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Transconjunctival Forceps-Assisted Flanged Intrascleral Fixation via a Posterior Approach: Clinical Outcomes of a Modified Technique

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Abstract

Background

To evaluate clinical outcomes, stability, and risk factors for complications of a modified posterior-approach, forceps-assisted sutureless intrascleral intraocular lens (IOL) fixation technique.

Methods

This retrospective, consecutive series included 332 eyes (309 patients; aged 3–91 years) undergoing IOL fixation between January 2020 and May 2025. All underwent modified flanged intrascleral fixation using 25-gauge vitreoretinal forceps via a posterior approach under direct visualization, without needle-docking and syringe maneuvers. Scleral tunnels were secured with 8 − 0 Vicryl in cases of scleral laxity. All cases underwent complete pars plana vitrectomy. Primary outcomes were IOL stability and centration; secondary outcomes included best-corrected visual acuity (BCVA) changes and risk factors for cystoid macular edema (CME) identified via multivariate binary logistic regression.

Results

IOL stability was achieved in 94.3% of eyes (median follow-up: 9 months, range: 6–60 months). Revision was required in 5.7% due to haptic slippage (4.2%) or IOL tilt (1.5%). Mean BCVA improved significantly by 7 lines, from 1.11 ± 0.63 (20/250 Snellen equivalent) to 0.42 ± 0.34 logMAR (20/50 Snellen equivalent) ($p < 0.001$). CME developed in 4.8%, with diabetes mellitus (OR = 3.7), prior retinal detachment surgery (OR = 4.2), and delayed vitrectomy for dropped lens material (OR = 4.6) identified as independent risk factors (model $p = 0.009$). Marfan syndrome eyes had the best visual outcomes (mean 0.11 logMAR; 20/25 Snellen) despite higher revision rates (12.9%).

Conclusions

The posterior-approach forceps-assisted technique simplifies sutureless IOL fixation by utilizing standard vitreoretinal instrumentation and direct visualization. It provides a safe, effective alternative for complex cases, including pediatric and Marfan syndrome patients, with a high primary stability.

Introduction

Intraocular lens (IOL) implantation in the absence of capsular support remains a technically demanding aspect of anterior segment surgery.[1,2] When capsular support is lacking—due to trauma, complicated cataract surgery, or zonular weakness—alternative fixation methods are required.[1,3,4] While anterior chamber, iris-fixated, and sutured scleral-fixated IOLs are commonly used, all of these methods are

associated with various complications, including corneal endothelial cell loss, iris chafing, suture erosion, and delayed IOL dislocation.[1,2,4]

The introduction of the Yamane technique in 2017 transformed the approach to secondary IOL implantation in eyes lacking adequate capsular support.[5] This intrascleral IOL fixation technique utilizes a double-needle approach and haptic cauterization to secure a three-piece IOL, avoiding suture-related complications and offering improved long-term stability.[4–6]

Since its introduction, the Yamane technique has undergone several modifications to enhance its efficacy, safety, and reproducibility in different clinical scenarios.[7–12] A notable modification, described in recent case reports by Erakgun[11] and Iannetti et al.[7], involves performing the intrascleral fixation through a posterior approach. In this technique, the haptics are docked into needles within the vitreous cavity under direct visualization. This allows secure docking and externalization of the haptics without blind maneuvers in the posterior chamber, minimizing iris and endothelial trauma. It is particularly advantageous for the minimally-invasive reposition of dislocated three-piece IOLs.

In this study, we report the outcomes of a modified posterior approach for intrascleral IOL fixation in a large series of patients with various underlying pathologies. Unlike the previously described posterior approach, our technique enables controlled haptic externalization without the need for needle docking in the vitreous cavity, further simplifying the procedure.

Methods

Study Design

This single-center, retrospective, consecutive case series was conducted at the Retina Department of Ankara Bilkent City Hospital. Data were collected from medical records of patients undergoing modified intrascleral fixation between January 2020 and May 2025. The study was approved by the institutional Ethics Committee (Approval No: TABED 1-25-1041) and followed the tenets of the Declaration of Helsinki. Written informed consent was obtained from all participants or their legal guardians.

Surgical indications included aphakia without adequate capsular support, a subluxated/ dislocated crystalline lens, subluxated/ dislocated IOL, or corneal decompensation related to anterior chamber IOL necessitating IOL removal and exchange. The exclusion criteria included a post-operative follow-up less than six months, incomplete medical records, and a prior scleral-fixated IOL in the study eye.

