Surgical Technique

MYX technique: A modified adaptation of Yamane and extraocular needle-guided haptic insertion techniques for scleral-fixated intraocular lens implantation

Karan Bhatia, Ruchita Manaktala, Mahipal Sachdev[1], Nikunj Tank, Indranil Saha, Deepak Mishra[2]

Scleral-fixated intraocular lens implantation in an important tool in the armamentarium of an ophthalmologist for managing aphakia. Various techniques have been described in the literature with variable learning curves. Herein, we describe an easy, fast, reproducible technique; the "MYX" technique, which utilizes the advantages of both the Yamane and the X-NIT technique, where the handshaking of the prolene haptic of a 3-piece PMMA IOL into the lumen of a 26-gauge needle is done externally (like in X-NIT technique), and the exteriorized haptic is cauterized to form a flange transconjunctivally, thereby avoiding the scleral pocket tucking (like Yamane technique), to achieve excellent surgical outcomes.

Key words: Aphakia, MYX technique, scleral-fixated intraocular lens implantation, X-NIT technique, Yamane technique

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The ideal situation in any cataract surgery is with implantation of an intraocular lens (IOL). However, it does not always happen. This could be the result of an intraoperative complication or due to a congenital anomaly of the lens or following trauma. Various techniques have been described in the literature from anterior chamber IOLs (AC-IOL) to retro-fixated iris-claw IOLs (RIC-IOL) to scleral-fixated IOLs (SF-IOL).[1-3] SF-IOLs are the most popular approach, with its long-term stability superior to RIC-IOLs. This could be due to a lack of long-term follow-up of RIC-IOLs. SF-IOLs, being stationed posterior to the iris plane, also avoid corneal decompensation seen in AC-IOLs and cause minimal or no iris trauma. They also can be done where iris is damaged (due to the primary surgery), where RIC-IOL cannot be done.

Various surgical approaches have also been described for SF-IOL, of which the most popular techniques include sutured SF-IOL, Prolene Haptic (3-piece IOL) exteriorization with tucking of haptics in the scleral pocket, glued IOL, Yamane technique, and the X-NIT technique.[1,3-9]

We have designed a technique by mixing the Yamane technique and the X-NIT technique to shorten the surgical time and also make the surgical procedure easier. Hence, we have named this technique "MYX" technique, where MYX = modified adaptation of Yamane and X-NIT techniques.

Surgical Technique

The surgery is performed under peri-bulbar anesthesia. A superior fornix-based conjunctival flap is made [Fig. 1b]. Wet field bipolar cautery is done to cauterize the bleeders and a superior 6 mm sclerocorneal tunnel is made [Figs. 1c, d and 2a]. Any pre-existing lens (particularly an anterior dislocated lens) can be removed via this tunnel [Fig. 1a and e]. A corneal suture marker (staining only the two opposite suture marks with ink) or toric IOL marker is used to mark the limbus at 0° and 180° [Figs. 1f, g and 2a]. Automated anterior vitrectomy is done to remove any vitreous in the anterior chamber, iris plane, and in the area of the ciliary sulcus (intended location of the SF-IOL). If the pupil is small and non-dilating, iris hooks can be used to expand the pupil [Fig. 1h]. An anterior chamber maintainer or a pars plana infusion can also be used, if available, to control the intraocular pressure. Using callipers, two marks are made, the first mark being 2 mm nasal to the 0° mark (Mark 1) and the second being 2 mm temporal to the 180° mark (Mark 2). Two more marks are made, 2 mm inferior to Mark 1

Regional Institute of Ophthalmology, Sitapur Eye Hospital, Sitapur, Uttar Pradesh, India, [1]Centre for Sight, Delhi, [2]Regional Institute of Ophthalmology, Banaras Hindu University, Varanasi, Uttar Pradesh, India

Correspondence to: Dr. Karan Bhatia, Regional Institute of Ophthalmology, Sitapur Eye Hospital, Sitapur - 261 001, Uttar Pradesh, India. E-mail: drkaranbhatia@gmail.com

