC can be filled again to coat the endothelium repeatedly during the procedure.
- Sclero corneal tunnels are useful in Post PK patients and suture incisions at the end of procedure if they don’t close very well