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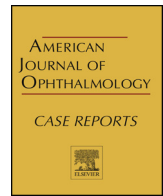
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Case report

Novel yamane technique modification for haptic exposure after glued intrascleral haptic fixation

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ABSTRACT

The field of intraocular lens fixation in the setting of inadequate capsular support is a dynamic one as surgical approaches are constantly evolving. There has been a paradigm shift towards the use of sutureless methods of scleral fixation to avoid suture-related complications. In the latest described style of scleral fixation, IOLs can be secured without suture or “glue”, and rather with the creation of a flange on each haptic that allows for firm intrascleral fixation. We describe a modification of the flange technique to refixate patients with glued IOLs who developed haptic extrusion and required surgical intervention.

1. Introduction

1.1. Sutureless techniques for scleral fixation

In 2007, Agarwal et al. described the use of fibrin glue for fixation of a posterior chamber IOL in the setting of deficient capsular support in a technique referred to as “glued IOL fixation”. Briefly, partial lamellar, limbus-based scleral flaps are fashioned exactly 180° apart. While maintaining adequate globe pressurization, a 20-gauge needle is used to create a sclerotomy under each flap, 1–1.5 mm posterior to the limbus, followed by vitrectomy as necessary. A three-piece IOL is introduced through a clear corneal incision while a 23-gauge forceps used to grasp the leading haptic tip and exteriorize it through one of the sclerotomies, and the trailing haptic is left outside of the eye. While the first haptic is stabilized, the trailing haptic is flexed into the anterior chamber and fed to another 23-gauge forceps inserted through the second sclerotomy. A 26-gauge needle is then used to create a tunnel under each scleral flap into which each haptic is tucked. Lastly, the scleral flaps are closed over the tunnels using fibrin glue. The conjunctiva is closed using fibrin glue or vicryl suture.³

Though the advent of the scleral-sutured IOL dramatically improved rates of corneal endothelial cell loss and uveitis-glaucoma-hyphema syndrome compared to anterior chamber intraocular- and iris-fixated lenses, the glued IOL technique provided further advantages over suture fixation.^{1–5} In a study of 50 patients, 25 with a glued IOL and 25 with a sutured IOL, Ganekal et al. reported a lower rate of postoperative inflammation, occurring in 16% of eyes with a glued IOL compared to

48% of eyes with a sutured IOL. The risk of postoperative glaucoma was also found to be lower, occurring 16% of the time with glued IOLs versus 40% with sutured IOLs.⁵ Furthermore, the use of glue over suture precludes problems such as suture breakage and exposure, which in a retrospective study by McAllister et al. occurred at a rate of 6.1% and 11% respectively with the use of 10–0 polypropylene.² Degradation of 10–0 polypropylene suture has been reported to occur as high as 27.9% of cases at a mean of 50 months postoperatively,¹ though one study's results showed that the use of a higher tensile strength material, Gore-Tex (polytetrafluoroethylene), virtually eliminates the risk of suture breakage at a mean follow up of 325 days.⁶ Overall, the glued IOL technique has shown a favorable risk and complication profile as reported by Kumar et al. Their retrospective analysis reported low incidence of postoperative complications in 208 eyes status post glued IOLs, including those that could be medically treated such as corneal edema (5.7%), epithelial defects (1.9%) and grade 2 anterior chamber reactions (2.4%), as well as those that required surgical management such as IOL decentration (3.3%), haptic extrusion (1.9%) and subconjunctival haptics (1.4%).⁷ Although the glued IOL technique is a promising method of scleral fixation, it is not immune to significant postoperative complications; specifically, haptic extrusion can result from factors including poor scleral tunnel construction, slipping of the IOL haptic from the scleral tunnel, inadequate scleral flap formation, insufficient scleral flap adherence, or fragility of the scleral wall secondary to the patient's history (e.g., Ehlers-Danlos Syndrome, scleritis, ocular trauma, surgeries, or exposure to mitomycin-C). And like suture exposure, haptic exposure poses a risk of infection/endophthalmitis.⁸

