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Cable tie technique for securing scleral fixation suture to intraocular lens

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ABSTRACT

Purpose: To report a new flanged intrascleral fixation technique for subluxated or dislocated intraocular lens (IOL) with c-loop or double c-loop haptics (cable tie fixation method).

Observations: We introduced a cable tie fixation method using 6–0 polypropylene for subluxated multifocal IOL with C-loop or double C-loop haptics. After passing the 6–0 polypropylene monofilament under the optic-haptic junction, the other end of the strand was taken out of the eye after passing it above the optic-haptic junction. A knot was made at one end, and the opposite strand was passed through the knot to form a loop. Both ends of the monofilament were tugged to make the loop fixed to the optic-haptic junction smaller. Both ends of the monofilament were externalized 2.5 mm posterior to the limbus using a 30 G needle. Another 6–0 polypropylene monofilament was tied to the opposite optic-haptic junction and scleral fixation was performed. While checking the IOL centration, the four ends of the 6–0 polypropylene monofilaments were heated with a cautery to form flanges.

Conclusions and Importance: A four-flanged intrascleral fixation technique involving a cable tie-shaped loop using 6–0 polypropylene could provide stable IOL fixation without damage for subluxated or dislocated IOLs with C-loop or double C-loop haptics.

1. Introduction

Intraocular lens (IOL) scleral fixation is one treatment option for subluxated or dislocated IOLs.[1] Repositioning existing dislocated IOL through scleral fixation has several advantages. First, repositioning surgery is more cost-effective than an IOL exchange, as there is no additional cost for IOLs used for implantation.[2] The cost of presbyopia-correcting IOLs is generally high and patients may pay out of pocket. Repositioning dislocated multifocal IOLs could save money and restore both far and near and/or intermediate vision.[1] Second, repositioning surgery could induce less corneal endothelial cell reduction than an IOL exchange.[3] Therefore, if the corneal endothelial cell density has been reduced through previous surgery, repositioning surgery may be preferential.[3]

There are several surgical techniques for IOL scleral fixation.[1,4–6] After the introduction of an IOL transscleral fixation by tying 10–0 polypropylene to the haptic,[7] various fixation methods using 8–0 or 9–0 polypropylene and gortex have been introduced.[1,8,9] Recently, flanged intrascleral haptic fixation with a double-needle technique, as proposed by Yamane et al., has been widely used as it is convenient and has a short surgical time.[6] The limitation of this technique is that it is only available for three-piece IOLs. For one-piece IOLs, Canabrava et al. proposed a flanged intrascleral fixation technique with 5-0 or 6–0 polypropylene.[4,5] However, in the case of subluxation of IOL with a C-loop or double C-loop, IOL should be penetrated by 5-0 or 6–0 polypropylene,[10] which may weaken its durability due to a cheese-wiring effect.

In the 5–0 or 6–0 polypropylene technique, the knot loosens and the knot volume increases when directly tied to the IOL haptic due to its rigidity and strand thickness. We confirmed in vitro that the strand is well fixed to the IOL optic-haptic junction when it is passed through a

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knot made by winding 6–0 polypropylene once and pinched with forceps. We report two cases of flanged intrascleral fixation technique for multifocal IOLs with c-loop or double c-loop haptics, named as the cable tie fixation method.

2. Surgical technique

2.1. Flanged cable tie intrascleral fixation technique

Four corneal paracenteses were made at 2, 4, 8, and 10 o'clock positions using a beaver blade. The 6–0 polypropylene monofilament (Ailee Co. Ltd, Busan, South Korea) was inserted into the anterior chamber through the side port at the 8 o'clock position. Then, the end of the monofilament was docked into the lumen of a 30 G needle passed under the optic-haptic junction and pulled out through the side port at the 4 o'clock position (Fig. 1A and A′). The end of the 6–0 polypropylene monofilament was reinserted into the anterior chamber using forceps through the side port at the 4 o'clock position, docked in the lumen of a 30 G needle, and pulled out through the side port at the 8 o'clock position after being passed above the optic-haptic junction (Fig. 1B and B′). A knot was made at the first end of the 6–0 polypropylene monofilament outside the eye (Fig. 1C and C′). The other end was passed through the knot to form a cable tie-shaped loop. The strand was pulled to both sides to make the knot smaller to fit into the anterior chamber. The knot was pinched with a needle holder once to prevent it from loosening (Fig. 1D and D′). One end of the monofilament was inserted into the anterior chamber through the side port at the 8 o'clock position, docked with a 30 G needle, and pulled out at 4 o'clock. Then, both ends of the monofilament were tugged to reduce the size of the loop fixed to the optic-haptic junction (Fig. 1E and E′). Similarly, another 6–0 polypropylene monofilament was tied to the opposite optic-haptic junction (Fig 1F∼1J and 1F'∼ 1J'). Next, one end of the monofilament was moved from the side port at the 2 o'clock position to the 10 o'clock position and reinserted into the anterior chamber through the side port at 10 o'clock. Then, a 30 G needle was inserted 2.5 mm posterior to the limbus at the 2 o'clock position. The end of the 6–0 polypropylene monofilament was placed in the lumen of the 30 G needle, and the end of the suture was externalized through the needle. The other ends of the remaining three sutures were externalized 2.5 mm posterior to the limbus through a 30 G needle at 4, 8, and 10 o'clock positions, respectively (Fig. 1K and K′). While checking the IOL centration, the four ends of the 6–0 polypropylene monofilaments were heated by cautery to form flanges (Fig 1L and L′).