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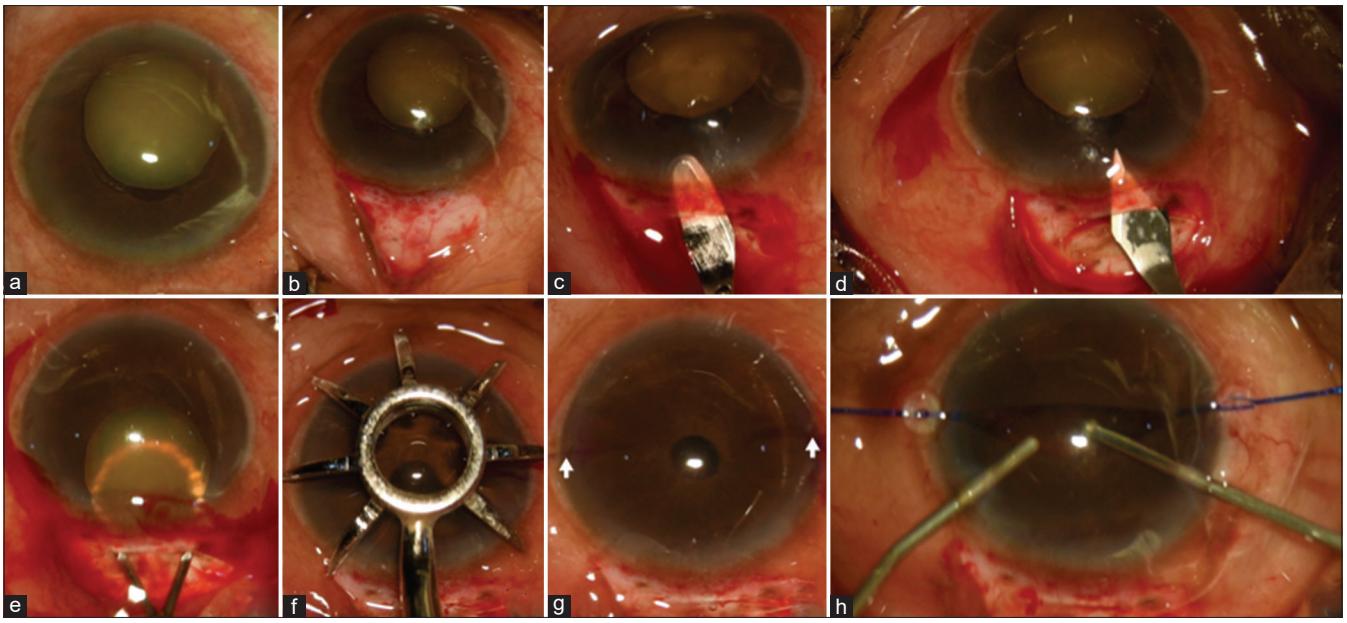

Figure 1: (a) Anteriorly dislocated lens. (b) Fornix based conjunctival flap. (c and d) Superior sclerocorneal tunnel. (e) Lens nucleus removed using wire vectis. (f and g) Limbus marked at 0° and 180° using corneal suture marker. White arrows indicating the marks. (h) Iris hooks placed and automated anterior vitrectomy being done