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A new method for intrascleral IOL fixation using a transconjunctival approach without the use of suture or glue was introduced by Dr. Shin Yamane in 2016: The flanged IOL fixation with a double-needle technique. In what is often colloquially referred to as the Yamane technique; two needles are bent in line with the bevel to a length approximately the distance from the sulcus to the pupil center. A three-piece IOL is inserted into the anterior chamber using an injector, making sure the trailing haptic is kept external to the incision. An angled sclerotomy is then made through the conjunctiva using a thin-walled 30-gauge needle 90° from the incision where the lens is inserted, 2 mm posterior from the limbus. When it enters the sulcus, the needle is directed toward the leading haptic, which is threaded into the needle using an intraocular forceps. With the haptic secure, a second sclerotomy is made with the second thin-walled 30-gauge needle 180° from the first sclerotomy. The trailing haptic is threaded into the lumen of the second needle. Once both haptics are docked and the lens is found to be centered, both haptics are externalized onto the conjunctiva. With low temperature cautery the externalized haptic end is heated to create a triangular flange with a diameter of 0.3 mm. The flange of each haptic is tucked through the conjunctiva and fixed into the scleral tunnels.⁴ Though IOL tilt and decentration are potential complications of the Yamane technique, review of the literature did not reveal any cases of haptic extrusion. One reasonable explanation for this is that there is very little haptic exposed in the flange, making extrusion less likely. Though considering the relatively recent birth of this technique for IOL scleral fixation, we are lacking in the long-term data.⁹

Overall, our rate of haptic exposure with glued IOLs is low, consistent with the reported rate in the literature of less than 2%. We present our modified technique for correcting haptic exposure of a scleral-fixated IOL using glue and two patients who had successful repositioning using the described technique.

2. Technique

2.1. IOL refixation technique using a transconjunctival approach

A localized conjunctival peritomy is performed over the area of haptic exposure. A grasping instrument, such as a tying forceps, is used to isolate and grasp the haptic with one hand, while low temp cautery is applied to the tip to create a flange with the other hand. A Vanass scissor may be used to trim the haptic tip to improve centration as necessary prior to applying cautery. The flange is then fixed inside the scleral tunnel and the conjunctiva re-approximated with fibrin glue or 8-0 vicryl suture according to surgeon preference.

3. Case presentations

The first patient is a 77-year-old female with pseudoexfoliation syndrome and history of bilateral cataract extraction with IOL placement in 2011 and a secondary IOL in the right eye one year later. She presented to our facility in September 2016 with decreased vision in the right eye, CDVA 20/80, and was found to have IOL subluxation. IOL exchange was performed with glue-assisted intrascleral-fixation of a monofocal three-piece lens (Aaris™ EC-3 PAL, Aaren Scientific Adaptic™ Optics). The haptics were tucked into each scleral tunnel and the scleral flaps glued using fibrin sealant without complication. The conjunctiva was re-approximated with the use of fibrin as well. By postoperative month one, the patient's vision had improved to 20/30. During routine examination six months later, the nasal haptic was observed to be subconjunctival and though not extruded, was thought to be at risk of eroding through the conjunctiva (Fig. 1). Surgical repositioning was performed using a part of the Yamane technique as follows: A conjunctival peritomy was made in the area of the nasal haptic. The haptic was isolated and low temperature cautery was applied to the tip creating a flange (Fig. 2). After the flange was buried in the sclera and found to be in good position, a single 8-0 vicryl suture was used to re-

