Management of Subluxated Lens in A Paediatric Patient: A Deliberation
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Ectopia lentis may occur after trauma, as an isolated condition or associated with ocular and/or systemic disease. Traumatic cases are usually unilateral while sporadic, familial and those associated with systemic diseases tend to be bilateral. Sporadic or familial form usually shows an autosomal dominant trait.

Grading systems for ectopia lentis have been proposed to facilitate and standardize studies, as well as enable communication between clinicians managing these patients, but no specific grading system is widely accepted. (Figure 1) Management of subluxated crystalline lens in children is a challenge. Surgical procedures such as intracapsular cataract extraction, limbal or pars plana lensectomy and anterior vitrectomy and suturing of the haptics to the sclera have been reported with several complications.

Figure 1: 3 broad groups (1) Minimal to mild lens subluxation in which the lens edge uncovers 0% to 25% of the dilated pupil; (2) moderate lens subluxation in which the lens edge uncovers 25% to 50% of the dilated pupil; (3) and severe lens subluxation in which the lens edge uncovers greater than 50% of the pupil.

Neha Rathie - Q. What are the investigations you get done for work up of a pediatric patient with subluxated lens?

Usha Kaul Raina: As ectopia lentis may be the first sign of a more serious systemic disease, due to its association with multiple ocular and systemic diseases. Appropriate history, which includes family history, any relevant trauma, onset, duration and types of visual symptoms, is taken from the parents and a complete physical examination is performed.

If a hereditary condition is suspected, or if the child shows physical attributes like tall stature or Marfanoid features, appropriate diagnostic and laboratory evaluation (e.g. total plasma homocysteine concentration for homocystinuria, cardiac evaluation for Marfan syndrome) is done. We routinely refer all such cases to a paediatrician for a complete systemic and cardiac evaluation (including cardiac echo wherever needed). Genetic testing has been evolving in ectopia lentis, and is available at some centres but we do not get any genetic testing done routinely in our cases.

Preoperative evaluation:
The ocular examination includes recording visual acuity (both distant and near), an external ocular exam, a slit lamp
exam, retinoscopic refraction (through phakic and aphakic areas), and a dilated fundus examination is a MUST to evaluate retinal periphery especially in cases like Marfans, and measurement of IOP. Corneal diameter, if needed, is measured under GA. If high astigmatism is present, keratometry is tried to determine whether the astigmatism is primarily corneal or if it is lenticular.

Slit lamp examination is carried out under maximum mydriasis for detecting:-
- Status of zonules: stretched or absent, number of clock hours affected
- Cataract, if any
- Presence or absence of any vitreous in anterior chamber
- Size of the ectopic lens, as in many cases it is is hypoplastic with small diameter. The small lens size in ectopia lentis is in marked contrast with the normal size of the lens in secondary lens subluxation, caused by blunt eye injury.
- Presence of any lens coloboma
- In cases of trauma, the lens capsule is examined for evidence of tear/capsular fibrosis

Sudarshan Khokhar: Non-traumatic subluxation can be associated with systemic disease, so it is important to identify the cause and early referral to pediatrician, to prevent life threatening complications, like cardiovascular diseases and thrombotic complications. We routinely perform cardiology evaluation and serum homocysteine in all patients with non-traumatic subluxation. Genetic testing is done in cases where family history is present.

Regarding ocular investigations, we perform specular microscopy and white to white measurement where ACIOL is planned, and ultrasound (USG) in cases where fundus can’t be visualized either due to poorly dilating pupil or due to cataractous lens.

Sumit Monga: Well, I would begin with a good history, taking history of trauma (beware of incidental history) and detailed family history (history of cardiac disease/ tall stature/ known case of marfan’s syndrome in family/ unexplained death), in particular. It is also useful to specifically ask about any intelligence issues/behavioural problems in the child (common in homocystinuria). A good dilated eye exam needs to be done to document degree of lens subluxation, laterality (unilateral is more likely to be traumatic but carefully rule out asymmetric, bilateral involvement), intactness of zonules (intact but weak, in cases of ectopia lentis), any vitreous herniation, and detailed retinal findings (especially to rule out glaucomatous damage, peripheral retinal degenerations and pigmentary retinopathy).