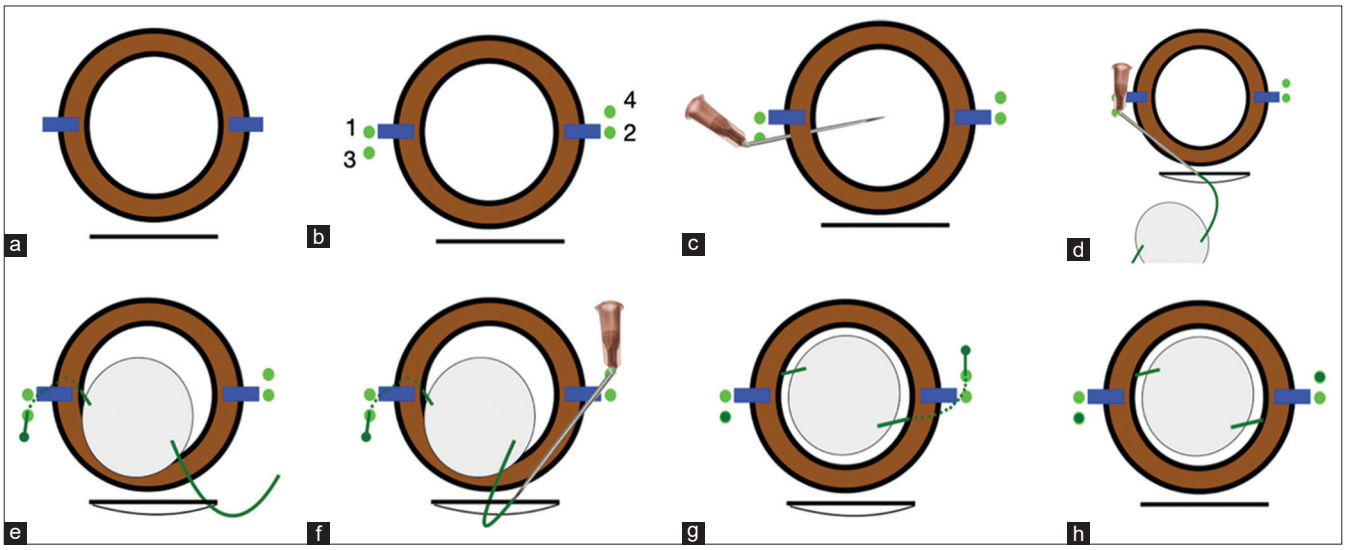

Figure 2: (a) Superior sclerocorneal tunnel made and limbus marked at 0° and 180° (b) Marks 1,2,3, and 4 (c) Angled sclerotomy via mark 3. (d) A 26 G needle directed out of the sclerocorneal tunnel and leading prolene haptic introduced into needle lumen. (e) Needle-haptic complex brought out of sclerotomy site and haptic end cauterized to create a flange. (f) A needle inserted via mark 4, directed to a sclerocorneal tunnel and trailing prolene haptic inserted in needle lumen (g) Needle-trailing haptic complex brought out of sclerotomy site, flange created by cauterizing haptic end (h) Stable position of IOL, with flanges visible

(Mark 3) and 2 mm superior to Mark 2 (Mark 4) [Fig. 2b]. An angled transconjunctival sclerotomy is made using a 26-gauge needle, bent to approximately 60°, via Mark 3, being visible in the ciliary sulcus behind the iris plane [Figs. 2c and 3a, b]. This needle is then directed out of the superior sclerocorneal tunnel, above the iris plane, taking care not to damage the iris [Figs. 2d and 3c]. The iris can be a barrier to the direction of the needle out of the sclerocorneal tunnel. A McPherson's forceps can be used to open the tunnel by depressing its posterior lip, which will help guide the needle out. The leading prolene haptic of a 3-piece polymethyl methacrylate (PMMA) IOL (Aurolens, Aurolab, India) is introduced into the lumen of the 26-gauge needle using a McPherson forceps [Figs. 2d and 3d]. The needle-haptic complex is slowly withdrawn out of the sclerotomy site while simultaneously pushing the optic of the 3-piece PMMA IOL in the anterior chamber [Figs. 2e and 3e]. The haptic is externalized and its end is cauterized using an ophthalmic cautery device (Bovie Low-Temperature Cautery, Bovie Medical Corporation, Clearwater, FL, USA) to make a flange larger than the size of the haptic, which is pushed back subconjunctivally [Figs. 2e and 3f]. The same is done for the trailing prolene haptic, which is introduced into the lumen of

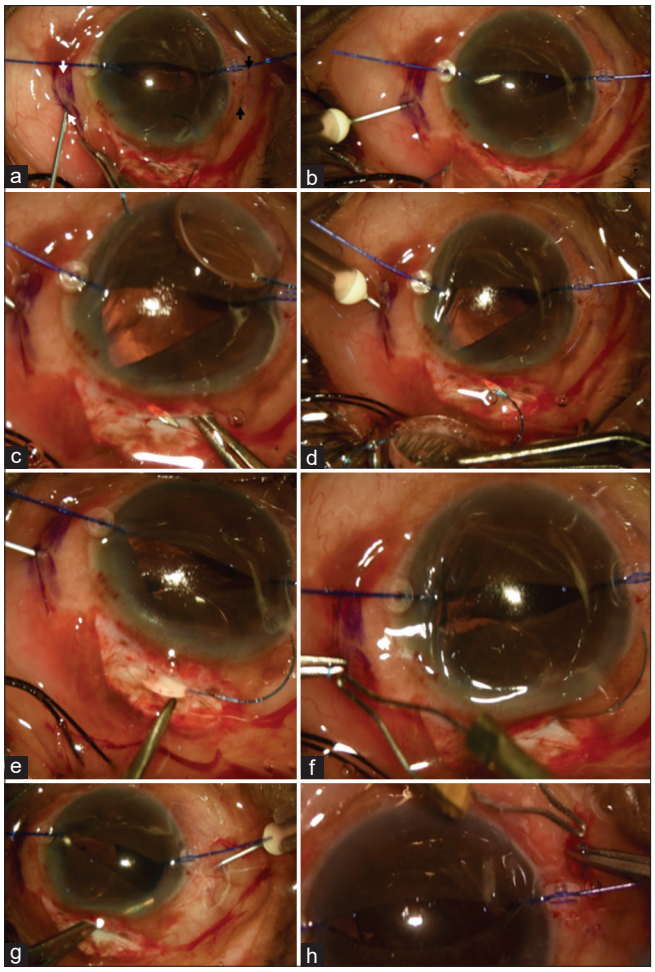

Figure 3: (a) Arrows showing Marks 1(Down white), 2(Up black), 3(Tilted Up white), and 4(Down black). Angled transconjunctival sclerotomy is done using 26-gauge needle via Mark 3 (b) Needle visible behind iris plane (c) Needle out of the sclerocorneal tunnel (d) Leading haptic put in needle lumen (e) Needle-haptic complex brought out of sclerotomy site, IOL optic directed into the anterior chamber (f) Haptic end cauterized to make flange (g) Needle inserted via sclerotomy via Mark 4 and trailing haptic inserted into needle lumen just before the opening of sclerocorneal tunnel (h) Flange created by cauterizing haptic end