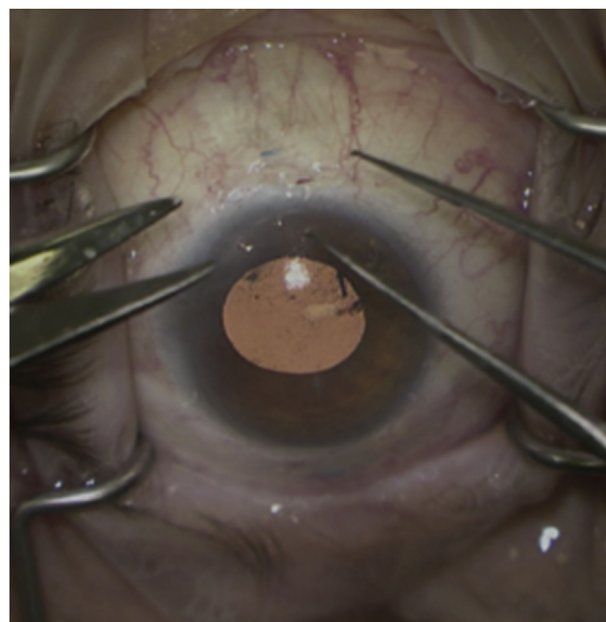


Fig. 1. Patient 1: Subconjunctival haptic at risk of exposure.

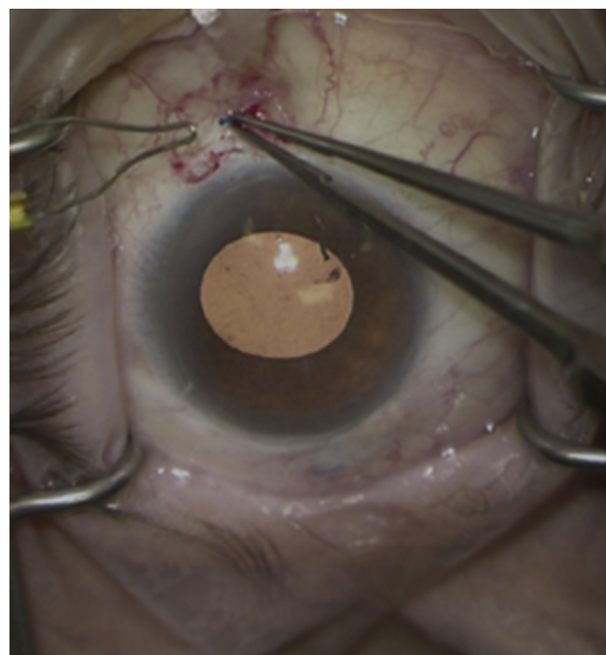


Fig. 2. Patient 1: Creation of a flange with low temperature cautery.

approximate the conjunctiva, assuring the haptic was not exposed (Fig. 3). One day following the operation, the previously exposed haptic was found to be in good position, the lens was centered and vision was stable.

Our second patient is a 67-year-old male with history of corneal penetration with anterior chamber and lens capsule violation resulting in traumatic cataract of the right eye. He underwent corneal laceration repair in March 2017. A few months later, he was referred to our center for evaluation of his traumatic cataract. We proceeded with cataract extraction and scleral fixation of a monofocal three-piece IOL (Aaris™ EC-3 PAL, Aaren Scientific Adaptic™ Optics) using glue assisted scleral fixation. Each haptic was incarcerated into a scleral tunnel and additionally secured with an 8-0 vicryl suture. The scleral tunnels and conjunctiva were closed using fibrin glue. The patient did well and his



Fig. 3. Patient 1: Closure of conjunctiva over haptic repositioned in scleral tunnel.

