Sutureless transconjunctival intrascleral intraocular lens fixation: the modified Yamane technique

Fixação de lente intraocular intraescleral transconjuntival sem sutura: técnica de Yamane modificada

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ABSTRACT | Purpose: To evaluate the efficacy and safety of the modified Yamane technique with sutureless transconjunctival intrascleral intraocular lens fixation. Methods: Sutureless transconjunctival intrascleral haptic fixed intraocular lens implantation was performed in patients with aphakia and dislocated intraocular lenses. A clear corneal incision (2.8 mm) was made into the temporal quadrant and a three-piece intraocular lens was implanted into the anterior chamber. The haptics of the intraocular lens were externalized with a 27 G needle via transconjunctival scleral tunnels at the 6 and 12 o'clock positions. The transconjunctival scleral tunnels were prepared to conform to the haptic position and curvature. The site of the scleral tunnels was 2mm from the limbus with a length of 2 mm in the sclera and was aimed at the end of the posterior chamber. The tips of the haptics were cauterized to create a terminal knob. The haptics were pushed back and the knobs were implanted into the scleral tunnels. Results: The study cohort included 21 patients with unilateral aphakia and dislocated intraocular lenses. All patients were examined postoperatively and at postoperative day 1, day 7, month 1, and month 3. All examinations revealed formation of the anterior chamber and well-centralized intraocular lenses. No haptic-related complications of exposure, foreign body sensation, or discomfort were observed. Conclusion: Sutureless transconjunctival intrascleral haptic fixed intraocular lens implantation is an effective, safe, and practical surgical alternative. This technique was superior to the Yamane method with regard to comfort and surgical duration. Further studies with longer follow-up evaluations are warranted to verify long-term complications.

Keywords: Aphakia; Intraocular lens implantation; Lens, intraocular; Sutureless surgical procedures/instrumentation; Ophthalmologic surgical procedures/methods

RESUMO | Objetivo: Avaliar a eficácia e a segurança da técnica de Yamane modificada com a fixação de lente intraocular transconjuntival sem sutura. Métodos: O implante de lente intraocular intrascleral e transconjuntival sem sutura foi realizado em pacientes com afasia e lentes intraoculares deslocadas. Uma incisão corneal clara (2,8 mm) foi feita no quadrante temporal e uma lente intraocular de três peças foi implantada na câmara anterior. Os hapticos da lente intraocular foram externalizados com uma agulha 27G através de túneis esclerais transconjuntivais nas posições de 6 e 12 horas. Os túneis esclerais transconjuntivais foram preparados para se ajustarem à posição e curvatura hapticas. O local dos túneis esclerais foi de 2 mm do limbo com um comprimento de 2 mm na esclera e foi destinado ao final da câmara posterior. As pontas dos hapticos foram cauterizadas para criar uma saliência terminal. Os hapticos foram empurrados para trás e as saliências foram implantadas nos túneis esclerais. Resultados: A coorte do estudo incluiu 21 pacientes com afasia unilateral e lentes intraocular deslocadas. Todos os pacientes foram examinados no pós-operatório e no dia 1, 7, 1 mês e 3 meses do pós-operatório. Todos os exames revelaram formação da uma câmara anterior e lentes intraoculares bem centralizadas. Nenhuma complicações hapticas relacionada à exposição, sensação de corpo estranho ou desconforto foram observadas. Conclusão: O implante de lente intraocular transconjuntival intrascleral sem sutura é uma alternativa cirúrgica eficaz, segura e prática. Esta técnica foi superior ao método de Yamane no que diz respeito ao conforto e duração cirúrgica. Mais estudos com avaliações de seguimento mais prolongados são necessários para verificar as complicações de longo prazo.

Descritores: Afasia; Implante de lente intraocular; Lentes intraoculares; Procedimentos cirúrgicos sem sutura/instrumentação; Procedimentos cirúrgicos oftalmológicos/métodos

INTRODUCTION

Aphakia is an undesirable complication of cataract surgery. There are several treatment approaches to
improve visual disturbances secondary to aphakia. Secondary intraocular lens (IOL) implantation methods in aphakic eyes without capsular support include IOL implantation into the anterior chamber (AC), iris-fixated IOL implantation, and scleral-fixated posterior chamber IOL implantation (SF-PC-IOL)(1-3). In aphakia rehabilitation, SF-PC-IOL implantation is preferred over other approaches. Since it reduces the iris contact with IOL, and prevents the cornea and iridocorneal angle damage due to distance, the risks of pupillary block, secondary glaucoma, and iritis are relatively low with SF-PC-IOL implantation, as compared to iris-fixated or IOL implantation into the AC(4-8). Despite these advantages, suture-related complications, such as suture rupture or erosion, may occur(9).