a 26-gauge needle bent at 60°, via a sclerotomy from Mark 4, after being brought out of the superior sclerocorneal tunnel or just before the opening of the sclerocorneal tunnel [Figs. 2f and 3g]. This haptic is also externalized, and again, a flange is created via a low-temperature cautery device, which is buried subconjunctivally [Figs. 2g, h and 3h]. The sclerocorneal tunnel is sutured with 10–0 nylon, the conjunctiva is sutured with 8–0 vicryl and the side-ports made are hydrated, forming the anterior chamber with balanced salt solution [Fig. 4 and Video 1].

Discussion

SF-IOLs are a popular choice of correcting aphakia in the absence of capsular support. Various techniques have been described in the literature. We describe a technique aiming to reduce the surgical time as well as the ease of the surgical procedure, by combining the advantages of the Yamane technique and X-NIT. Hence, we have called it "MYX" technique.

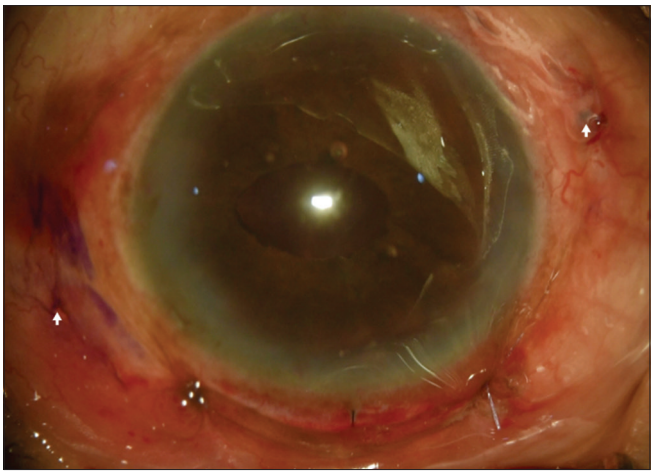

Figure 4: Well-centered intraocular lens. Superior tunnel and conjunctiva sutured. White arrows indicating flanges buried subconjunctivally

Yamane *et al*. had described a technique where the haptics of a 3-piece IOL was exteriorized using thin-walled 30-gauge needles 2 mm away from the limbus and cauterized to create flanges of 0.3 mm, which were buried into the sclera. Here, the IOL was injected into the anterior chamber using an injector via a 3.0 mm sclerocorneal incision. This had a unique advantage where the creation of a flange not only reduced the surgical time but also made the surgery easier since the tucking of the prolene haptic into the created scleral pocket was avoided. However, the sandwiching of the haptic into the lumen of the needle intraocularly was a challenging task in this technique.[8]

Baskaran *et al*. had described the extraocular needle-guided haptic insertion technique of scleral fixation of IOL (X-NIT), where after the creation of a 5.5 mm sclerocorneal tunnel, the intraocular challenging maneuvre of handshaking the prolene haptic into the needle lumen is avoided by externalizing the bent 26-gauge sclerotomy needles out of the sclerocorneal tunnel, and introduction of the haptics of a 3-piece PMMA IOL outside the eye, thereby, reducing the learning curve of the procedure. The exteriorized haptics was tucked into scleral pockets, which was the challenging step in this technique, sometimes resulting in haptic damage.[9]

The "MYX" technique uses the advantage of both the Yamane and the X-NIT technique, where the handshaking of the prolene haptic into the lumen of a 26-gauge needle is done externally (like in X-NIT technique), and the exteriorized haptic is cauterized to form a flange transconjunctivally, thereby avoiding the scleral pocket tucking (like Yamane technique), hence, making it an easily reproducible technique with a relatively short learning curve.

MYX technique, like the X-NIT technique, requires the creation of a 6 mm sclerocorneal tunnel and cannot be done via 2.8 mm clear corneal incision. We have currently used only non-foldable Aurolab 3-piece IOLs, which is about 10 to 13 times cheaper than the foldable 3-piece IOLs available in India, making it a very cost-effective option also. However, we do believe even a foldable 3-piece IOLs with the creation of a sclerocorneal tunnel would work in this technique.

Conclusion

MYX technique is a cost-effective, fast, easy technique with a relatively short learning curve for scleral fixation of IOL.

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Conflicts of interest

There are no conflicts of interest.

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