Planned extracapsular cataract extraction with posterior chamber intraocular lens implantation is the “gold standard” procedure for managing cataracts. Posterior chamber intraocular lenses have several distinct advantages which include a lower rate of retinal detachment, cystoid macular edema, a proven track record especially when implanted in eyes with co-existing ocular diseases such as diabetic retinopathy, uveitis and glaucoma 1,2,3.

Long term follow-up of anterior chamber intraocular lens implants (ACIOLs) have been associated with complications like pseudophakic bullous keratopathy, uveitis, glaucoma, hyphaema and cystoid macular oedema 4, 5. Although the newer designs of open loop flexible AC IOLs are associated with fewer complications, their use is limited in the presence of uveitis, glaucoma and in eyes with compromised anterior chamber angle anatomy 6.

The essential prerequisite for posterior chamber intraocular lens implantation (PCIOL) is the presence of adequate capsulozonular support. However in the absence of adequate support for a posterior chamber implant, intraocular lenses fixated to the sclera or iris has been described. Hu and Cowden 7, Agapitos and Lindstorm 8 have described various techniques for suture fixation of PCIOL implants to the sclera in the absence of adequate capsulozonular support. Transsclerally sutured lenses are stabilised by the fixation sutures and the presumed placement of haptics in the ciliary sulcus. Increased clinical experience with these IOLs has shown that they are well tolerated in the eye although a variety of associated complications have been described. These include (1) intraocular haemorrhage during needle passage through the ciliary body, (2) persistent suture track and higher risk of endophthalmitis, (3) suture erosion through scleral flap and giant papillary conjunctivitis, (4) suture slippage from haptic causing subluxation, tilt or dislocation of IOL (5) difficult IOL power calculation, (6) episcleritis,(7) secondary glaucoma etc 9,10,11.

Gabor and Pavilidis first described the technique wherein the IOL haptics are placed in a scleral tunnel. This technique ensures sutureless fixation of a PCIOL using permanent incarceration of the haptics in a scleral tunnel parallel to the limbus. Agarwal et al have described a similar technique wherein the haptics are exteriorized and inaddition to incarcerating it in a sclera pocket, the haptics are glued down to the sclera bed with fibrin glue. It combines the control of a closed-eye with postoperative stability of the PCIOL and can be employed for fixation of subluxated IOL- capsular bag complexes or any IOL or intraocular device that requires transscleral fixation.

We report the results of this technique that places a posterior chamber IOL (PCIOL) in eyes with deficient posterior capsule in the ciliary sulcus with its haptics externalized under a sclera flap and securely tucked into a sclera pocket dissected at the edge of the flap.

**Surgical Technique**

Under peribulbar or retrobulbar anaesthesia 2 partial thickness sclera flaps are dissected 180 degrees apart diagonally and about 0.75 - 1.5mm from the limbus. 2 straight sclerotomies are made in the bed of the flap about 1mm from the limbus using a 23G MVR blade. The sclerotomies are positioned in such a way that the superior sclerotomy lies close to the upper edge of the flap and the inferior one lies close to the lower edge of the flap.

The PCIOL is introduced into the anterior chamber through the limbal tunnel. At the same time a 23 guage microvitreous forceps is introduced through the sclerotomy (inferior). The haptic is grabbed and exteriorized. The superior haptic is a similarly exteriorized through the superior sclerotomy. Both haptics are securely tucked into a sclera pocket dissected at the edge of the flap using a 22g needle or 23 g MVR blade. (Figure 1 – Figure 3)
Figure 1 – 3 demonstrates the surgical technique of securing the haptics in the scleral pocket after exteriorizing it using 23 gauge microvitreous forceps.

Fig 4 & Fig 5: Postoperative day 1 and 12th month anterior segment photograph of case 1 who was aphakia following repair of a penetrating corneal injury with lens injury, endophthalmitis and a retained lead foreign body.

Fig 6 – Fig 7: Postoperative day 1 and day 30th anterior segment photograph of case 2 who had subluxated PCIOL with a total retinal detachment.
Posterior chamber intraocular lens was implanted in 4 patients by a sutureless scleral fixation technique. The surgical technique, intraoperative difficulties and results of postoperative followup were analysed. Indications for surgery included aphakia following surgery for a penetrating injury with lens injury and retained intravitreal lead foreign body (1 Case), displaced PCIOL with retinal detachment (1 Case), and dislocated PCIOLs (2 cases).