Surgical Technique

All surgeries were performed by a single experienced vitreoretinal surgeon (MO) under local or general anesthesia. A standard 25-gauge or 27-gauge 3-port pars plana vitrectomy (PPV) was performed in all cases using the Constellation Vision System® (Alcon, Fort Worth, TX, USA). Complete vitrectomy,

including meticulous removal of the anterior and peripheral vitreous was ensured to minimize postoperative complications such as vitreous traction or hemorrhage. In eyes with subluxated or dislocated crystalline lenses, lensectomy was performed using the vitreous cutter and, when required, a fragmatome. In cases with subluxated or dislocated posterior chamber IOLs, the existing 3-piece IOL was preserved and repositioned whenever the haptics were intact and suitable for intrascleral fixation. If the existing IOL required exchange due to single-piece or anterior chamber design, optic/haptic damage, or instability, the IOL was explanted through a scleral tunnel incision and replaced with a 3-piece foldable posterior chamber IOL (MA60AC, Alcon).

Following vitrectomy and IOL preparation, two transconjunctival sclerotomies were created 2.0 mm posterior to the limbus, positioned 180° apart along the horizontal meridian, using a 25-gauge trocar blade. The sclerotomies were constructed in an angled fashion to provide a self-sealing tract for haptic externalization and stabilization. Using a 25-gauge maximum-gripping forceps (Grieshaber MaxGrip, Alcon®) inserted through each sclerotomy, the leading and trailing haptics were sequentially grasped from their distal ends and externalized under direct visualization with the light pipe and the EIBOS (Enhanced Intraoperative Binocular Ophthalmic System) non-contact wide-angle viewing system (Haag-Streit, Germany). Final IOL centration was adjusted by fine repositioning of the externalized haptics within the scleral tract. Once each haptic was externalized, low-temperature thermal cautery was used to create flanges. The cautery device was brought close to the tip of the externalized haptic without direct contact; radiant heat softened the haptic material in a controlled manner, forming a smooth, conical flange. This configuration allowed the haptic to fit snugly within the scleral tunnel, enhancing stability and reducing the risk of slippage or extrusion. The flanged haptics were then gently tucked into the scleral tunnels to achieve secure intrascleral fixation without the use of sutures or fibrin glue. In pediatric patients with scleral laxity, scleral tunnels were additionally secured with 8 – 0 Vicryl sutures to ensure flange retention and prevent postoperative IOL dislocation. Subconjunctival cefazolin and dexamethasone are injected at the end of the surgery and pupil dilation is avoided in the postoperative period to decrease the risk of IOL capture by the iris.

The refractive target was emmetropia or mild myopia, adjusted according to the fellow eye's refractive status. IOL-induced astigmatism of − 0.50 to − 1.00 diopters was considered acceptable, whereas postoperative refractive astigmatism exceeding 2.00 diopters attributable to IOL tilt or decentration after confirming by anterior segment OCT was designated a structural failure and constituted a standard indication for surgical revision. Peripheral iridotomy was not performed in any case. Complete pars plana vitrectomy and meticulous IOL positioning 2 mm posterior to the limbus ensured an unobstructed retro-iridial space, eliminating the need for prophylactic iridotomy; no patient developed pupillary block or angle-closure.

The surgical procedure is demonstrated step-by-step in the Fig. 1, Fig. 2, and Supplementary Video.

Data collection

Demographic characteristics (age, sex), and systemic comorbidities —including diabetes mellitus (DM) and connective-tissue disorders— were recorded. Preoperative ocular data included lens/IOL status, surgical indication, history of trauma, ocular comorbidities, and prior intraocular surgeries. Intraoperative details consisted of the surgical procedure(s) performed and any complications.

At baseline and each postoperative visit, best-corrected visual acuity (BCVA), intraocular pressure (IOP), and IOL stability/centration were evaluated. When clinical suspicion of IOL tilt or decentration was present, anterior segment optical coherence tomography was performed for confirmation. All patients were evaluated for the presence of cystoid macular edema (CME) using macular optical coherence tomography (OCT). Other postoperative complications (e.g., retinal detachment, endophthalmitis, etc.), the need for revision surgery, and follow-up duration were also documented. Hypotony was defined as an intraocular pressure (IOP) below 6 mmHg at any postoperative examination.

The primary outcome measure was postoperative IOL stability and centration. The secondary outcomes included postoperative BCVA improvement, incidence of CME and related factors, and other complications.

