Surgical Technique

Scleral tunnel with conjunctival autograft for rescue management of extruded haptic: Surgical technique and review of literature

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Extrusion of haptic is a rare complication after intra-scleral haptic fixation of intraocular lens (SF-IOL). Various techniques described for its management such as autologous scleral patch, cauterization of exposed haptic, reattempting the glued IOL and IOL explant have their own limitations. Presently, we describe a simple rescue technique for management of such situations. In this method, after performing localized conjunctival peritomy, 2 mm long partial-thickness scleral tunnel is fashioned with an angled 20-guage microvitreoretinal blade 1.5 mm away from the limbus in line with pre-existing defective scleral flap underneath which the exposed haptic is tucked securely. Following this, conjunctival autograft (CAG) with fibrin glue application is undertaken to combat conjunctival fibrosis. In three patients, where this technique was performed, had well-tucked haptic and maintained visual acuity with no complications at 3-months follow-up. This technique is a useful method of tucking extruded haptic after SFIOL in eyes subjected to multiple previous surgeries.

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Intrascleral fixation of intraocular lens (SFIOL) is a well-known method of visual rehabilitation in aphakic individuals with absent or deficient posterior capsular support.[1] Haptic extrusion is a rare complication encountered after this surgery secondary to slippage of the haptic from the scleral tunnel, poor scleral tunnel or scleral flap construction or adherence, and inherent scleral fragility. The reported rates vary from 0.8% to 12.5%.[2-4] Eyes with too thin flaps, excessive use of scleral cautery, and local or autoimmune scleral thinning disorders such as scleritis, episcleritis, and rheumatoid arthritis are more prone for such a complication.[5] These exposed haptics carry risk of exogenous endophthalmitis as they serve as a direct communication channel between the outside environment and the eye and therefore, mandate urgent repair.[2,5,6]

Microscope-integrated optical coherence tomography (i-OCT) is a recently introduced imaging modality that is known to improve surgical management of various ophthalmic disorders.[7]

Surgical Technique

Presently we describe a simple rescue technique for the management of extruded haptic after SFIOL.[7-10]

Previous surgical details

Three patients who underwent intrascleral haptic fixation of IOL elsewhere were referred to our center for management of extruded haptic [Table 1, Fig. 1a]. In all the cases, as suggested by previous records, sequential surgical steps included: localized peritomy, creation of two 2 × 2.0 mm partial thickness scleral flaps 180° apart 1.5 mm from the limbus and straight sclerotomies with a 20-Gauge microvitreoretinal blade (MVR) underneath these flaps, sequential externalization of IOL haptics (MA60MA, Alcon Laboratories, Inc, USA) by grasping them with a 25 guage micro-rhexis forceps, burying of haptics into 2 mm-long intrascleral tunnels created with 26-guage needles and closure of scleral flaps and conjunctival peritomy with 8-0 vicryl sutures. All the cases had uneventful intraoperative course.

A thorough evaluation was undertaken to rule out ocular or systemic autoimmune scleral thinning disorders in all patients. The IOL was stable and centered in all patients. After explaining the risks associated with extruded haptic, the patients agreed for its surgical correction under the guidance of i-OCT equipped microscope (OPMI Lumera 700 and RESCAN 700, Carl Zeiss, Meditec, Germany, under aseptic precautions).

Rescue surgical technique

The surrounding conjunctiva was carefully dissected away from the haptic, taking care not to damage it [Fig. 1b]. Conjunctival shortening and fibrosis were noted in all. Whenever required, minimal scleral dissection was carried out to hold and stabilize

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extruded haptic with a McPherson forceps. A 2 mm long scleral tunnel was fashioned with an angled MVR knife (20 gauge, Alcon Laboratories, Inc, USA) 1.5 mm away from the limbus superficial to the previously made scleral pocket for tucking the extruded haptic [Fig. 1c]. The exposed haptic was tucked inside this tunnel with the aid of a 25-gauge micro-rhexis forceps [Fig. 1d]. The conjunctival defect was measured and same size conjunctival autograft (CAG) was transplanted from the superior bulbar conjunctiva to this site [Fig. 1e]. The CAG was approximated with the aid of FG (Tisseel VH, Baxter Healthcare Corp, Deerfield, IL) and local pressure applied for 10 seconds [Fig.1f-h, Video 1]. Following this, a drop of antibiotic was administered and the eye-patched overnight.