The mean postoperative best corrected visual acuity of 6/18 was stable at 12 months follow up. There was no significant change in the mean intraocular pressure. The endothelial cell count did not show any significant decrease from the preoperative values at 30 days, 3 months and 12 months after the procedure. No major complications were encountered during follow up. (Figure 4 – Figure 7)

Posterior chamber intraocular lens was implanted in 4 patients by a sutureless scleral fixation technique. The surgical technique, intraoperative difficulties and results of postoperative followup were analysed. Indications for surgery included aphakia following surgery for a penetrating injury with lens injury and retained intravitreal lead foreign body (1 Case), displaced PCIOL with retinal detachment (1 Case), and dislocated PCIOLs (2 cases).

The results obtained by this technique were compared with the results of of ab-externo 2 point and 4-point scleral fixation techniques from our centre (Table 1).

### Results

This technique was used in 4 eyes. Indications for surgery included aphakia following surgery for a penetrating injury with lens injury and retained intravitreal lead foreign body (1 Case), displaced PCIOL with retinal detachment (1 Case), and dislocated PCIOLs (2 cases).

The mean postoperative best corrected visual acuity of 6/18 was stable at 12 months follow up. There was no significant change in the mean intraocular pressure. The endothelial cell count did not show any significant decrease from the preoperative values at 30 days, 3 months and 12 months after the procedure. No major complications were encountered during follow up. (Figure 4 – Figure 7)

### Discussion

The current indications for scleral fixation of PC IOL include aphakic status after intracapsular cataract surgery with inability to tolerate contact lenses, partial or total absence of the posterior capsule after extracapsular cataract extraction, and subluxation or dislocation of crystalline lens. Also in those cases where iris atrophy, distortion or absence render iris fixation impossible, a scleral fixation remains the only viable alternative.

Stability of the lens in scleral fixation is primarily the result of intact trans-scleral sutures and not fibrosis, encapsulation or the presumed ciliary sulcus placement of haptics. Numerous techniques have been devised to increase the chances of correct positioning, although no surgical technique guarantees sulcus placement of the haptics.

Using eye bank eyes Duffey and co-authors defined the exact anatomic measurements and surgical techniques necessary for sulcus fixation of the IOL. A scleral entry point 0.50mm to 0.75mm from the surgical limbus avoids the major arterial circle and the entire ciliary body and may provide true ciliary sulcus placement of the IOL.

The use of a one piece all PMMA, large optic IOL with fixation eyelet in each haptic in the area of maximum haptic spread provides excellent centration and haptic stabilization when one trans-scleral suture pass per haptic is made.

Postmortem histological studies on the characteristics at the site of scleral suture fixation disclosed a thin fibrous capsule.
surrounding the haptic at their attachment and absence of inflammation around the trans-scleral portion of the suture. Intra ocular tilt of the suture supported PCIOL has not been associated with significant astigmatism.

The main advantages of this technique are 1) easy placement of sutures 2) less chance of suture slippage 3) avoidance of difficult intraoperative maneuvers and possible injury to the ocular tissues. This method is simple and provide predictable placement of the sutures within the ciliary sulcus, proper haptic stabilisation, optic centration and decreases the risks of intraoperative bleeding during needle pass through the ciliary body. It requires minimal manipulation is relatively atraumatic to the delicate ocular structures, and facilitates safe IOL placement in the absence of capsulozonular support.

Increased clinical experience with these IOLs have shown that they are well tolerated in the eye although a variety of associated complications have been described. These include (1) intraocular haemorrhage during needle passage through the ciliary body, (2) persistent suture track and higher risk of endophthalmitis, (3) suture erosion through scleral flap and gaint papillary conjunctivitis, (4) suture slippage from haptic causing subluxation, tilt or dislocation of IOL, (5) difficult IOL power calculation, (6) episcleritis,(7) secondary glaucoma etc.

Sutureless sclera fixation techniques are useful in clinical situations where a sclera fixated PC IOL implantation is indicated such as subluxated or dislocated crystalline lens or PC IOL, secondary IOL implantation in surgical aphakia and also in the presence of significant zonulopathy. This technique can be adapted for rigid PMMA, 3 piece PC IOL’s or IOL’s with modified PMMA haptics. One does not need special sclera fixated IOLs with eyelets for suture fixation.

Since the haptic is placed in its normal curved configuration with out traction, securely in the sclera tunnel under a sclera flap, there is greater stability for the IOL than in suture scleral fixation IOLs which tends to move. IOL tilt, pseudophacodonesis and probably retinal damage can be minimized by this technique.

Conclusion

Sutureless scleral fixation technique can be considered as an option in patients with absent capsular support and compromised corneas. Larger series with longer follow-up data is necessary to validate these results.

References