Statistical analysis

Data were recorded and analyzed using SPSS version 22.0 (IBM Corp, Armonk, NY, USA). The normality of continuous variables was assessed with the Shapiro-Wilk test. Descriptive statistics were presented as mean ± standard deviation (SD) or median (range) for continuous variables, and as counts and percentages for categorical variables. Visual acuity values were converted to logMAR for analysis, and pre- and postoperative values were compared using the Wilcoxon signed-rank test. Categorical variables were compared using the chi-square test or Fisher's exact test, as appropriate, and Bonferroni correction was applied for multicategory comparisons. A multivariate binary logistic regression analysis was employed to identify independent predictors of postoperative cystoid macular edema (CME). A backward conditional method was used to select variables for the final model. Odds ratios (ORs) with 95% confidence intervals (CIs) were calculated, and model fit was evaluated using Nagelkerke R^2 and the Hosmer–Lemeshow goodness-of-fit test. Statistical significance was set at $p < 0.05$ for all analyses.

Results

A total of 332 eyes from 309 patients (186 males, 123 females) were included in the analysis. Bilateral involvement was present in 23 patients (7.4%), most frequently associated with connective-tissue disorders (15/23, 65.2%).

The median age at the time of surgery was 69 years (range, 3–91 years), with pediatric patients representing 27 eyes (8.1%) from 14 children (median age, 7 years; range, 3–12 years).

Regarding etiology, pseudoexfoliation was the most common underlying condition (99 eyes, 29.8%), followed by complicated cataract surgery (98 eyes, 29.5%) and traumatic lens/IOL pathology (75 eyes,

22.6%). Connective-tissue disorders, including Marfan syndrome and homocystinuria, accounted for 31 eyes (9.3%). Aphakia without capsular support and anterior chamber IOL–related complications comprised the remaining cases. A complete breakdown of etiologies and surgical procedures are presented in Table 1, and patient characteristics are given in Table 2.

Table 1
Etiology and Surgical Indications for Posterior Intrascleral Fixation

Etiology / Indication	**Eyes, n (%)**	**Surgical Procedure(s)**
Pseudoexfoliation-related IOL dislocation	99 (29.8)	PPV / IOL exchange (n = 67) PPV/ Reposition of existing 3-piece IOL (n = 32)
Complicated cataract surgery	98 (29.5)	Concurrent PPV / PPL (± fragmatome) / ISF-IOL (n = 71) Delayed PPV / PPL (± fragmatome) / ISF-IOL (n = 27)
Traumatic lens / IOL pathology	75 (22.6)	PPV / PPL (± fragmatome) / ISF-IOL (n = 43) PPV /IOL exchange (n = 28) PPV /Reposition of existing 3-piece IOL (n = 4)
Connective-tissue disorder- related ectopia lentis	31 (9.3)	PPL / PPV / ISF-IOL
Aphakia without capsular support	19 (5.8)	PPV / Secondary ISF-IOL
Anterior chamber IOL–related complications	10 (3%)	PPV / IOL exchange
PPV: pars plana vitrectomy; PPL: pars plana lensectomy; ISF-IOL: intrascleral-fixated-intraocular lens; n: number		

Table 2
Patient demographics and functional characteristics

Subjects (eyes), n	**309 (332 eyes)**
Age (years), median (range)	69 (3–91)
Sex (male/female), n	186/123
Baseline BCVA, mean logMAR ± SD (Snellen equivalent)	1.11 ± 0.63 (20/250)
Final BCVA, mean logMAR ± SD (Snellen equivalent)	0.42 ± 0.34 (20/50)
BCVA: Best corrected visual acuity; SD: Standart deviation; n: number	

Surgical Outcomes

All eyes underwent forceps-assisted intrascleral fixation of a 3-piece IOL (MA60AC, Alcon®) using scleral tunnels created with 25-gauge MVR blades. The median postoperative follow-up duration was 9 months (range, 6 months–5 years).

IOL stability was achieved in the majority of cases (94.3%), with well-centered, stable fixation observed throughout the postoperative follow-up. Revision surgery was required in 19 eyes (5.7%) due to postoperative IOL tilt (n = 5, 1.5%) or dislocation (n = 14, 4.2%). Revision frequency varied by etiology, being highest among eyes with Marfan syndrome (4/31, 12.9%), followed by trauma-related cases (5/75, 6.6%). Dislocation rates did not differ significantly between eyes undergoing scleral fixation of a retained 3-piece IOL and those receiving a new IOL implantation (5.6% vs 4.1%, p = 0.67).

The most common mechanism of instability was haptic slippage from the scleral tunnel. Among these, four eyes with Marfan syndrome demonstrated delayed slippage occurring 4 months to 3 years postoperatively; these were earlier cases, initially performed without scleral suturing, and were subsequently resecured with supplemental sutures. In contrast, eight eyes without connective-tissue disorders exhibited early slippage within the first 2 postoperative weeks and were managed by haptic externalization and repositioning through a newly created sclerotomy using forceps. Less frequently, revision was required due to haptic breakage (2 eyes) causing dislocation or optic–haptic junction deformation (5 eyes) causing tilt, for which IOL exchange was performed. Overall, 18 of 19 eyes were successfully stabilized with a single revision. One traumatic eye with significant anatomic distortion demonstrated persistent instability despite IOL exchange and was ultimately left aphakic.