2.2. Case presentations

2.2.1. Case 1

A 49-year-old man was referred for multifocal IOL subluxation in his right eye. He had a history of phacoemulsification and TECNIS ZKB00 (Johnson & Johnson Vision, Jacksonville, FL, USA) IOL implantation in

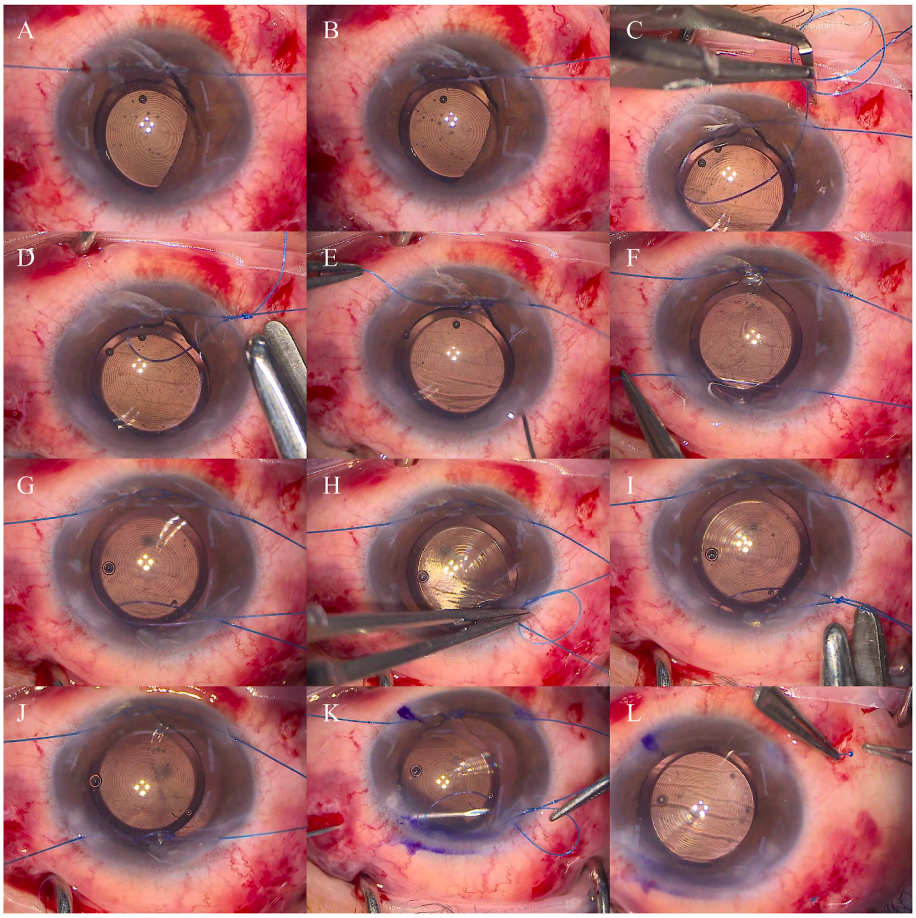

Fig. 1. Four-flanged intrascleral fixation technique involving making a cable tie-shaped loop using 6–0 polypropylene for the reposition of subluxated multifocal IOLs. After passing the 6–0 polypropylene monofilament under the optic-haptic junction (A, A′, F, and F′), the other end of the strand was taken out of the eye after passing above the optic-haptic junction (B, B′, G, and G′). A knot was made at one end (C, C′, H, and H′). The opposite strand was passed through the knot to form a cable tie-shaped loop and the strand was pulled on both sides to make the knot smaller so that it fit into the anterior chamber (D, D′, I, and I′). Both ends of the strand were tugged to make the loop smaller to fix it to the optic-haptic junction (E, E′, J, and J′). Both ends of the 6–0 polypropylene were externalized to 2.5 mm posterior to the limbus using a 30 G needle (K and K′). The four ends of the 6–0 polypropylene monofilaments were heated with a cautery to form flanges (L and L′).