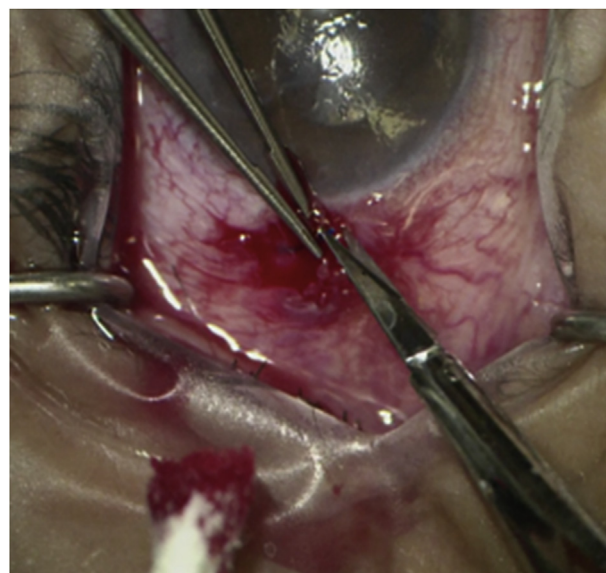


Fig. 5. Patient 2: Trimming haptic end.

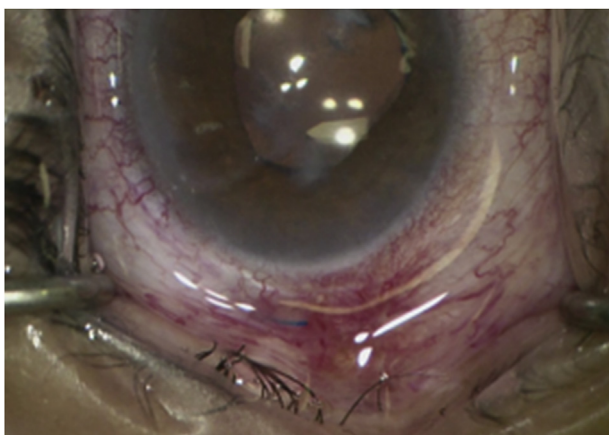


Fig. 4. Patient 2: Exposed temporal haptic.

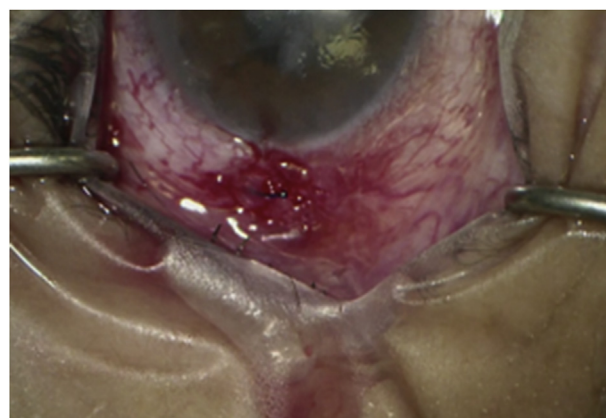


Fig. 6. Patient 2: Newly created flange.

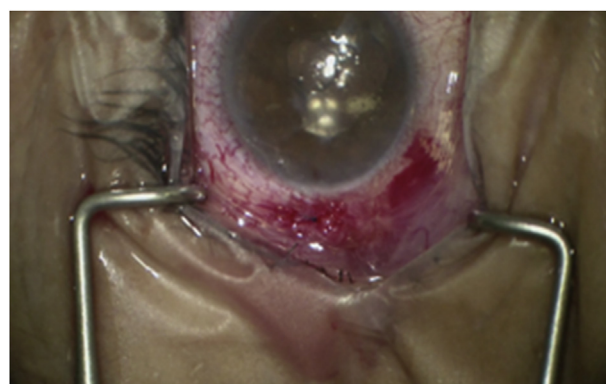


Fig. 7. Patient 2: Intrasclerally repositioned flanged haptic.

vision continued to improve postoperatively, but at his two-month follow up appointment, the temporal haptic had extruded and was found to be exposed through the conjunctiva (Fig. 4). The patient was taken to the operating room for IOL repositioning, again with influence from the Yamane technique considering its success in the management of our previous case of haptic erosion. We started with a small conjunctival peritomy to further expose the temporal haptic. The tip was mildly shortened with a Vanass scissor to improve centration (Fig. 5) and then cauterized with low temperature cautery to create a flange (Fig. 6). Once the tip was positioned within the sclera (Fig. 7), two interrupted 8-0 vicryl sutures were used to close the conjunctiva. One month postoperatively, the haptic was found to be well covered and the lens centered (Fig. 8). The patient is also being treated for ocular hypertension associated with his trauma, but otherwise is doing well and the vision is stable.