External haptic exposure occurred in 2 eyes (0.6%) and was managed conservatively by gentle repositioning into the scleral tunnel at the slit lamp.

Visual Outcomes

Visual acuity improved significantly from baseline to final follow-up, demonstrating a mean improvement of approximately 7 lines (mean BCVA: 1.11 ± 0.63 logMAR, 20/250 Snellen equivalent preoperatively vs. 0.42 ± 0.34 logMAR, 20/50 Snellen equivalent postoperatively; $p < 0.001$). Meaningful visual improvement was achieved in the majority of cases, provided that no irreversible macular or optic nerve pathology was present.

Final visual outcomes varied according to the underlying ocular condition. Eyes with connective-tissue disorders (primarily Marfan syndrome with crystalline lens dislocation) achieved the most favorable postoperative vision (mean 0.11 ± 0.07 logMAR, 20/25 Snellen equivalent). Trauma-related eyes demonstrated the lowest functional gains at final follow-up (mean 0.83 ± 0.79 logMAR, 20/135 Snellen equivalent), largely due to coexisting retinal damage or corneal scarring.

Postoperative Complications

Cystoid macular edema (CME) was the most common postoperative complication, confirmed on OCT in 16 eyes (4.8%) requiring treatment beyond nonsteroidal anti-inflammatory drops. Logistic regression analysis identified diabetes mellitus (DM) (OR, 3.68; 95% CI, 1.17–11.59; p = 0.026), history of prior retinal detachment (RD) surgery (OR, 4.23; 95% CI, 1.04–17.24; p = 0.025), and delayed vitrectomy for dropped lens nucleus (performed in a separate session rather than same-session rescue) (OR, 4.55; 95% CI, 1.35–15.40; p = 0.015) as independent risk factors for postoperative CME (overall model p = 0.009, R^2 = 0.192). All cases resolved after a single sub-Tenon's triamcinolone injection, and no eye developed chronic or recurrent CME.

Other postoperative complications were infrequent and included transient hypotony in 4 eyes (1.2%), mild self-limiting vitreous hemorrhage in 6 eyes (1.8%), and elevated IOP in 6 eyes (1.8%), of which 2 required surgical intervention. Rhegmatogenous retinal detachment occurred in 5 eyes (1.5%) and was repaired successfully in all cases. No cases of endophthalmitis, IOL-iris capture, choroidal hemorrhage, or persistent hypotony were observed during the follow-up period. Complications are summarized in Table 3.

Table 3
Postoperative complications

IOL malposition, n (%)	**19 (5.7)**
Cystoid macular edema, n (%)	16 (4.8)
Hypotony, n (%)	4 (1.2)
Elevated intraocular pressure, n (%)	6 (1.8)
Vitreous hemorrhage, n (%)	6 (1.8)
Retinal detachment, n (%)	5 (1.5)

Discussion

In this study, we evaluated the outcomes of a posterior approach for flanged intrascleral IOL fixation using 25-gauge MVR blade–assisted scleral tunnels and forceps-assisted haptic externalization. Across 332 eyes, the technique achieved high rates of stable IOL fixation (94.3%) and meaningful visual improvement, with a low revision rate and an acceptable complication profile.

Compared with the previously described sutureless fixation techniques,[5,11,13] our modified method offers several advantages. By eliminating needle-based docking and syringe-assisted maneuvers, it reduces technical complexity and the risk of blind intraocular maneuvers. Direct forceps control under continuous visualization within the vitreous cavity simplifies haptic externalization and minimizes handling of fragile haptics, thereby reducing the risk of deformation or breakage and potentially

