Surgical Correction of Ectopia Lentis

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Introduction

Ectopia lentis due to any cause presents a challenge to the ophthalmologist, and management requires adhering to certain paradigms and principles. Surgical management of ectopia lentis poses two major challenges:

1. Removal of lens itself
2. Fixation of IOL

Strategies include:

Counseling: The patient and the family are made aware of:
- Possibility of uncertain surgical outcome
- Challenges and consequences of scleral fixation of IOL
- Postoperative suboptimal visual recovery
- Need for secondary intervention
- Regular monitoring for glaucoma and retinal complications

Preoperative evaluation: is carried out under maximum mydriasis for detecting:
- Extent of zonular weakness
- Grade of cataract, if any
- Presence of vitreous strands in anterior chamber, and
- Peripheral retinal lesions

As per extent of area of zonular dehiscence surgical strategy is decided. Pars plana lensectomy with vitrectomy is an option for gross subluxation of lens, following which scleral fixation of lens or intrascleral fixation-glued IOL or iris fixated lens can be done for IOL implantation. We prefer to preserve the bag as far as possible because of the advantages:

1. It preserves and maintains natural compartments
2. It preserves the intact anterior vitreous phase
3. In the bag IOL implantation is the ideal site for IOL fixation

But this is technically demanding and long-term stability is still a question. There are many options for bag fixation and in-the-bag IOL implantation. The Cionni ring and Ahmed segments are designed to fixate the capsular bag to the sclera without violating the integrity of the capsular bag. However, several innovative devices are available for fixing the capsular bag to the sclera.
Surgical Steps

My preferred surgical strategy consists of the following steps:

1. **Creation of a Scleral Pocket**: Initially, a scleral pocket is created in the area of maximum zonular dehiscence. I prefer the technique described by Dr. Hoffman, which involves creation of a partial thickness limbal groove, which is then dissected backwards into the sclera, without disinserting the conjunctiva (Fig. 1).

2. **Corneal Incision**: I fashion two clear corneal paracentesis incisions of about 1.00 mm. I also make a temporal clear corneal paracentesis of 1.00 mm to start off. Using the “soft shell technique” of Dr. Arshinoff, first dispersive OVD, Viscoat is injected into the anterior chamber, specifically over the area of zonular dehiscence. This creates a tamponade on the exposed anterior vitreous face. This is followed by injection of cohesive OVD such as Provisc. This ensures adequate space maintenance in the anterior chamber.

3. **Capsulorhexis**: An initial small rhexis is initiated with 26 gauge needle. In conditions where initiating the rhexis with 26 gauge needle is difficult, a paracentesis knife is used to make a slit opening on the anterior capsule, subsequently the rhexis is completed using microincision rhexis forceps through the same 1.00 mm paracentesis incision. This allows maintenance of a closed chamber. An initial small rhexis is attempted and then definite large rhexis is performed if necessary.

4. **Capsular Bag Stabilisation**: Capsular bag stabilization is either required to complete the capsulorhexis, or after completing the capsulorhexis. Iris retractors help to temporarily support the cataract and prevent additional loss of zonules. Other devices such as Mackhool capsular hooks may also be used to stabilize the capsular bag (Fig. 2).

5. **Cortical Cleaving Hydrodissection**: Gentle but thorough multiquadrant hydrodissection is performed to reduce the stress on zonules during cortex removal.

6. **Lens Removal**: In cases of children or young individuals, bimanual I/A is performed for lens removal. This allows maintenance of a closed chamber. By using a low aspiration flow rate and low bottle height minimal turbulence is maintained within the anterior chamber. At every stage, Viscoat is injected into the eye before retracting an instrument out of the eye to prevent collapse of the anterior chamber and forward bulge of the vitreous face.

7. **Capsular Bag Fixation**: The capsular bag is inflated using high viscosity cohesive viscoelastic. I prefer to use a Cionni modified capsule tension ring for stabilization and centration of the bag. A corneal paracentesis incision is made opposite to the area of maximum zonular dialysis. The Cionni element of the ring is threaded with 9/0 prolene monofilament nonabsorbable suture, double armed with 2 straight needles (Ethicon) outside the eye. The ring is then is passed through a 2.8 mm corneal incision into the capsular bag. It is dialed until the Cionni’s element is subjacent to scleral flap. Bent 26 Gauge needle is passed transconjunctivally through
scleral pocket to fetch the curved needle which is introduced through the opposite corneal stab incision. Similarly the second needle is passed in the same track. Both the needles are cut, and the ends of the sutures are pulled out through the scleral pocket, and tied. This allows the knot to be buried inside the dissected scleral pocket (Fig. 3). Once the capsular bag is stabilized the IOL is implanted in the bag. My IOL of choice is a hydrophobic acrylic IOL (AcrySof, Alcon Laboratories, USA). Thereafter, a thorough removal of the OVD is performed, again taking care to avoid very high aspiration. Finally, before retracting the I/A cannula from the eye, stromal hydration of incisions is performed. The paracentesis incisions and the main incision are sutured (Fig. 4). The Ahmed capsule tension segment is a modification of the Cionni ring, that provides segmental support, and can be used for small areas of zonular dehiscence or as an additional support in presence of a Cionni ring. Several other devices, like the Assia Anchor device and others have also been designed to provide stable capsular bag fixation.
Alternatives to Capsular Bag Fixation

In cases where the capsular bag cannot be preserved, I fixate the IOL to the sclera using conventional scleral fixation technique. However, the intrascleral IOL fixation (the glued IOL) is also a very elegant method of stable IOL fixation. Other options are iris sutured IOL fixation of anterior chamber IOL implantation.

To recapitulate, the pearls for surgical management of ectopia lentis are:

a) Adhere to the principles of the closed chamber technique
b) Use modest irrigation and aspiration parameters to prevent turbulence
c) Choose the IOL fixation site according the available capsular bag support
d) Capsular bag fixation with IOL implantation in-the-bag preferred

Literatur