Role of i-OCT

In all cases, before starting the surgery, i-OCT confirmed our diagnosis by demonstrating the exposed IOL haptic protruding well above the conjunctival level. This was appreciated as a hyperreflective tube-like structure with pointed ends and a vertical subconjunctival and subscleral course. The depth of the previous flap at approximately 50% [Fig. 2a] was also appreciated on the imaging modality. However, it failed to demonstrate any scleral tunnel previously dissected for burying haptic. The modality also revealed adequate scleral thickness around the exposed haptic thereby allowing us to proceed with our planned rescue technique of additional scleral tunnel creation above the prior flaps. A dip was appreciated between the protruded haptic and the edge of the sealed flap. This suggested that the haptics must have cheese-wired out of the tunnel with the latter self-sealing with time. Intraoperatively, i-OCT guided adequate depth and uniformity of plane of freshly created intrascleral tunnel. At the end of the surgery, the horizontal orientation of the haptic, its presence inside

Table 1: Clinical details of patients

Case	Age/ gender/ eye	Previous surgeries	On presentation with extruded haptic					Intraoperative	Postoperative
			Time gap from 1st surgery	Time gap after SFIOL	BCVA	IOL details	Scleral health	Conjunctival shortening	At 3 months after reposition
1	49 yr/ male/ OS	1st- Cataract surgery with IOL in bag 2nd- Tectonic PKP with aphakia (for post traumatic corneal perforation with IOL explant) 3rd- SFIOL	2 yrs	1.5 mon	6/18	Stable, centered, extruded temporal haptic	Well-healed flap, no thinning	Present	6/18, well covered haptic, centered IOL
2	36 yr/ male/ OD	1st - Repaired corneal perforation with lens aspiration (post trauma) 2nd -SFIOL	6 mon	3 mon	6/12	Stable, centered, extruded nasal haptic	Well-healed flap, no thinning	Present	6/12, well covered haptic, centered IOL
3	45 yr/ male/ OD	1st- Repaired corneal perforation (post trauma) 2nd- Wound resuturing with intralenticular lens aspiration 3rd- SFIOL	7 mon	2.5 mon	6/18	Stable, centered, extruded nasal haptic	Well-healed flap, no thinning	Present	6/18, well covered haptic, centered IOL

*IOL=Intraocular lens, PKP=penetrating keratoplasty, SFIOL=scleral fixation of intraocular lens, BCVA=best corrected visual acuity