shortening operative time. These benefits are particularly relevant in eyes with anterior segment abnormalities, limited pupillary dilation, or media opacity— such as those seen following trauma or complex surgery, in which the conventional Yamane technique may be more challenging and associated with a higher risk of malposition.[13] Trocar-cannula-assisted modifications were developed to allow controlled haptic manipulation in a wider working space of vitreous cavity;[6,9,10] however, they introduce additional procedural steps and retain a risk of haptic kinking or damage during trocar removal. Our posterior forceps-based approach avoids trocar insertion and needle-haptic docking entirely, providing a further simplified method while maintaining effective IOL fixation. Additionally, this posterior approach allows direct reuse of a dislocated three-piece IOL and enables simultaneous posterior segment intervention when needed. This represents a major advantage in the context of lens drop during phacoemulsification or dislocated IOLs— the predominant indications in our cohort. Regarding wound architecture, performing a trocar-less, oblique entry with a 25-gauge MVR blade creates a narrow, slit-like sclerotomy rather than the round profile produced by a trocar or needle lumen. This linear geometry provides a tighter structural grasp around the haptic, and the thermally induced conical flange then acts as a mechanical plug within the linear slit. Notably, the 25-gauge MaxGrip forceps enters and exits in the closed position, and the effective outer diameter of the closed forceps tip is smaller than that of a standard 25-gauge trocar-needle system; the sclerotomy is therefore not appreciably enlarged. Unlike the classic Yamane technique, which produces a longer intrascleral tunnel, the shorter MVR-created tunnel in our technique is intentionally preferred, as it facilitates forceps manipulation during haptic externalization. Although the longer tunnel may theoretically offer additional haptic containment, the shorter tunnel is effectively sealed by the conical flange, achieving equivalent wound integrity — as supported by our low hypotony rate (1.2%). Finally, we prefer 25-gauge instrumentation over 27-gauge for its superior stiffness, which enables more precise intraoperative maneuvering. The IOL stability observed in our series is highly favorable and aligns well with the most recent literature on flanged intrascleral IOL fixation. The rate of IOL malposition requiring surgical revision was 5.7%, which is well within the range reported in recent meta-analyses (2.3%-7.3%).[2,14] Our rate also compares favorably to the 4.4% dislocation rate observed by Mustafi et al.[13] in surgically complex cases and the 6.6% dislocation rate in a large series by Patel et al.[10] using the trocar-cannula-assisted technique.

Several factors may contribute to postoperative IOL malposition. Moore et al.[9] suggested a higher dislocation risk with repositioned IOLs, attributing this to possible haptic weakness in older lenses or inadvertent damage during removal of adherent capsular and cortex material. Although the dislocation rates associated with the reuse of existing 3-piece IOLs were slightly higher than newly implanted IOLs in our cohort, we did not observe a statistically significant difference. Therefore, we advocate for their utilization where feasible to minimize additional surgical trauma and cost. Careful handling is essential, however: the optic should be grasped rather than the haptic when possible, and the use of a chandelier to facilitate bimanual dissection may help prevent haptic injury while freeing adherent material. Even so, whether the IOL is newly implanted or repositioned, we observed that MA60AC haptics, with their polymethyl methacrylate (PMMA) composition, remain vulnerable to deformation or breakage if not grasped precisely at the tip—making haptic–optic junction damage a common mechanism of IOL tilt in

our series. Although we lack comparative data for alternative platforms, the AMO Sensar AR40e features PMMA haptics with similar mechanical properties and likely comparable vulnerability, whereas the Zeiss CT Lucia 602 utilizes polyvinylidene fluoride (PVDF) haptics with a higher elastic threshold that may be more resistant to permanent kinking during externalization. While our primary stability rate with the MA60AC was high (94.3%), platforms with PVDF haptics may further reduce the incidence of haptic-deformation-induced tilt. A formal comparative analysis of IOL platforms is beyond the scope of the current study; future prospective trials examining long-term stability across different three-piece IOL designs would be valuable.

In our cohort, the etiology of the underlying pathology strongly influenced IOL instability, with the highest revision rate observed in eyes with Marfan syndrome (12.9%), followed by trauma eyes with distorted anatomy (6.6%). The mechanism of dislocation in Marfan eyes differed from early dislocations (< 2 weeks postoperatively), which were likely due to technical factors such as inadequate flanges or overly direct tunneling. In contrast, despite appropriate flanging, the reduced scleral rigidity inherent in Marfan patients appears to have contributed to late dislocation occurring months or years after surgery.[8,15] After observing early cases of haptic slippage in Marfan eyes, we modified our technique to routinely secure the scleral tunnel with a supplemental suture, after which no further instability was noted. Moreover, the Marfan group achieved the most favorable final vision in our cohort, suggesting the value of this technique in these challenging younger eyes.

Overall, the technique demonstrated a favorable safety profile. A total of 4.8% developed postoperative CME requiring treatment beyond drops, which is in line with rates seen in sutureless scleral-fixated IOL surgeries, ranging from 2–9%,[2,9,13,14,16] despite the high surgical complexity in our cohort. IOP elevation (1.8%), vitreous hemorrhage (1.8%), and retinal detachment (1.5%) were all infrequent and comparable to reported outcomes in the literature.[2,5,9,14,16] Hypotony was less frequent compared to previous studies[2] and did not require treatment in any case. Notably, iris capture was not encountered in any case, supporting the effective posterior positioning of the IOL with this technique.

