ABSENCE OF CAPSULAR SUPPORT: THE ALTERNATIVES FOR ACIOL

Intraocular lens (IOL) implantation in the eye that lack capsular support remains a great challenge for cataract surgeons. Till the past decade, there were only two choices - insert an angle supported anterior chamber lens or suture a PMMA lens to the sclera via a large corneo-scleral wound. Although the open loop ACIOLs have good track record of safety and visual outcome, many surgeons are shying away from this option due to its potential complications to the cornea, iris and angle in the long run. Lately, many new techniques have been described on the fixation of posterior chamber IOL with their own set of nuances. All these techniques aim to place the IOL in a more physiological position via smaller incisions and minimal manipulation of surrounding ocular tissues.

The Glued IOL Technique

In 2007, Dr Amar Agarwal introduced the glued IOL technique, which is a sutureless, fibrin glue–assisted PCIOL implantation with intrascleral tunnel fixation. In this technique, a 3-piece foldable IOL injected into the eye and the haptics exteriorized through a scleral opening; the haptics are then buried inside a scleral tunnel with the scleral flaps glued. A recent five-year review by the Agarwal group promised good visual outcome with no optic-haptic related complications. However, there are concerns about the long-term stability and the centration of the scleral-fixated IOLs.

The Yamane Technique of flanged intrascleral IOL fixation

This novel double-needle technique for flanged intrascleral posterior chamber IOL fixation was first described by Yamane at the 2016 ASCRS meeting in New Orleans. The Yamane technique involves externalizing the haptics of the 3-piece IOL using two needles, and then using cautery to form a mushroom-shaped tip at the end of each haptic. As the needles are externalized, the haptics are drawn through the trans-scleral tunnel, with the leading edge temporarily externalized. After cautery, gentle manipulation is used to depress the haptics back into the scleral tunnels and achieve centration of the lens. This transconjunctival technique has been widely accepted because it is free from scleral flaps, tunnels, sutures, and fibrin glue with relative short-learning curve and faster postoperative recovery.

Artisan Iris Claw Lens

The Artisan iris-claw IOL (Ophtec) is another available option for secondary IOL fixation. The IOL fixation can be performed on either the anterior or posterior iris by using an enclavation forceps and needle. The main drawback of this method is the requirement of a 6 mm corneoscleral incision to accommodate the PMMA material, leading to astigmatism. However, studies have shown that Implantation of the iris-claw IOL in the retropupillary position through a scleral tunnel incision is an effective and safe alternative that can provide better refractive results compared with other techniques. Complications can include chronic inflammation, cystoid macular edema, and iridodonesis. Dislocation of an anteriorly placed IOL could lead to corneal endothelial cell loss, while dislocation of a posteriorly placed IOL would fall into the vitreous space.

Four point Fixation of Scleral sutured IOL

Another widely employed method is ab-externo four point fixation using PTFE monofilament suture with either an Akreos AO60 (Bausch + Lomb) or an enVista MX60 (Bausch + Lomb) IOL. These looped IOL models provides stable four-point fixation. Lately, the off-label use of Gore-Tex CV-8 as a 7-0 suture (W.L. Gore & Associates) has proven to be superior to Prolene because it does not break or degrade.

Four Point Fixation of Scleral Sutured IOL using Hoffmann Pocket

We describe a modified technique of the above mentioned four point fixation of scleral sutured IOL method using the Hoffmann Pocket. We presented this technique in the recent APAO 2019 in Bangkok and won popular video award.

In this Hoffman pocket method, two scleral pockets are dissected posteriorly from the corneolimbal region 180° apart. The fixating sutures are passed through the scleral pockets at the ciliary sulcus space, and the sutures retrieved anteriorly by pulling them out of the pockets. The sutures are then tied down and the knots are buried within the pockets. This technique allows easier construction of scleral flaps to prevent suture erosion and exposure with minimal disruption of adjacent tissue

1. A toric lens marking set is used to mark the horizontal axis to ensure proper sclerotomy placement and lens centration. Calipers are used to mark the sclerotomy sites 4 mm apart, 1.5 mm posterior to the limbus, and centered on the horizontal axis (Figure 1). This positioning simulates in-the-sulcus placement, so standard IOL power calculation formulas can be used.
2. According to the Hoffmann technique, scleral pockets dissected posteriorly from a partial-thickness peripheral clear corneal incision. The Micro A lens (PhysIOL, Belgium), a co-polymer monofocal IOL with four loops provides excellent four-point fixation owing to its shape and configuration. The preloaded four looped Micro A IOL was injected through 2.8mm clear corneal incision on iris plane.
3. A double-armed 10-0 Prolone suture was passed through the nasal side Hoffmann pocket into the loops of the IOL (Figure 2). The needle was subsequently retrieved through the corneal incison. The same suture needle threaded through another loop of the IOL and retrieved through Hoffmann pocket via handshake technique using a 25 gauge needle (Figure 3). The same procedure is repeated with the other end on the nasal side (Figure 4).
4. Sutures externalised to the pocket to tie the ends with good IOL centration (Figure 5). The IOL pushed posteriorly to be placed in the ciliary sulcus. After the sutures are tightened, the knots were then slided into the safety of the pocket. Care must be taken to place the sutures in the proper position and to balance the suture tension; if not achieved; IOL tilt or malposition can result.