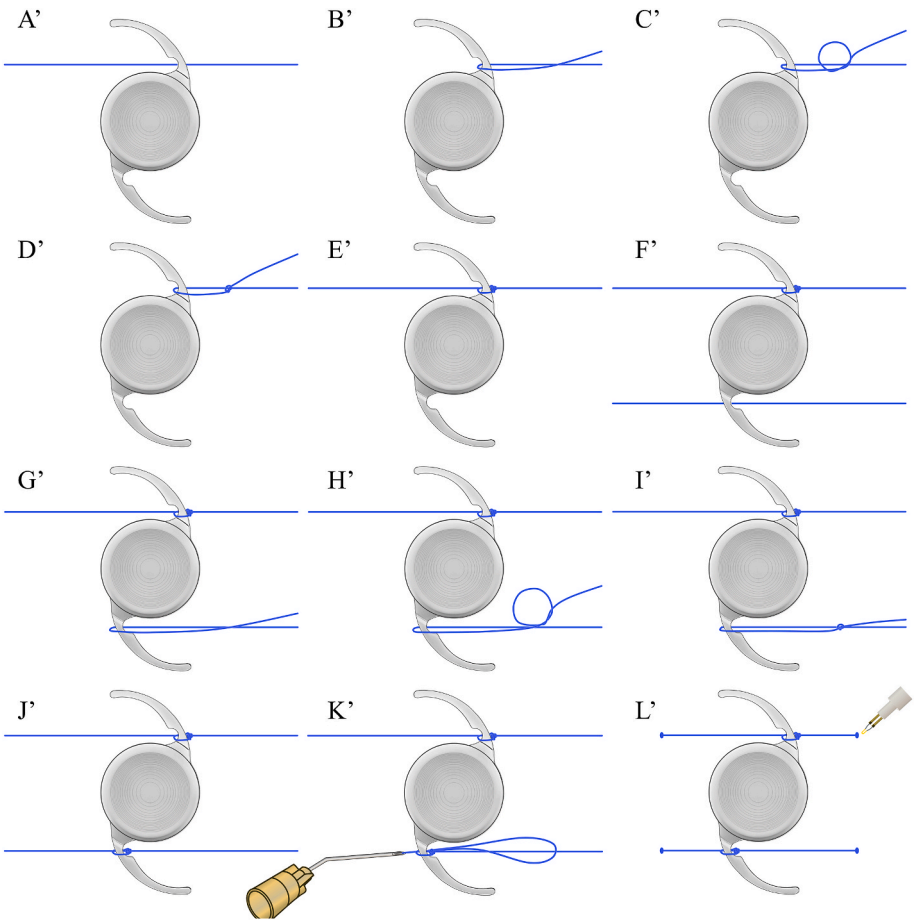

Fig. 1. (*continued*).

his right (15.0 D) and left eyes (17.0 D) three and six years ago, respectively. Three weeks before coming to the hospital, he experienced a decrease in visual acuity in his right eye. The patient was informed of the IOL subluxation in his right eye at a private clinic and was referred to our hospital for surgical treatment. Slit-lamp examination showed an IOL in-the-bag subluxation in the inferotemporal direction (Fig. 2A). The patient wanted to rescue a subluxated multifocal IOL to restore both far and near vision. We decided to do a scleral fixation of the existing IOL with a 6–0 polypropylene monofilament 2.5 mm posterior to the limbus via the cable tie fixation method. Three weeks after surgery, the IOL showed good centration (Fig. 2B). The patient's uncorrected distance visual acuity (UDVA) was 20/20 with a refractive error of plano and an