In 2008, Agarwal et al.(10) in their study described a sutureless intrascleral posterior chamber IOL fixation technique with the use of fibrin glue rather than sutures. The major disadvantages of this technique are wide sclerotomies and the risk of ocular hypotony due to sclerotomy closure using fibrin glue without suture augmentation. Yamane et al.(11) in their study reported that the intrascleral haptic-fixated IOL implantation technique with the use of fibrin glue rather than sutures significantly reduced the risk of complications.

Hence, the aim of the present study was to investigate the efficacy and safety of the modified Yamane technique with sutureless transconjunctival intrascleral intraocular lens fixation using a less invasive method.

METHODS

The records of patients who underwent the modified Yamane technique with sutureless transconjunctival intrascleral intraocular lens fixation at the Van Education Research Hospital of Health Sciences University (Van, Turkey) between February 2017 and October 2017 were retrospectively reviewed. Patients with aphakia and dislocated IOL were included in the study, while those who underwent vitreoretinal surgery and had a follow-up duration of less than three months were excluded from analysis.

The best corrected visual acuity (BCVA) of the patients was measured with Snellen charts prior to surgery. Goldmann applanation tonometry was used to measure intraocular pressure (IOP). A detailed anterior segment and fundus examination was performed. Prior to surgery, keratometric measurements of the patients were taken and the Sanders-Retzlaff-Kraff/Theoretical formula was used to calculate the power of the posterior chamber IOL aiming for emmetropia. The Eyecryl Plus three-piece, foldable, acrylic IOL (TP6130; Biotech Vision Care Pvt., Ltd., Ahmedabad, Gujarat, India) was used for implantation.

Before surgery, 0.5% proparacaine (0.5% Alcaine; Alcon, Istanbul, Turkey) was instilled to provide topical anesthesia. Lidocaine (4 cc, 20 mg/mL; Jetokain, Adeka, Turkey) was injected retrobulbarly with insufficient orientation to topical anesthesia. A 2.8-mm clear corneal incision was made into the temporal quadrant. A coaxial anterior vitrectomy was performed in cases with vitreous in the AC. Then, 1.4% sodium hyaluronate (Proectaton; VSY Biotechnology, Istanbul, Turkey) was injected into the AC. A three-piece IOL was implanted into the AC with the use of an injector system, while the trailing haptic was kept outside the AC.

Firstly, a transconjunctival scleral tunnel was prepared with a 27-gauge insulin needle at the 12 o’clock position. The first haptic was pushed into the lumen of the insulin needle with utrata forceps and the first haptic was externalized with an insulin needle. The forceps were entered into the AC through the main incision. A terminal knob was formed by cautering the haptic with a battery-operated thermal cautery unit. The created knob was pushed and fixed into the scleral tunnel. The same procedure was followed for the second haptic at the 6 o’clock position.

Transconjunctival scleral tunnels were prepared to conform to the haptic position and curvature. The site of the scleral tunnels was 2 mm from the limbus, with a length of 2 mm in the sclera, aimed at the end of the posterior chamber. After implantation of the IOL, the corneal incision was hydrated with balanced salt solution following intracameral viscoelastic removal (Figure 1).

Postoperatively, 1% prednisolone acetate eye drops (1% Pred Forte; Allergan, Istanbul, Turkey) were applied every hour for the first two days, which was then tapered and stopped at postoperative week four. Topical 0.5% moxifloxacin (0.5% Vigamox, Alcon, Turkey) was applied every 4h for 10 days. Follow-up examinations included BCVA, IOP measurement, and evaluation of the anterior and posterior segments on postoperative day 1, week 1, month 1, and month 3.

IBM SPSS Statistics for Windows, version 23.0, software (IBM Corporation, Armonk, NY, USA) was used for statistical analysis. Parameters, including the BCVA and IOP both before and after surgery, were compared using the paired samples t-test. A probability (p) value of <0.05 was considered statistically significant.
RESULTS

Of the 21 patients included in this study, 12 were male (57.14%) and nine were female (42.86%) with a mean age of 70.20 ± 9.50 (range, 59-97) years. The mean axial length of the eyes of the patients was 22.02 ± 1.05 (range, 20.12-24.03) mm. Anterior vitrectomy with IOL implantation was performed for seven patients and two patients with dislocated IOL (foldable one piece IOL) underwent anterior vitrectomy with IOL exchange.