In a case of ectopia lentis, I generally request for a systemic evaluation by a paediatrician (to rule out any associated skeletal and systemic findings), cardiac evaluation (and mandatory ECHO) to rule out aortic root dilatation (or get a baseline of the same) by a paediatric cardiologist, and serum homocysteine level (to rule out elevated homocysteine levels in homocystinuria). Of late, in absence of a clear cut family history and if family can afford, I do request for genetic testing to rule out mutation in fibrillin gene (available at SGRH, Delhi).

Jyoti Matalia: First of all, it is important to rule out trauma in these cases, as there is no substitute for a good clinical history. If the child presents with bilateral involvement, it would be most likely related to a systemic cause. Common systemic associations include Marfan’s syndrome, Weil Marchesani syndrome and homocystinuria, hence a systemic work-up is needed and referral to a pediatrician and cardiologist is mandatory. Presence of a congenital heart disease may point to Marfan’s syndrome if associated with skeletal abnormalities. Referral to the cardiologist is important as the valvular abnormalities, conduction abnormalities, as well as cardiomyopathy are quite common in these cases. It is important to do a 2-D Echo to look for the aortic root dilatation, and follow it over time, since it may be an early sign of disease. In addition, presence of a systemic cause confirms that the subluxation would progress and hence we need to plan our management accordingly. As regards to homocytinuria, a simple urine test (the cyanide nitroprusside test) will be confirmatory but what is more important are the precautions that need to be taken during anesthesia in the perioperative period to avoid complications and mortality associated with this metabolic disorder.

Summary (Neha Rathie): A thorough clinical history and ophthalmological examination is a must for all cases of subluxated lens in a paediatric patient. Apart from this, complete systemic examination especially cardiology work up is important to rule out any associated syndromes.

Neha Rathie - Q. Which all cases of subluxated lens need to be operated? What is the timing of surgery and what are the factors taken into consideration?

Usha Kaul Raina: Most of cases with ectopia lentis are children who are in the process of growth of the ocular structure and development in the visual acuity. Therefore, clinical decision-making crucial from the viewpoint of avoiding amblyopia.

The decision to operate depends on many factors, including visual acuity, lens location, progressive subluxation of the lens, imminent total dislocation, and others.

Absolute indications for surgery include, but are not limited to
- Poor visual acuity at near and distant viewing(< 6/18 and < N8)
- Lens-induced glaucoma (LIG) (due to lens tilt / vitreous in AC)
- Lens in the anterior chamber, especially if the lens is touching the corneal endothelium
- Lens opacity that is causing decrease in vision
- Visual acuity not correctable by refraction due to high astigmatism /lens tilt /lens edge bisecting the pupil which makes it impossible to optically correct either the aphakic or phakic part of the pupil
There are two scenarios when optical correction could be adequate and surgery will not be needed; in mild subluxation, wherein the astigmatism can be corrected by spectacles alone, surgery can be deferred. If the subluxation is more than 3 clock hours, there is more chance of higher order internal aberrations resulting in poor quality of vision. In such cases, a surgical intervention is needed as the astigmatism is unlikely to be corrected with spectacles. Contact lenses have no added advantage over glasses to correct this lenticular astigmatism.

Summary (Neha Rathie): The vision of child at presentation and the degree of subluxation, remain the two most important factors to determine whether surgical intervention is required or not. Other associated pathologies like LIG and cataract also play a determining role.

Neha Rathie - Q. What is the role of glasses for management?

Usha Kaul Raina: In all cases, timely optical correction is important for prevention of amblyopia. In very minimal subluxation glasses are the first choice. Unfortunately we get cases in advanced stages of luxation who need surgery. Retinoscopy is tried both through phakic and aphakic portion and we try to see the distant and the near unaided and aided visual acuity in UNDILATED PUPIL. Glasses with observation is done only in cases of early subluxation with a distant visual acuity of at least 6/18 with correction and reasonably good near VA. Rarely glasses are the only option when the families are reluctant to go through surgery.