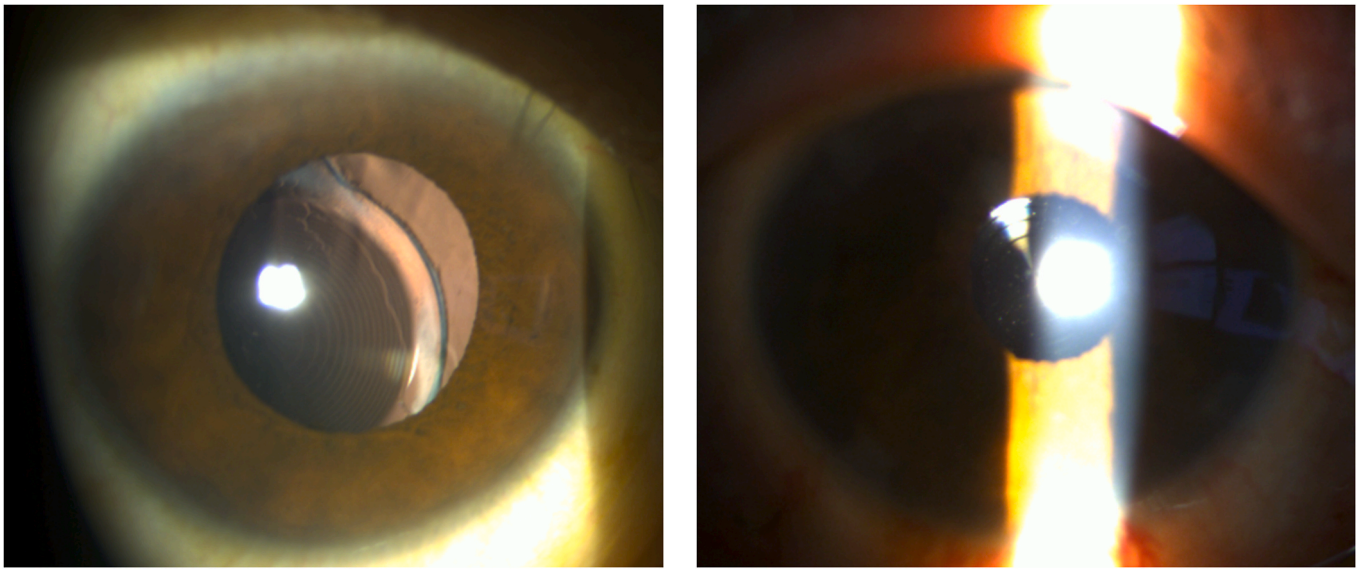

Fig. 2. Preoperative (A) and postoperative week three (B) anterior segment photographs of the right eye of case 1 with TECNIS ZKB00 IOL.

uncorrected near visual acuity (UNVA) at 40 cm of J2 in his right eye.

2.2.2. Case 2

A 65-year-old woman was referred for multifocal IOL subluxation with anterior capsule contraction in her right eye. She had a history of phacoemulsification and implantation of the FineVision HP (PhysIOL, Liège, Belgium) IOL in both eyes three months prior. She went to a private clinic three days prior due to decreased vision in her right eye. The patient was referred to our hospital for reposition surgery of the subluxated multifocal IOL. Slit-lamp examination showed an IOL in-the-bag subluxation superiorly (Fig. 3A). The patient came to our hospital to fix the subluxated IOL, so we performed scleral fixation with a 6–0 polypropylene monofilament through the cable tie fixation method. The IOL showed good centration one month (Fig. 3B) after surgery. Her UDVA was 16/20 with a refractive error of −0.50 D, and the UNVA at 40 cm was J1 in her right eye one month postoperatively.

3. Discussion

Scleral fixation of subluxated or dislocated multifocal IOLs can restore both far and near vision.[1] This case report introduced a four-flanged intrascleral fixation technique involving a cable-tie-shaped loop using a 6–0 polypropylene monofilament. The cable tie fixation method provides good surgical outcomes regarding IOL centration and far and near vision. Similarly, Whang et al. applied the flanged intrascleral fixation technique for monofocal toric and multifocal IOLs, which provided good surgical outcomes.[11] However, a previous study used IOL with two plate haptics with four holes. Thus, two 5–0 polypropylenes can pass through the holes to easily fix the IOL. Mahmood et al. introduced the four-flanged prolene fixation technique, which wraps 5–0 polypropylenes suture around the optic-haptic junction of double C-loop haptics in eyes with severe capsular phimosis.[12] In that case, due to severe capsular phimosis, the 5–0 prolene wrapped around the optic-haptic junction could be fixed without slipping.[12] The cable tie fixation technique can be applied to IOL with a C-loop (TECNIS ZKB00) or double C-loop (FineVision HP) without capsular phimosis. When the 6–0 polypropylene monofilament was tied directly to the IOL optic-haptic junction by wrapping the free end once around the other end, the knot could easily loosen due to its rigidity unless tension was applied to the strand. When passing the strand through the knot and then tightening it, the loop fixed to the optic-haptic junction was maintained without tension.