We further evaluated factors contributing to CME and found that diabetes mellitus, history of prior RD surgery, and delayed vitrectomy for dropped lens material were independently associated with significantly higher CME risk — each conferring approximately a three- to fourfold increase in odds. Diabetes is well recognized to increase susceptibility to postoperative macular inflammation due to underlying microvascular dysfunction and chronic inflammatory activity.[17] Eyes with prior retinal detachment also represent a higher-risk environment, where a compromised blood–retina barrier and repeated vitreoretinal manipulation may heighten postoperative inflammatory response.[18] Notably, delayed rather than same-session vitrectomy for lens drop demonstrated the strongest association, reinforcing the benefit of immediate surgical rescue to limit prolonged retinal exposure to retained lens fragments and inflammatory mediators. Prophylactic perioperative anti-inflammatory regimens, including use of intravitreal triamcinolone at case completion, and early macular monitoring may be particularly beneficial in these high-risk groups.

There are several limitations to this study, primarily its retrospective nature and single-surgeon design. While the latter ensures surgical consistency, it may limit the immediate generalizability of the learning curve to other centers. Additionally, our cohort featured variable follow-up durations, and anterior segment imaging (e.g., OCT or Scheimpflug imaging) was not routinely employed to objectively quantify IOL tilt or centration. Future studies should incorporate anterior segment imaging to quantify IOL position and refine IOL calculation formulas. Additionally, referral and follow-up biases are inherent, as patients with uncomplicated postoperative courses or good visual acuity may be lost to follow-up, whereas eyes with complications are more likely to return for care, potentially influencing reported outcomes. Nevertheless, the study's strengths include the large cohort, inclusion of pediatric eyes and high-risk groups, and detailed assessment of mechanisms underlying complications such as IOL dislocation and postoperative CME. By including patients with connective tissue disorders and scleral laxity, we were able to demonstrate the broad applicability and safety of this posterior-approach technique in complex scenarios.

In conclusion, we have described a modified sutureless 3-piece IOL scleral fixation technique via a posterior approach. Its major advantages—direct reuse of dislocated IOLs, atraumatic manipulation in the spacious vitreous cavity under direct visualization with reduced haptic stress, and simultaneous posterior segment management—make it particularly valuable in challenging surgical scenarios. By using commonly available vitreoretinal instrumentation—25-gauge MVR blades and forceps—without syringe or trocar-cannula assistance, the technique simplifies and shortens the procedure. Outcomes are encouraging even in eyes with connective-tissue disorders, trauma-related scarring, or distorted anterior segment anatomy, offering an efficient and safe solution across a wide range of clinical situations. Careful attention to high-risk groups and technical nuances ensures optimal results and a favorable safety profile.

Abbreviations

BCVA
Best–corrected visual acuity
CI
Confidence interval
CME
Cystoid macular edema
DM
Diabetes mellitus
EIBOS
Enhanced Intraoperative Binocular Ophthalmic System
IOL
Intraocular lens
IOP
Intraocular pressure

logMAR
Logarithm of the Minimum Angle of Resolution
mmHg
Millimeters of mercury
MVR
Microvitreoretinal (blade)
OCT
Optical coherence tomography
OR
Odds ratio
PMMA
Polymethyl methacrylate
PPV
Pars plana vitrectomy
PVDF
Polyvinylidene fluoride
RD
Retinal detachment
SD
Standard deviation
SPSS
Statistical Package for the Social Sciences

Declarations

Proprietary Interests

The authors have no relevant interests to disclose.

Ethics approval and consent to participate:

The study was approved by the institutional Ethics Committee of Ankara Bilkent City Hospital (Approval No: TABED 1-25-1041). Written informed consent was obtained from all participants or their legal guardians. Patient confidentiality was maintained throughout the study.

Consent for publication:

Not applicable

Competing interests:

The authors declare that they have no competing interests.

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Author Contribution

Concept and design: MO; Data collection: MS, FDI, HO, OT; Data analysis and interpretation: EOZ, MO; Drafting of the manuscript: EOZ; Critical revision of the manuscript and supervision of the study: MO, OEK. All authors read and approved the final manuscript.

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None.