Sudarshan Khokhar: Refractive correction with glasses helps in improving visual acuity in majority of patients. In patients with mild subluxation where no aphakic area is seen in the undilated pupil as well as in patients with severe subluxation where lens has migrated completely across leaving the pupillary area aphakic, significant improvement can be seen with glasses. We perform refraction with both phakic and aphakic area and give final prescription based on patient’s acceptance. Cases where lens margin is bisecting the pupillary area, and cases with high myopic astigmatism due to abnormal lens shape and position, generally do not improve with glasses.

Sumit Monga: I think it plays a huge role. A good refraction through central (pupillary area) phakic/aphakic part (if subluxation is severe) plays a vital role in obviating amblyopia. Myopic astigmatism is the most common refractive error found in these cases. Contrary to presumed notion, in my view, a child with ectopia lentis, who has been rehabilitated well with spectacles in early childhood, has only a mild to moderate amblyopia risk and achieves reasonably good vision after surgery in late childhood or adulthood.

Jyoti Matalia: There are multiple factors that we need to look into before we plan the surgery like age at presentation, vision, and degree of subluxation. Surgery performed at an early age, will allow early visual rehabilitation and better amblyopia management. A best corrected vision of 6/18 or worse is my cut off to proceed for surgery. Vision is also a good prognostic factor and if an older child present with poor vision, the possibility of vision improvement is less as compared to a younger child who is 2 to 3 years old.

Detailed ocular examination in any case of subluxation is a must. It is also important to check the anterior segment to look for signs of trauma and the posterior segment for retinal periphery to rule out tears. Degree of subluxation needs to be assessed in terms of the clock hours and also in terms of severity. One can grade the severity of subluxation into mild, moderate and severe depending on the visualization of the subluxated edge through the pupil. For less than 3 clock hours of subluxation, check the lenticular astigmatism and if not found significant and the vision can be corrected by spectacles alone, surgery can be deferred. If the subluxation is more than 3 clock hours, there is more chance of higher order internal aberrations resulting in poor quality of vision. In such cases, a surgical intervention is needed as the astigmatism is unlikely to be corrected with spectacles. Contact lenses have no added advantage over glasses to correct this lenticular astigmatism.
be corrected with spectacles, and in severe subluxation wherein the lens is completely off from the visual axis. In the latter, aphakic glasses or lenticular contact lenses can be considered for visual rehabilitation. Between the two, contact lenses are preferred over glasses. However, glasses may have an advantage when children do not tolerate contact lenses or as a safer option in very small children. Further these high power glasses can act like a magnifying lens to allow better vision in those with an existing visual impairment secondary to a delayed presentation. In my practice, I have encountered good visual outcomes and compliance with aphakic contact lenses.

Summary (Neha Rathie): Glasses have no role in case of moderate subluxation of lens where the lens edge is bisecting undilated pupil. In such cases, surgery is a must. Whereas in mild and severe cases, significant visual improvement may be seen with glasses.

Neha Rathie - Q. What is preferred, a primary intraocular lens (IOL) implantation or a secondary IOL implantation?

Usha Kaul Raina: Primary IOL implantation is always preferred. It avoids delay in visual rehabilitation, and avoids a second general anesthesia. It is a MUST in unilateral cases. Only exception would be very young children, less than 2 years of age, with bilateral involvement. They could be left aphakic, with either glasses or contact lenses, till they are older and there is a chance to implant IOL with the correct power.

Sudarshan Khokhar: We prefer primary IOL implantation in the bag using capsular tension ring/segment or scleral fixation of bag using Cionni’s ring. ACIOL is preferred in cases where bag can’t be fixed.