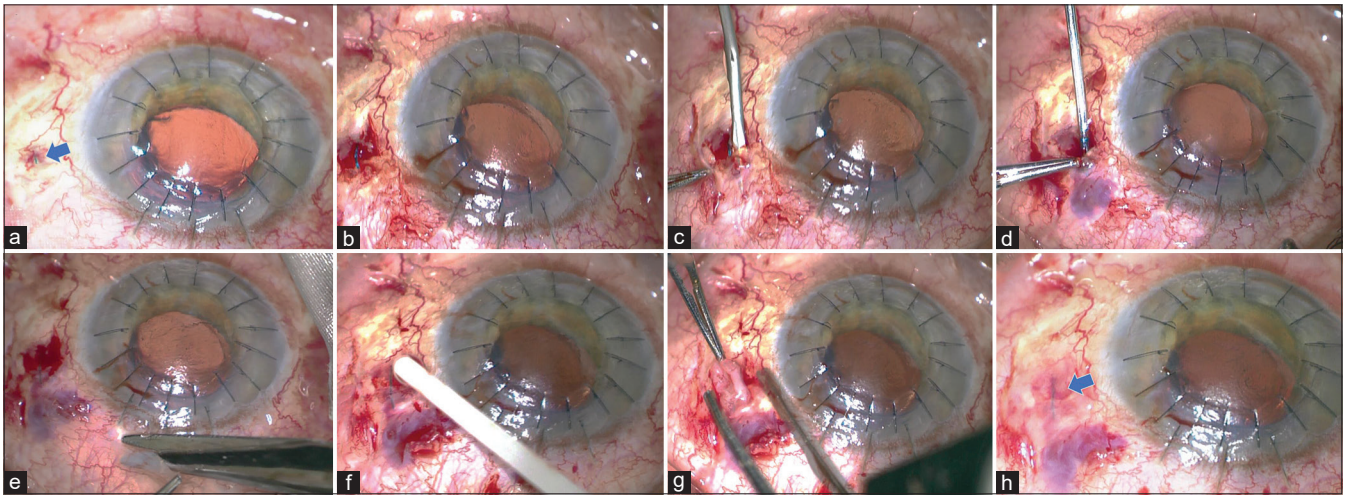

Figure 1: Figure showing surgical steps; extruded haptic (a), localised conjunctival peritomy (b), creation of scleral tunnel with angled MVR knife (c), intrascleral tucking of haptic (d), preparation of CAG (e), placing fibrin glue over peritomy (f), placing CAG on the affected site (g), well covered haptic (h). Note: the IOL appears falsely decentered IOL due to downward rotation of eyeball after peribulbar block

the scleral tunnel and the overlying CAG were clearly appreciated [Fig. 2b, Video 1].

All the above findings aided us in speculating pathogenesis for exposed haptic. As no risk factor for haptic exposure such as thin flaps (normal flap thickness on i-OCT), excessive use of scleral cautery (prior surgical notes), and local or autoimmune scleral thinning disorders were identified in our patients, we believe that repeated scleral inflammation from multiple prior surgeries weakened sclera and made it vulnerable to erosion by unnaturally placed haptics. It might be possible that subclinical uveitis from primary pathology and prior surgeries could have rotated the haptics slightly thereby subjecting them to unnatural tension thereby giving them a scope to cheese-wire through an already weakened sclera.

Follow-up

Postoperatively, topical moxifloxacin 0.5% and prednisolone acetate 1.0% eyedrops were prescribed 4 times daily for 4 weeks in all patients. Topical steroids were tapered slowly for 3 months to control subclinical uveal inflammation.

Till three months follow-up, all patients had a stable and centered IOL, well tucked haptic and a maintained visual acuity [Table 1]. No other complications were noted. However, as the risk factors for haptic exposure remain largely unknown, the patients are being followed up regularly for recurrences.

Discussion

There are various ways of managing exposed haptics after sutureless SFIOL surgery [Table 2]. Autologous scleral patch undertaken by Matsui can cause cosmetic disfigurement to the patient and sometimes needs IOL explant for recurrent haptic exposure.[11] Rachel Gelman described cauterization of the exposed haptic with a low-temperature cautery to create a bulb-shaped flange larger than the diameter of the haptic which can then be pushed back to lodge within the substance of the