Figure 1 : Horizontal axis marked with toric marker set

Figure 2: Double-armed 10-0 Prolone suture passed through the Hoffmann pocket into the loops of the IOL retrieved via corneal incision

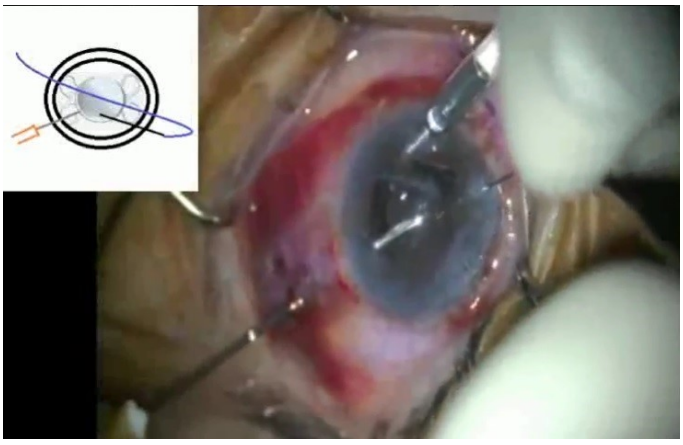

Figure 3: The same needle threaded through another loop of the IOL and retrieved via Hoffmann pocket using a 25 gauge needle

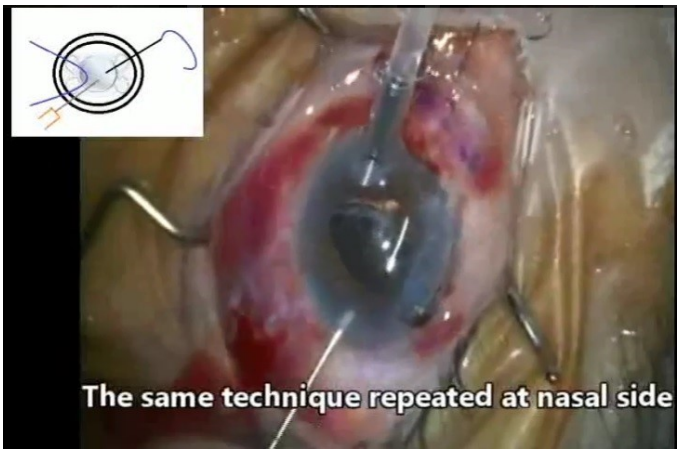

Figure 4: The same technique repeated at nasal side

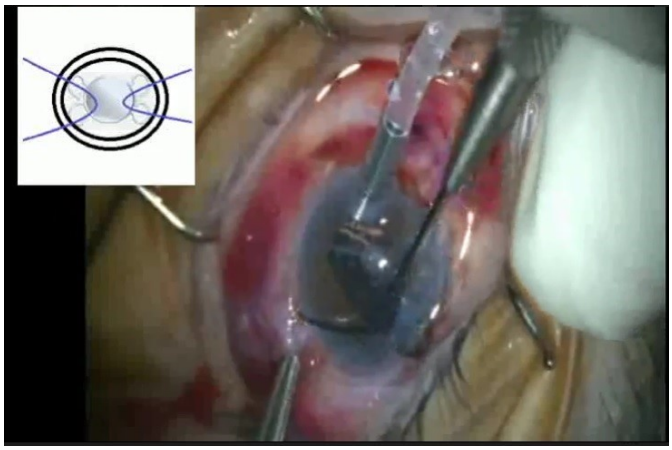

Figure 5: Fixating sutures retrieved from Hoffman pocket and tied down with adequate lens centration.

Four point scleral fixation of foldable IOLs allows small incision surgery with greater lens stability that reduces operative time, minimizes astigmatism and inflammation, thereby providing faster visual rehabilitation. Externalisation of haptics via scleral tunnel as in Glued IOL or Yamane technique maybe difficult in myopic eyes with a large limbus-to-limbus diameter and post-traumatic eyes with significant corneoscleral and conjunctival scarring. Our technique will be a safe alternative for visual rehabilitation in these cases.

Anterior segment surgeons might find it difficult to perform these techniques as a result of repeated globe collapse. Using an anterior chamber maintainer can alleviate this. Another concern about using the limbus-alone route is that when the polypropylene needle or 25g needle is introduced, the instruments pass to the midvitreous cavity and are then tilted upward to allow the surgeon to perform further maneuvers. This can lead to engagement of the vitreous gel into the instrument tips and inadvertent vitreous traction with resultant complications.

In summary, various approaches have been introduced over time to secure IOLs in the absence of capsular support, each with its own set of complications and learning curves. The decision to choose the suitable method should therefore be evaluated on a case-by-case approach. As these techniques can be surgically demanding, the surgeon's comfort level and experience should dictate the approach to IOL fixation. The primary goal for IOL fixation is always to minimize surgical trauma, maximize IOL stability and provide visual rehabilitation for our patients.

The link to the surgical video available at *https://drive.google.com/file/d/1n-vwyTNExeld40eXOzFfYzO1XSmpcEO4/view?usp=sharing*

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