Sumit Monga: In cases of ectopia lentis, I would plan a primary IOL implantation if subluxation is mild to moderate, with ≤6 clock hours of zonular dehiscence. However for severe subluxation of >6 clock hours, with the edge of the lens visualized in the pupillary plane, I prefer IOL implantation as a secondary procedure, especially in younger children. These children are at an increased risk of trauma and therefore increased associated complications like glaucoma, retinal detachment, intracocular hemorrhage etc. if noncapsular IOL implantation is performed. Considering the various drawbacks and possible complications of IOL implantation in children, I prefer leaving the child aphakic till older. This gives a chance to implant the correct IOL power, as repeat surgeries or IOL exchange may not be the best option in these cases.

Summary (Neha Rathie): Most surgeons prefer a primary, in the bag IOL implantation, with the help of capsular support devices, if needed.

Neha Rathie - Q. Whether to use a posterior chamber IOL or an anterior chamber IOL (ACIOL)? Any advantages/drawbacks encountered in your experience? Which technique do you prefer for posterior chamber lens implantation –in the bag IOL with a capsular tension ring or Cionni ring, or scleral fixation of IOL?

Usha Kaul Raina: The first choice is of course in the bag IOL implantation, and to preserve the bag as far as possible because of the advantages: first, it preserves and maintains natural compartments, second, it preserves the intact anterior vitreous phase, third, in the bag IOL implantation is the ideal site for IOL fixation. For the bag, the choice is Acrysof single piece IOL. Sometimes we see a subluxated bag of smaller equatorial diameter in which in the bag IOL implantation is impossible. Although there are some studies which have shown good results with ACIOL, we are not sure what happens to the stability of IOL in AC during the growth of eye and what are the long term effects on IOP. We usually avoid ACIOL in children whose life expectancy is greater than 20 years. In our practice, we don’t use iris fixated IOL.

In a posttraumatic eye showing a small focal area of dialysis (<3 clock hours) with otherwise strong adjacent zonules, we do not use a capsular tension ring (CTR). In cases of even mild zonular laxity but with a progressive pathologic state such as, Weil-Marchesani or Marfan syndrome, the zonular problems can be expected to worsen over time, we use a Cionni ring with scleral fixation as a primary procedure. Even if there is no zonular instability at the time of surgery, a CTR should be placed in the bag, anticipating and thus providing support, in case a subluxation occurs in future.

If there is more than 4 clock hours of zonular deficiency or if the lens is moderately to severely displaced, we use a Cionni ring with scleral fixation as a primary procedure. For suturing Polypropylene10-0 is unadvisable, as it will hydrolyze over time. Polypropylene 9-0 has a longer survival time; however, to date, the interval before degradation of this suture gauge has not been reported. A polytetrafluoroethylene CV-8 suture, Gore-Tex has been used for scleral fixation off-label and to date has had excellent longevity. We have now shifted to using this suture routinely in all our cases that require scleral fixation.
of IOL/Cionni.
If an intact, properly fixated and centered capsular bag is accomplished, and a circumferential CTR/ Cionni ring is in place, a 1-piece or 3-piece IOL is equally good, for in the bag placement.
In the presence of posterior capsule compromise, no CTRs are placed and a scleral fixated IOL is preferred. 
Another approach described for dealing with the severely subluxated lens, is to avoid removal of the lens altogether if the patient is optically aphakic due to severe lens subluxation and placement of an AC IOL without lens extraction. We have not done this and have no experience in this respect. 
In the rare instances in which the lens has dissociated into the vitreous cavity, the lens can be removed by a pars plana approach by a vitreoretinal surgeon.

**Sudarshan Khokhar:** Choice of IOL will depend upon etiology, patient’s age, degree of subluxation, status of corneal endothelium, white to white diameter and pupil size (Table 1). In traumatic subluxation, PCIOL can be placed in the bag using CTR (<5 clock hour subluxation) or Cionni + CTS (5-9 clock hours). SFIOL can be considered if there is >9 clock hours of traumatic subluxation and patient’s age is more than 10 years.