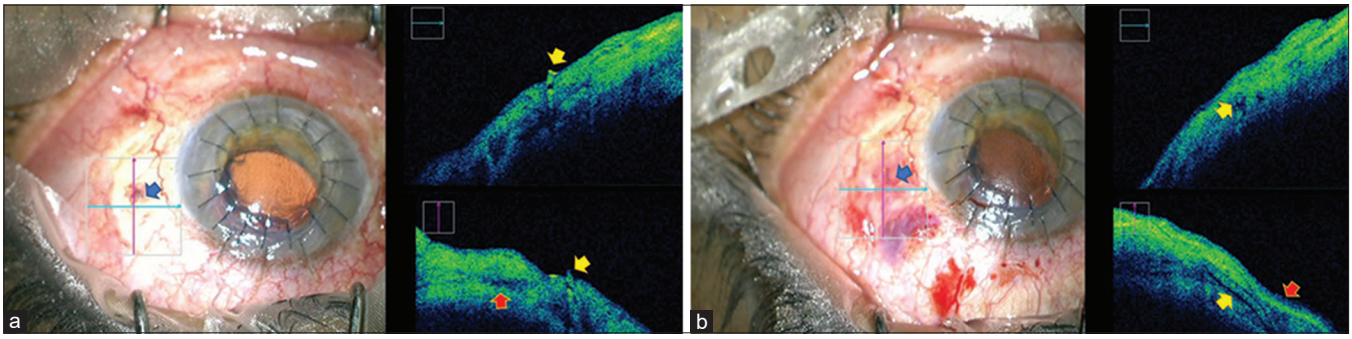

Figure 2: i-OCT guided visualization; vertically positioned extruded haptic (a), horizontally placed well-tucked haptic (b)

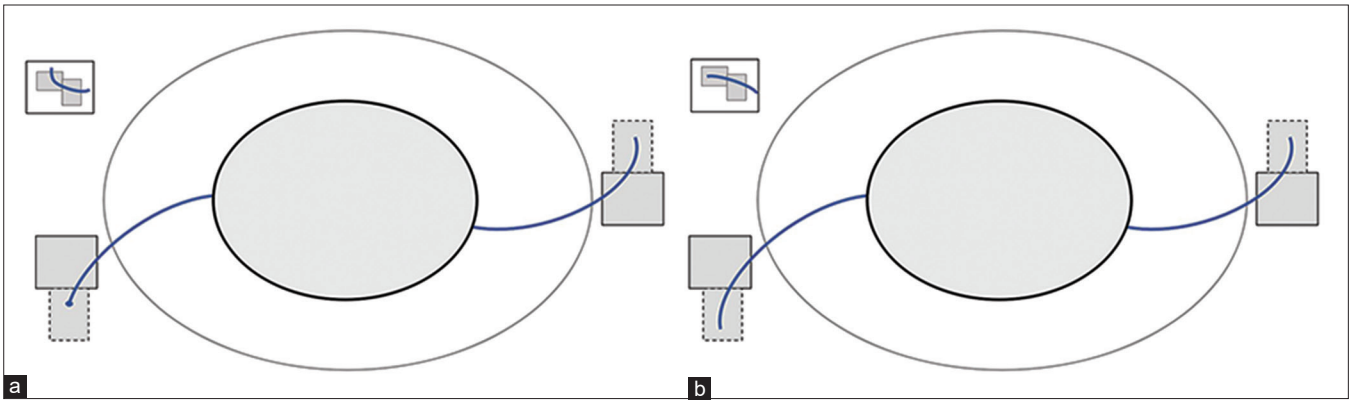

Figure 3: Animated representation (Inset) of vertically placed extruded haptic (a) and horizontally placed well-tucked haptic (b)

Table 2: Review of literature on management of exposed haptic

Author, year	Number of patients	Technique used	IOL used	Timing of presentation	Presentation	Rescue technique
Matsui, 2015	1 (75 yr/M)	Y-fixation	NX-70, Santen, Japan	1 month	IOL tilt, exposed nasal haptic	Self-scleral patch, IOL exchange
Gelman, 2019	2 (77 yr/M; 67 yr/M)	Glue-assisted intrascleral fixation	Aaris™ EC-3 PAL, Aaren Scientific Adaptic™ Optics	6 months	IOL subluxation, exposed nasal haptic	Modified Yamane
Obata, 2019	1 (88 yr/F)	Sutureless intrascleral fixation	-	3 yrs	Endophthalmitis, exposed nasal haptic	Vitrectomy with IOL explant