Data Availability

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

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Figures

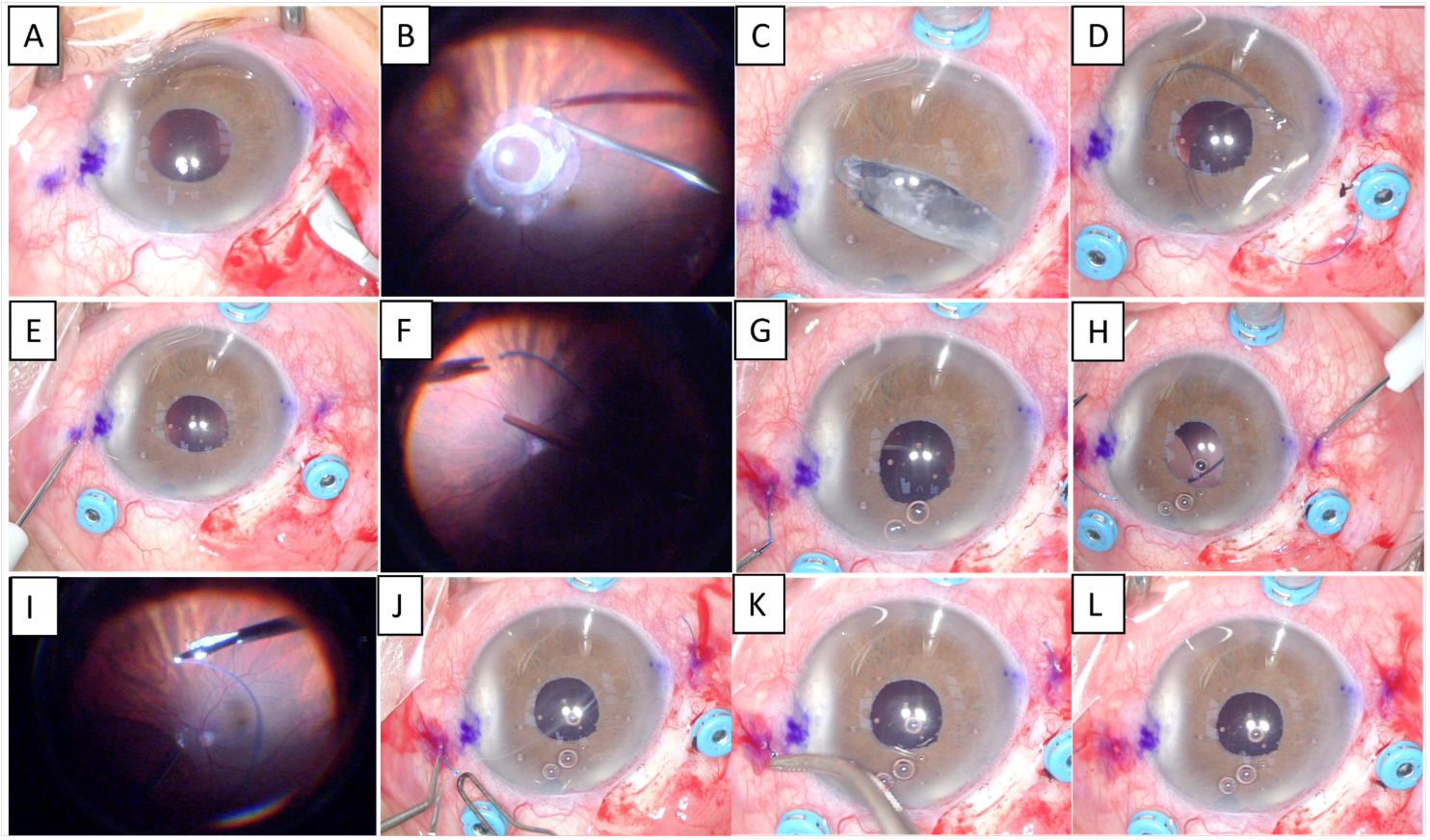


Figure 1

Modified posterior-approach forceps-assisted sutureless intrascleral intraocular lens (IOL) fixation in a case of a dislocated posterior chamber intraocular lens (IOL). (A) Surface marking of scleral entry sites 2.0 mm posterior to the limbus, 180° apart, and creation of a 5.0-mm scleral tunnel incision. (B) Visualization of a dislocated posterior chamber IOL. (C) Controlled explantation of the dislocated IOL through the scleral tunnel. (D) Temporary placement of a three-piece foldable IOL (MA60AC, Alcon) in the anterior chamber. (E) Creation of an angled transconjunctival sclerotomy using a 25-gauge trocar blade. (F) Insertion of 25-gauge maximum-gripping forceps through the sclerotomy to grasp the leading haptic distal tip under wide-angle visualization. (G) Controlled externalization of the leading haptic. (H) Creation of the second angled sclerotomy 180° opposite to the first. (I) Forceps-assisted grasping and externalization of the trailing haptic through the second sclerotomy. (J) Application of low-temperature thermal cautery to the haptic tips to form smooth, conical flanges. (K-L) Sequential tucking of the flanged haptics into the self-sealing scleral tunnels, achieving secure intrascleral fixation.