In progressive subluxation, we avoid in the bag implantation using capsular tension ring as remaining zonules will weaken over time leading to bag dislocation with the IOL, in such cases scleral fixation of bag should be done either using Cionni’s ring or CTS, even in cases having minimal subluxation.

We prefer ACIOL over SFIOL in patients with non-traumatic subluxation, in whom in the bag implantation is not possible, as these patients may have associated connective tissue disorders with thin sclera, further leading to complications with SFIOL.

**Sumit Monga:** I prefer posterior chamber IOL, as it more physiological. If affordability is an issue, or if extensive peripheral retinal degeneration poses high risk for retinal detachment, I would consider anterior chamber IOL as an alternative.

In cases with less than 180 degrees subluxation, I do consider a capsular stabilisation device, before IOL implantation. A conventional capsular tension ring is not a good option, owing to associated profound zonular weakness. A scleral fixated capsular tension ring (Modified Cionni CTR) offers better stability of capsular bag and IOL.

Over a period of time, especially in children less than 10 years, I am more inclined towards doing a good lensectomy with limited anterior vitrectomy, along with glued/scleral fixated IOL (taking help of our esteemed VR colleagues). This inclination is because of high incidence of visual axis opacification in young children (with IOL implantation with capsular stabilisation techniques and intact posterior capsule/anterior vitreous).

**Jyoti Matalia**: My first choice is implanting a posterior chamber IOL (PCIOL) in the bag using a CTR, with or without Ahmed segments. I feel that this is the best possible option, that is physiological and therefore, wherever possible, it is best to preserve the bag and implant an IOL within it. Once the capsular bag is properly fixated and centred, a single piece or 3-piece IOL can be implanted. Never place an IOL in the sulcus without any type of fixation as there is a possibility of the IOL haptics migrating through the compromised zonular fibers, resulting in subluxation of the PCIOL. In case the capsular bag is compromised, I prefer scleral fixated PCIOLs (SFIOLs). However, there are many other alternatives for IOL placement outside the bag, iris-fixed posterior chamber IOLs, or fibrin glue-assisted PCIOL and anterior chamber IOLs like iris claw ACIOLs, flexible open-loop ACIOLs. A review by the American Academy of Ophthalmology found no significant advantage in any of the above techniques in the absence of randomised controlled trials. Thus, the choice of technique and IOL is dependent on the surgeon’s training and experience.

**Neha Rathie - Q.** What is the surgical technique followed for lensectomy in your practice: via anterior route or via pars plana route, and why?

**Usha Kaul Raina**: Anterior segment surgeons will always prefer anterior route. We usually use the anterior route when doing in the bag IOL implantation ± Cionni /CTR.

For lensectomy we have shifted to 25 gauge vitrectomy system. We make two openings in the anterior capsule and aspirate the soft lens matter by the vitrectomy cutter by alternating suction aspiration and cutting mode. This is followed by removal of the bag. (Figure 2)

In cases of severe subluxation where the patient needs scleral fixated IOL, both pars plana and anterior routes are equally good.

Rarely, lenses may appear approachable with the patient

| Degree of Subluxation | Type of Subluxation | Procedure |
|-----------------------|---------------------|-----------|
| < 5 clock hours       | Non-progressive     | CTR with IOL |
| < 5 clock hours       | Progressive         | CTR + CTS or Cionni with 1 eyelet with IOL |
| 5-7 clock hours       | Non-progressive/ Progressive | CTR + CTS or Cionni with 1 eyelet with IOL |
| 7-9 clock hours       | Non-progressive/ Progressive | Cionni with 2 eyelets or Cionni with 1 eyelet + CTS with IOL |
| > 9 clock hours       | Age > 10 years      | SFIOL     |
|                       | Traumatic subluxation | ACIOL     |
|                       | Sclera healthy      |           |

**Summary (Neha Rathie):** Choice of IOL depends mainly upon etiology, patient’s age and degree of subluxation. Posterior chamber IOL with CTS/CTR/Cionni’s ring, is preferred by most surgeons over ACIOL, which is associated with increased risk of glaucoma in paediatric eyes.
in an upright position but subluxate into a position better managed with a pars plana lensectomy when the patient is placed supine. Thus it is important to evaluate the subluxation in both supine and sitting position. If available, ultrasonic biomicroscopy (UBM) is a valuable tool in assessing this, as well as the degree of zonular compromise. Since the UBM images are recorded with the patient in the supine position, information gathered simulates the condition of the crystalline lens during surgery.

