A large amount of effort has gone into the development of devices and techniques with which to manage subluxated cataracts and IOLs. Before any discussion on this topic, it is necessary to acknowledge the work of those innovators who have contributed so much.

The endocapsular ring, introduced by Drs Hara and Nagamoto & Bissen-Miyajima, and further popularised by Leglen, revolutionised subluxated cataract surgery by providing a mechanism for achieving capsular fornical expansion. This was further modified by Drs Henderson, Nishi & Menapace and Burkhardt Dick.

Subsequently, suture fixation of the capsular tension ring was described by Drs Cionni and Osher and made possible scleral anchorage of the capsular bag in larger subluxations. Scleral sutured segments were described by Drs Ike, Assia, Yaguchi. For larger as well as progressive subluxations, the glued IOL technique was described by Prof Agarwal.

New device. I would now like to describe a new intraocular device – the glued endocapsular hemi-ring (ECHR) segment for fibrin glue-assisted sutureless fixation of the capsular bag to the scleral wall.

This is a new device to stabilise the capsular bag intra- and postoperatively (Figure 1). It is made of polyvinylidene fluoride (PVDF) which is a popular material used for manufacturing IOL haptics and hence is known to be biocompatible within the eye. We also chose PVDF over other materials because of its superior memory and better shape retaining abilities.

It is designed to have two arms that sit in the capsular fornix and expand the fornix, a double scroll locking mechanism for engaging the rim of the rhexis and a haptic that is exteriorised out through a sclerotomy (made under a lamellar scleral flap in the zone of subluxation) and tucked into a scleral tunnel. The arms of the segment extend about two quadrants in arc length and hence, despite being a segment and not a full ring, it provides equatorial expansion of the capsule as well. The double scroll mechanism anchors the capsule via the haptic to the scleral wall without the use of any sutures.

Surgery involves creating a lamellar scleral flap in the area of subluxation. A sclerotomy is made under the flap with a 20-gauge needle, taking care not to damage the lens capsule (Figure 2A, B). This can be easily done by creating space between the iris and the anterior capsule with a cohesive viscoelastic. Capsulorhexis, hydro-dissection and hydro-delineation are then performed. An end gripping forceps introduced through the sclerotomy then grasps the haptic tip using the handshake technique. The device is then single-handedly inserted using Little’s fishtailing technique into the anterior chamber while simultaneously exteriorising the haptic through the sclerotomy (Figure 2C). The arms are inserted under the rhexis margin using...
the microforceps and the double scrolls are made to engage the rhexis rim (Figure 2D). At this point, pulling on the haptic centres the entire capsular bag complex. After cutting the haptic to the desired length in order to get an adequate tuck, it is tucked into a 26-gauge tunnel made at the edge of the scleral flap (Figure 3A). The rest of the phacoemulsification is then performed as usual followed by IOL implantation (Figure 3B, C). The degree of centration of the bag-IOL complex is once again verified and if not satisfactory is readjusted by adjusting the tuck of the haptic until good centration is achieved. The scleral flap is then glued down using fibrin glue (Figure 3D), which creates a hermetic seal around the haptic. The same technique can also be similarly used for subluxated IOLs after opening up the bag by injecting viscoelastic.

**Double scroll mechanism**  The double scroll mechanism used in the device is similar to the single scroll pupil engaging mechanism used in the Malyugin ring which is made of prolene. Tucking of the haptic of the device is similar to the intra-scleral tuck of haptic that is used in the glued IOL technique and the Scharioth intra-scleral haptic tuck. Experience with both these techniques has shown absence of any significant long-term complications of an intra-sclerally tucked haptic. The scleral flap and fibrin glue closure has also been used since 2007 for the glued IOL technique with no significant postoperative complications.

The advantages of the glued ECHR segment includes ease and rapidity of surgery. It does away with the use of sutures and difficult-to-manoeuvre long and thin needles that are used for sutured scleral fixation of endcapsular rings. At the same time, it gets rid of all suture related complications such as suture erosion, degradation, knot loosening or slippage etc. There has been a shift to the use of 9-0 prolene or Goretx for the use of sclerally sutured IOLs and endcapsular rings with the assumption that 9-0 sutures are less likely to degrade over time than 10-0. The glued endcapsular hemi-ring segment being of the same gauge as IOL haptics provides sturdier and more robust fixation to the scleral wall. The device is flexible and is therefore easy to insert. It also has good memory and so re-expands within the anterior chamber. In our experience, implantation of these segments was more surgeon friendly than suturing a ring to the sclera. Intra-operative adjustability is easy and simply involves adjusting the degree of tuck of the haptic into the scleral tunnel. As the haptic of the device is exteriorised out from the sclerotomy at the very beginning of surgery, there are less chances of dropping the device accidentally into the vitreous. It provides adequate fixation of the bag complex to the scleral wall and hence initial stabilisation of the bag with capsular hooks for the sake of stability is not required.

We also felt that there was less pseudophakodonesis as compared to suture fixation of capsular bag, as it is a part of the device per se that carries outwards through the sclerotomy to get anchored to the sclera unlike in suture fixation where it is the suture that suspend the capsular bag complex to the scleral wall. This device not only provides centrifugal expansion of the capsular equator but also anchors the bag to the scleral wall giving vertical and horizontal stability intra-operatively as well as postoperatively.

This device was designed by Dr Soosan Jacob (senior consultant, Dr Agarwal’s Group of Eye Hospitals, Chennai, India) and is manufactured by Mateen Amin (Epsilon, USA).