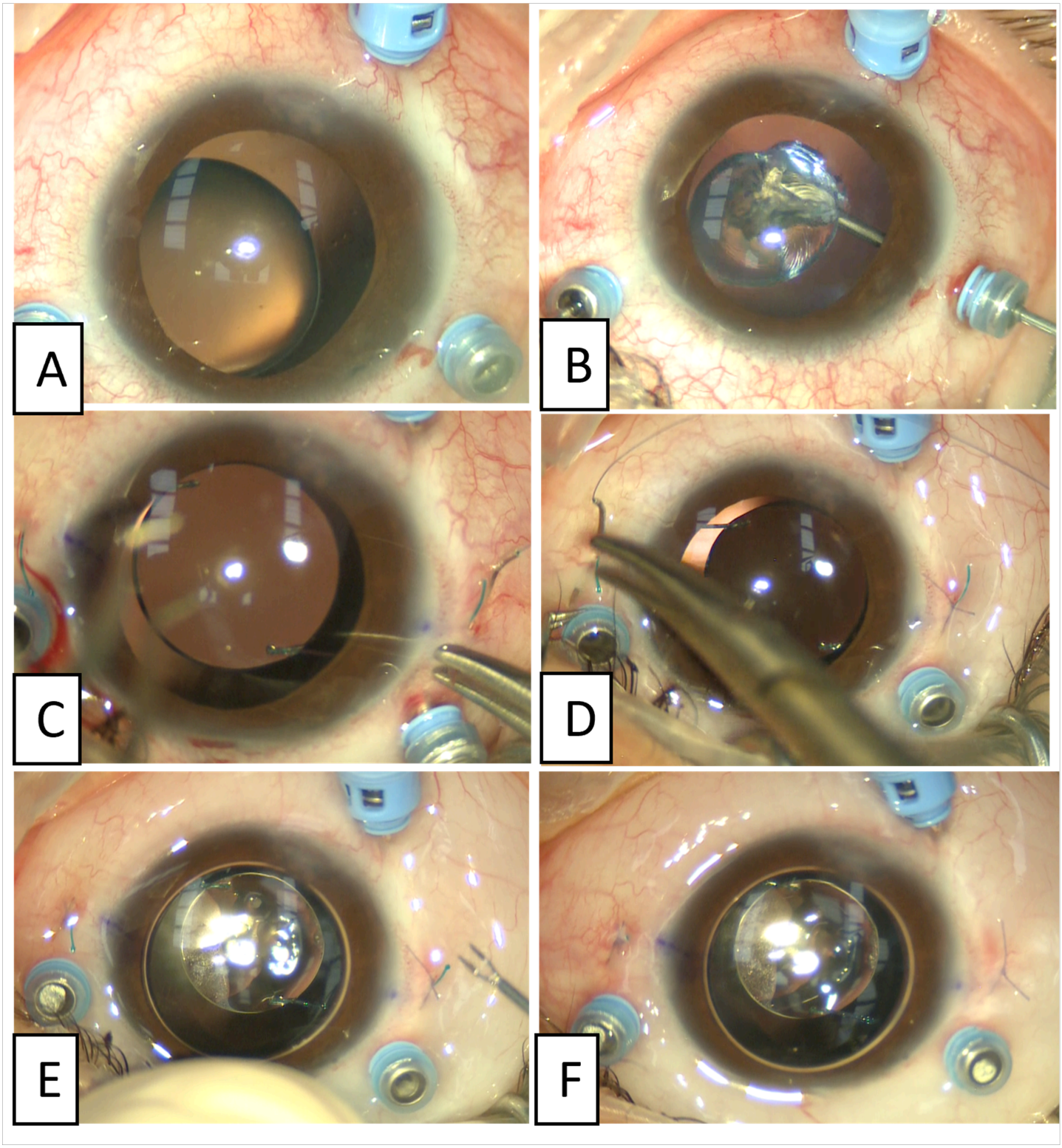


Figure 2

Management of ectopia lentis in a pediatric patient with Marfan syndrome using modified posterior-approach intrascleral fixation. (A) Peroperative view of a subluxated crystalline lens. (B) Pars plana lensectomy performed using a vitreous cutter. (C-D) Supplemental stabilization of the scleral tunnels using 8-0 Vicryl sutures to counteract pediatric scleral laxity and prevent haptic slippage. (E)

Confirmation of secure flange retention within the reinforced scleral tract. (F) Final anterior segment appearance showing a well-centered and stable IOL.

Supplementary Files

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- SupplementaryVideo98mb.mp4