Sudarshan Khokhar: We prefer intralenticular bimanual irrigation aspiration when ACIOL is planned as both can be performed through the anterior route, and prefer doing pars plana lensectomy if planning to leave the patient aphakic, as it causes less astigmatism.

Sumit Monga: I prefer a pars plana approach, which ensures a more complete and efficient removal of the lens. In case of microspherophakia, I prefer the limbal approach.

Jyoti Matalia: There is no ideal route for lensectomy and no ‘one’ route is better than the other. I am an anterior segment surgeon and I prefer the anterior route. However, if the lens is subluxated too posteriorly, the pars plana route is preferred. I prefer to make an anterior capsulorrhexis via a closed chamber approach through a limbal route followed by a good hydrodissection and phacoaspiration. This ensures thorough cortical clean up before removal of the bag. This is then followed by partial anterior vitrectomy by using the automated vitrector.

Summary (Neha Rathie): The route of lensectomy depends upon the ease of the surgeon and also on patient requirement. Anterior route can be used when limited anterior vitrectomy is planned along with IOL implantation. Pars plana route can be used for more extensive vitrectomy especially when IOL implantation is not to be done, or in cases with severe lens subluxation posteriorly into the vitreous cavity in the supine position.

Neha Rathie - Q. For scleral fixation of IOL which is your preferred approach- ab interno or ab externo and a two-point or a four-point fixation technique? What are the various IOLs you used in your practice?

Usha Kaul Raina: For intrascleral haptic fixation, the choice is Acrysof 3 piece IOL (Alcon, MA60AC) but we don’t have much experience with this technique in children.

For scleral suture fixation, the choice is, four point fixation with an Akreos IOL. Four-point fixation helps decrease IOL tilt, an outcome that is often difficult to achieve with a 2-haptic IOL. The Akreos AO60 has 4 eyelets that allow easy 4-point fixation using a horizontal mattress suturing technique to the sclera, thus ensuring IOL stability and minimizing tilt. The advantages of this fixation method are the small incision, relative technical ease, anatomic location, and excellent visual acuity. The Akreos AO60 IOL is extremely soft with no sharp edges on the haptic eyelets, decreasing the risk that the suture would be cut. (Figures 3, 4)

Ab externo approach is used. We no longer dissect a scleral flap (this can be quite challenging in young eyes with thin sclera). Instead we make a scleral groove with 25 gauge sclerotomies at each end. The knots of the suture are buried by carefully rotating them into the sclerotomies thus avoiding any suture erosion/exposure.
Sudarshan Khokhar: We prefer sutureless intrascleral fixation of IOL after making the scleral flaps instead of sutured SFIOL, to avoid suture related complications, like suture erosion, suture knot exposure or dislocation of IOL after suture disintegration. We use 3 piece hydrophobic acrylic lens (Alcon, MA60AC) for the same.

Sumit Monga: I have experience only with ab-externo, 2 point scleral fixation of IOL.
I have used scleral fixated IOLs (eyelets on haptics), foldable 3 piece Acrylic IOLs for, in-the-bag implantation (rigid PMMA haptic additionally help in stretching the capsule, along with capsular stabilising device), and glued IOLs.

Jyoti Matalia: I have performed scleral fixation with the ab-externo route using a two point fixation technique and also performed posterior chamber iris claw fixation.
I have used Aurolab SC6530 (Aurolab, India) single-piece polymethylmethacrylate (PMMA) lenses with eyelets and optic diameter of 6.5 mm & overall diameter of 13 mm for scleral fixation. For iris fixation, I have used Freedom Lens (Model FIC5085Vmodel no.: PIC 5590, or PIC 5580; manufactured by Freedom Ophthalmic Pvt Ltd Hosur, Tamil nadu) in few older children.