*IOL- Intraocular lens

sclera.[12] This modified Yamane technique of haptic refixation seemed inappropriate in our cases as mismatch between the size of previous sclerotomy (20-gauage MVR, 1.1 mm) and the size of the flange (0.7 mm) carried risk of intraocular slippage of the haptic. Ohta's proposal of fixing the haptic to the scleral bed with a single 8–0 nylon suture to prevent its postoperative displacement predisposes it to risk of haptic malposition.[13] Hook-like fixation of the haptic might transport extraocular organisms to the interior of the eye and the part of uncovered haptic super-adds to the risk of infection.[14] Reattempting glued IOL or undertaking IOL exchange using different methods of fixation (e.g., iris-fixated, scleral-sutured, and anterior chamber placement) seemed unsuitable for our patients as the IOL was stable and these techniques carried risks associated with repeat intraocular surgery.

To reduce the chances of late-onset endophthalmitis, IOL haptics must be covered adequately not only by the sclera but also by the conjunctiva. Our technique ensures these two factors aptly and minimizes excessive globe manipulation and need for other corrective maneuvers. A 1.1 mm wide and 2 mm long scleral tunnel fashioned with a 20 guage MVR in our technique covers a 0.14 mm wide haptic adequately and prevents torsional instability of the IOL by promoting proportionate haptic tuck on either side respectively.[15] We believe that unnatural tension develops if curved haptics of a 3-piece lens (MA60MA) inadvertently configure a vertical position, and this results in cheese-wiring of the overlying scleral flaps [Fig. 3a]. Horizontal tucking of haptics in appropriately thick scleral tunnels created in our technique revert them to a more natural position, i.e., parallel to the sclera [Fig. 3b] and therefore lower the likelihood of repeat haptic extrusion. As these tunnels are created immediately adjacent to the previous sclerotomy site, no part of the haptic remains exposed after tucking it. CAGs undertaken in our technique avoid unnecessary tension generated by primary closure on an already deficient conjunctival tissue. Rather, inclusion of healthy conjunctival tissue at the affected site is expected to enhance scleral healing. FG used for apposition of CAG in our technique may battle antecedent scleral inflammation and suture related complications besides shortening the total surgical time. It may be particularly helpful in our series of patients where repeated episodes of scleral inflammation from primary pathology and multiple previous surgeries rendered the sclera vulnerable to erosion by unnaturally placed IOL haptics. By filling the gap around the haptic and by sealing previous sclerotomy site, FG may allow good intrascleral apposition and prevent its further slippage.[15]

Various authors have suggested 50% depth of scleral thickness for proper scleral tunnel construction during SFIOL.[2,3,11] For this, it is important to assess the health of sclera pre-operatively. i-OCT played a pivotal role in this regard by objectively depicting healing of previous wounds and adequacy of residual scleral thickness for tunnel formation in our cases. This intraoperative visualization even before starting surgery complemented clinical evaluation and aided in choosing the most appropriate rescue procedure. Additionally, the real-time feedback images constantly guided in assessment of precise tunnel depth. This converted blind dissection into a controlled maneuver and prevented accidental perforation of sclera or superficial flap creation. At the end of the surgery, the modality demonstrated horizontally placed intrascleral haptics and well apposed CAG determining the end-point of the procedure. However, the emphasis is laid on the surgical rescue technique and not on the imaging modality. Considering the high cost and limited availability of i-OCT, surgeons lacking this modality might employ routine ophthalmic microscope for accomplishing our rescue technique.

Conclusion

To conclude, i-OCT guided scleral tunnel creation with CAG and FG application is a useful rescue technique of managing extruded haptic with conjunctival shortening post-SFIOL. However, low number of cases and short-term follow-up validate large long-term comparative studies to confirm the benefits of the rescue technique as well as the role of i-OCT during such procedures.

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Conflicts of interest

There are no conflicts of interest.

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