4. Discussion

The surgical approach for IOL fixation in the setting of poor or absent capsular support continues to evolve. Though a novel technique may offer advantages over its predecessor, the natural history dictates

the development of a new set of intraoperative hurdles and post-operative complications; for example, corneal decompensation ensuing from an anterior chamber IOL, iris atrophy and glaucoma resulting from iris fixation, suture degradation and chronic inflammation associated with the use of suture, and haptic exposure occurring with scleral fixation.^{1-3,5-7} Though the glued IOL technique has a favorable safety profile, haptic extrusion is a potential complication secondary to slipping of the haptic from the scleral tunnel, poor scleral tunnel

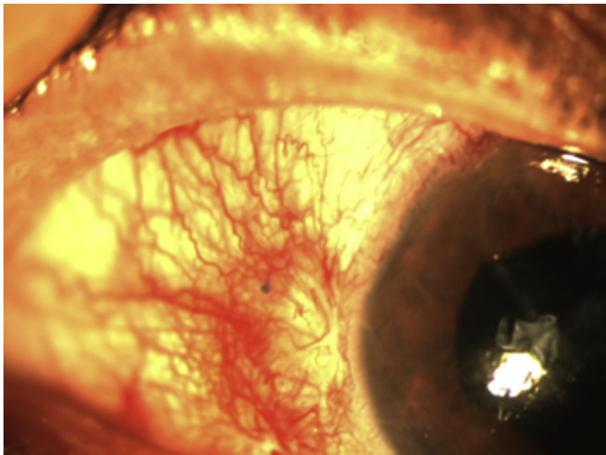


Fig. 8. Patient 2: Well-positioned haptic on postoperative month 1.

construction, scleral flap formation or scleral flap adherence, and scleral fragility⁸. Secondary to the increased risk of postoperative infection, urgent repair is indicated. One approach to correcting haptic exposure is reattempting the glued IOL technique, though the factors that contributed to haptic extrusion intraoperatively may still be present and place the patient at risk of haptic exposure once again. Another potential approach is IOL exchange, using a different technique of IOL fixation (e.g., iris-fixated, scleral-sutured, and anterior chamber placement). The risks of an IOL exchange include all those associated with intraocular surgery as well as those more specifically associated with other IOL fixation techniques that were hoping to be avoided in the first place with a glued IOL (e.g., endothelial cell loss, suture breakage, and cystoid macular edema). The advantages of our proposed technique of IOL refixation over other methods of repair are manifold and include evasion of the risks associated with intraocular surgery and other methods of IOL fixation, low likelihood of repeat haptic extrusion with very little haptic exposed in the flange, intrascleral haptic stability acquired from the flanged tip, decreased surgical time and less globe manipulation. Herein, we report two patients from our practice with glued IOLs and haptic extrusion as the first two cases that we know of, to undergo successful haptic intrascleral refixation via creation of a flange inspired by the Yamane technique.⁴ There may be preference for one method of IOL fixation over another, but there is not a consensus as to which method proves to be best; and despite the associated complications, none has been rendered obsolete. To the contrary, the preferred approach should take into consideration factors such as the patient's anatomy and comorbidities, be individualized to the patient's needs and customized for the revolving circumstances - such as the use of one technique to address the postoperative complication of another, exemplified by our two patients.

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Patient consent

Written consent to publish this case has not been obtained. This report does not contain any personal identifying information.

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Conflicts of interest

The following authors have no relevant financial disclosures: (RG, SG).

Authorship

All authors attest that they meet the current ICMJE criteria for Authorship.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ajoc.2019.03.009>.

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