The BCVA before and at postoperative month 3 was 0.21 ± 0.88 and 0.09 ± 0.85 logMAR, respectively. Visual recovery was statistically significant and none of the eyes had deterioration in visual acuity (p=0.001). There was no significant difference in mean IOP measurements before surgery and at postoperative month 3 (14.13 ± 2.61 [range, 10-18] mmHg vs. 13.53 ± 2.90 [range, 9-19] mmHg, respectively; p=0.12). Comparisons of the BCVA and IOP before and three months after surgery are presented in table 1.

DISCUSSION

Various methods have been used for IOL implantation into the posterior chamber with scleral fixation. Suture exposure and associated late endophthalmitis are the most important late-stage complications of trans scleral IOL suture fixation. To prevent these complications, the knobs are buried under the scleral flap (12). The most commonly preferred surgical method is to form a scleral flap after conjunctival dissection and to close it by suturing the knob under the flap, thereby preventing complications related to scleral suture exposure. However, Solomone et al. (13) in their study reported that long-term suture erosion occurs in 73% of patients even if a scleral flap is made and they concluded that this method does not prevent, but rather delays, the onset of suture erosion. Although the long-term outcomes of intrascleral IOL fixation without sutures remain unknown, this procedure has gained popularity due to some advantages over other methods (10-11). In the present study, the results of anew intrascleral IOL fixation method without the use of fibrin glue or suture are discussed.

The method used in the present study is a modified version of a procedure described in the study by Yamane et al. (11) as “flanged intrascleral intraocular lens fixation with double-needle technique,” which included a series of 100 patients. Our method has some advantages over the method described in the study by Yamane et al. in terms of applicability and practicality (Table 2). In this

Table 1. Comparison of preoperative and 3-month postoperative BCVA and IOP parameters.

<table>
<thead>
<tr>
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<th>Preoperative</th>
<th>Postoperative</th>
<th>p</th>
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<tbody>
<tr>
<td>BCVA (logMAR)</td>
<td>0.21 ± 0.88</td>
<td>0.09 ± 0.85</td>
<td>0.001</td>
</tr>
<tr>
<td>IOP (mmHg)</td>
<td>14.13 ± 2.61</td>
<td>13.53 ± 2.90</td>
<td>0.12</td>
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BCVA= best corrected visual acuity; IOP= Intraocular pressure.
Sutureless transconjunctival intrascleral intraocular lens fixation: the modified Yamane technique

Table 2. Advantages of our modified technique over the method described in the study by Yamane et al. in terms of applicability and practicality

<table>
<thead>
<tr>
<th>Yamane et al.</th>
<th>Our study</th>
<th>Advantages of our modified technique</th>
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<tbody>
<tr>
<td>30-gauge thin-walled needle</td>
<td>27-gauge needle</td>
<td>Freely available and appropriate for every 3-piece IOL</td>
</tr>
<tr>
<td>Nasal and temporal quadrants for sclerotomy</td>
<td>6 and 12 o’clock positions for sclerotomy</td>
<td>Haptic-related complications of exposure, conjunctival scar formation, discomfort are minimized</td>
</tr>
<tr>
<td>Double needle</td>
<td>Single needle</td>
<td>The possibility of the first haptic emerging from the needle lumen due to the IOL position and manipulation during the entry of the second haptic into the needle lumen is eliminated</td>
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<tr>
<td>More corneal ports are needed</td>
<td>Single corneal port is used</td>
<td>Less invasive method</td>
</tr>
<tr>
<td>Angled sclerotomy</td>
<td>Sclerotomy with 2 mm scleral tunnel</td>
<td>Postoperative complications such as IOL tilt, decentralization and iris capture were not observed in the early period</td>
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In the early period and peripheral iridotomy was not required.

Similar studies\(^{10,11,14,15}\) have reported various complications, such as IOP elevation, hyphema, vitreous hemorrhage, IOL decentralization, and cystoid macular edema. However, in our study, only one case of cystoid macular edema was observed during the follow-up period. Limitations to this study included a relatively low number of patients and a short follow-up period, which may have assisted in reducing the complication rate.

The modified Yamane technique with sutureless transconjunctival intrascleral intraocular lens fixation is an effective, safe, and practical method with some advantages over the method described by Yamane et al. in terms of applicability and practicality. It is also a less invasive method that does not require the creation of conjunctival and scleral flaps or pockets, although fibrin glue or sutures are needed.

The duration of the surgery is relatively short and is quite comfortable to the patient and physician. In addition, postoperative recovery is rather short. However, patients should be followed-up for a longer period due to possible late-term complications.

REFERENCES