Summary (Neha Rathie): Ab externo technique of scleral fixation of IOL with two point fixation is preferred by most surgeons. Four point fixation of Akreos IOL may help provide better stability and centration.

Neha Rathie - Q. Do you perform vitrectomy for all cases? How much of vitrectomy should be done and whether to perform vitrectomy before or after IOL implantation?

Usha Kaul Raina: Vitreous in anterior chamber is more often seen in post-traumatic cases.
If vitreous is present at the beginning of the case, it must be removed from the anterior chamber before anterior segment maneuvers begin. In rare cases of minimal prolapse, the vitreous can be pushed back by the use of a dispersive OVD.
In most cases of prolapse, a vitrectomy is required before IOL implantation.
We do a limited anterior vitrectomy(if needed ) in cases of in the bag IOL implantation using the 25 gauge vitrectomy system.
In cases requiring a scleral fixated IOL little more than anterior vitreous is removed but never go beyond mid vitreous. We generally depress sclera in the meridian of scleral fixation for a more thorough vitrectomy in the area of fixation.

Sudarshan Khokhar: Yes, we perform vitrectomy in all cases with lensectomy till mid vitreous before implanting the IOL.

Sumit Monga: I perform limited anterior vitrectomy, along with lensectomy. I prefer IOL implantation, along with capsular stabilisation techniques (with intact posterior capsule and no vitrectomy) in higher age group (>10 years).
In traumatic cases, vitreous herniation needs to be tackled.

Jyoti Matalia: It is very important to assess the status of the vitreous in patient with subluxated cataracts. In cases of subluxation with vitreous noted in the anterior chamber, which is usually seen after trauma, it may be necessary to perform vitrectomy first before lens removal. As we are aware that vitreous is a transparent structure and we need to completely clear it off, we need to use supportive measures like intraocular triamcinolone acetone or endoilluminator. The latter is a simple device I use regularly for ensuring a good and thorough vitrectomy. This endolight is routinely used by our retinal colleagues intraocularly but in case of anterior vitrectomy performed by the limbal route we need to use it externally and obliquely over the limbus. This allows visualization of the invisible vitreous, what I call ‘seeing the invisible’. For all other cases of subluxation, I perform vitrectomy after removal of the bag before IOL implantation. One needs to remember that only partial anterior vitrectomy should be done such that the vitreous is cleared from the anterior chamber till just below the pupillary plane, so don’t aim for a core vitrectomy. To ensure this keep a high cut rate (800-1000) with low vacuum (60-80mm Hg). If one keeps a higher vacuum, it may result in intraoperative hypotony and difficulty in IOL implantation. It is important to ensure that the final position of the IOL is free of any vitreous for best results.

Summary (Neha Rathie): Most surgeons do a limited anterior vitrectomy in all cases of scleral fixation of IOL in paediatric patients. The aim is to keep the anterior chamber and pupillary plane free of vitreous during and after IOL fixation. Any vitreous in anterior chamber, if present, must be cleared.

Neha Rathie - Q. What are the complications of scleral fixation of IOL encountered in your practice?

Usha Kaul Raina: We have had so far two cases of suture breakage after 7/8 years leading to subluxation of IOL needing surgery. In both these cases 10/0 Prolene suture was used.
We no longer use this suture and have shifted to Gore-Tex (rarely 9/0 Prolene). Even the Cionni ring can be fixated with Gore Tex suture.

Sudarshan Khokhar: Our experience with SFIOL in pediatric patients is limited as we do SFIOL only in children with more than 10 years of age and with traumatic subluxation. However, we encountered one patient with haptic exposure after glued SFIOL operated at age of 5 years from outside. (Figure 5)

Sumit Monga: Lens decentration of varying degree and exteriorisation of knots with suture granuloma, has been seen by us.