For multifocal intraocular lenses, it is important to properly position the center of the IOL during scleral fixation.[13,14] The flanged scleral fixation method is advantageous for adjusting the IOL centration while symmetrically melting the polypropylene in the opposite direction. Both previous Whang et al.'s report and this case report showed good postoperative IOL centration using the flanged intrascleral fixation technique with 5-0 or 6–0 polypropylene.[11] One of two flanged intrascleral fixation techniques could be applied to the subluxated/dislocated IOL according to the haptic design.

There are some limitations of the technique proposed in this case report. There are possible several complications in the flanged intrascleral fixation method such as late erosion and exposure of the flanges and the risk of endophthalmitis.[15,16] Therefore, it is necessary to evaluate the long-term stability of the flanged intrascleral fixation technique, and careful attention is required during follow-up.

4. Conclusion

A four-flanged intrascleral fixation technique with a cable tie-shaped loop using 6–0 polypropylene could provide good surgical outcomes without IOL damage in cases of subluxated or dislocated multifocal IOLs with C-loop or double C-loop haptics without a hole.

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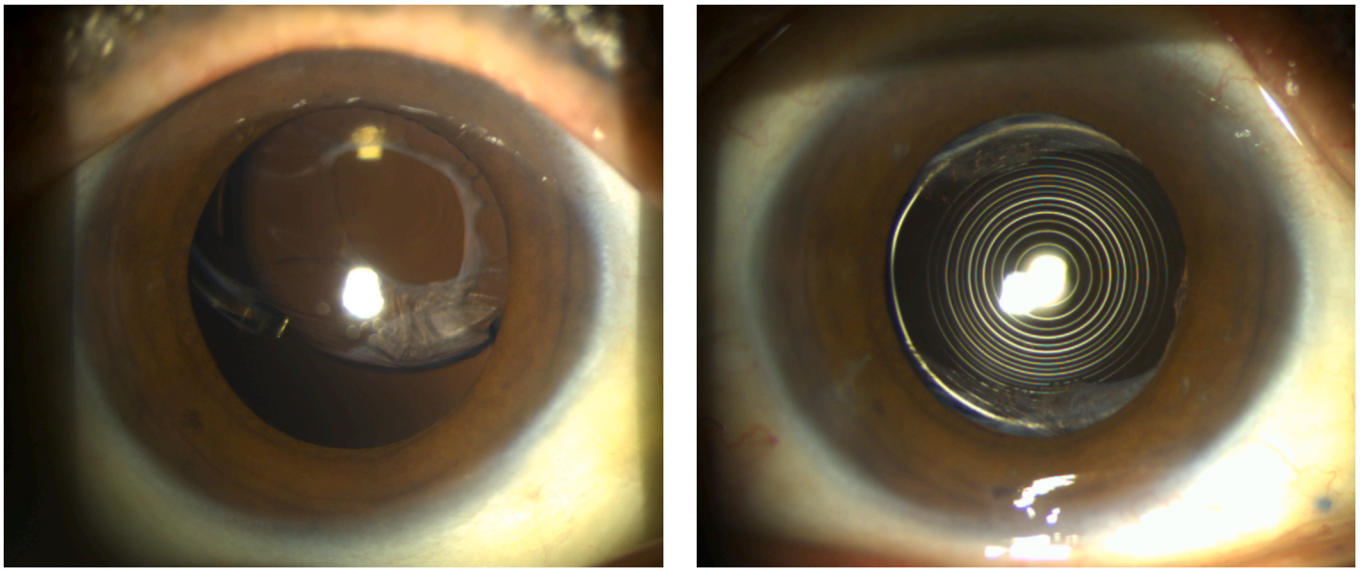

Fig. 3. Preoperative (A) and postoperative month one (B) anterior segment photographs of the right eye of case 2 with FineVision HP IOL.

Authorship

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

Patient Consent

Consent to publish this case report has been obtained from the patients in writing.

Declaration of competing interest

The authors have no financial disclosures: Y. E., Y.J.L., S.Y.P., Y.C., J. W.K., S.J.K., J.S.S., H.M.K.

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Appendix A. Supplementary data

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