Jyoti Matalia: I have encountered vitreous hemorrhage, pupillary capture and tilting of the IOL. Suture erosion is another complication which needs to be watched out for, in the late postoperative period, after the first decade of surgery. I have therefore shifted to Gore-tex sutures for similar reasons instead of prolene.
Summary (Neha Rathie): Different complications have been experienced with scleral fixation of IOL, the common ones being, decentration and suture/haptic exposure. Gore-tex suture, instead of prolene, is recommended to avoid the complication of suture erosion in the late post-operative period.

Neha Rathie - Q. What according to you are the new trends in the management of subluxated lens in children?

Usha Kaul Raina: Femtosecond laser–assisted cataract surgery may offer some advantages. The femtosecond laser does not depend on counter resistance from zonular support and is able to cut a circular and well-centred anterior capsule opening despite subluxation of the lens, as long as the lens is not tilted excessively. Although not every subluxated crystalline lens may lend itself to this type of surgery, some lenses are too grossly subluxated, some may have poorly dilating pupil, and some may have a very mobile crystalline lens. Zepto capsulorhexis also could be used to create a well centred capsulorhexis, which is usually a challenge in these cases.

Sudarshan Khokhar: The ‘dual support’ by placement of CTR along with CTS helps to provide additional capsular stabilization in patients with microspherophakia and in cases with progressive subluxation. In this, CTR act against IOL decentration and capsular phimosis by exerting symmetric centrifugal force and the addition of CTS secures the ring to the sclera and decreases the risk of future displacement of the bag-IOL–CTR complex. CTS was preferred over Cionni in these cases because of ease of insertion as well as flexibility in timing of implantation. Cionni also entails the risk of cheese wiring of the suture through the capsular bag due to excessive shearing force exerted by the device in a subluxated bag of smaller equatorial diameter.

Sumit Monga: I think doing a capsulorrhexis is an additional challenge in these cases. Hopefully, in near future, with the possible use of femtolaser technology, a more controlled anterior and posterior capsulorrhexis could be possible in these cases. Glued IOLs, instead of conventional scleral fixation of IOLs with sutures for fixation, is another useful advance.

Jyoti Matalia: Using suture less SFIOLs with glue or without glue where in the haptics can be tucked into the scleral pockets may gain more popularity in children. An ab-interno technique with direct endoscopic viewing of the ciliary sulcus to ensure that the uveal tissue remains un breached may be the way forward.

Summary (Neha Rathie): Quite a few advancements can be tried in the management of subluxated lens in children such as Femtosecond laser–assisted cataract surgery, to create a well centred capsulorhexis. Glued IOLs, instead of conventional scleral fixation of IOLs with sutures for fixation, is another useful advancement.

Neha Rathie - Q. What is your take on the use of glued IOLs?

Usha Kaul Raina: I think the better term is intrascleral fixation of haptics since we are not gluing the IOL anywhere but in fact gluing the scleral flaps. This procedure has few studies with limited follow up in literature for children. In very young it is not clear what happens when there is scleral expansion as the child gets older. It is also technically more demanding in children with a positive vitreous pressure and thin sclera. However, it has the advantage of being sutureless.

Sudarshan Khokhar: The term ‘glued IOL’ in my opinion is wrong, because it’s not the fibrin glue that is holding the lens in place, rather it’s the scleral pocket that the tip of the IOL haptic is tucked into, that is securing the lens. Glue just helps in closing the partial thickness scleral flap and conjunctiva.

Sumit Monga: I believe it’s a promising technique, but it definitely has a learning curve and its long term outcome needs to be seen.

Jyoti Matalia: Glued IOL is certainly a good technique and can be performed in children, but since the follow up in children needs to be measured in decades and long term results for safety are still not available, glued IOLs will need to stand the test of time before they can be used routinely in children.

Summary (Neha Rathie): The general consensus on Glued IOLs is, that it is a promising technique but it still needs to withstand the test of time, since long term follow-ups have yet to be taken into consideration.
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