Int Ophthalmol (2019) 39:2077–2081
https://doi.org/10.1007/s10792-018-1047-3

ORIGINAL PAPER

A practical and easy surgical technique for recovery of an incarcerated haptic

Yusuf Koçluk · Emine Alyamaç Sukgen · Burcu Kasım · Oğuzhan Saygılı

Received: 22 May 2018 / Accepted: 12 November 2018 / Published online: 22 November 2018

Abstract
Purpose To present a surgical intervention for a posterior haptic trapped between the cartridge and plunger during intraocular lens (IOL) implantation.
Materials and methods Posterior haptic incarceration was detected in 36 cases during implantation of a one-piece foldable IOL during cataract surgery with phacoemulsification. In 11 of the patients (Group 1), recovery was achieved by forcibly pulling out the incarcerated posterior haptic. In 25 cases (Group 2), the haptic was recovered by using an MVR knife to cut the cartridge tip from the bottom up parallel to the trapped haptic.
Results In Group 1, tears were seen on the incarcerated haptic in all cases (100%). In Group 2, the procedure was successful in all 25 cases and there was no accidental cutting of the haptic. In all cases, the surgeries were completed with the recovered IOL in Group 2.
Conclusions Posterior haptic incarceration in cataract surgery can be solved by the simple and easy method of cutting the cartridge tip from the bottom upwards and releasing the haptic.

Keywords One-piece intraocular lens · Foldable intraocular lens · Injector system · Cartridge · Incarcerated posterior haptic · Cataract surgery

Introduction

The use of an injector system has become standard procedure for intraocular lens (IOL) insertion, and various injector systems have been designed for cataract surgery with phacoemulsification [1]. As cataract surgeons may encounter minor complications on IOL optics and haptics during implantation via an injector system, some major problems may also be seen. There have been several reports of damage occurring to IOLs while using injector systems, including marks or scratches, stress fractures, cracks and tear lines [2–5]. In some cases, the occurrence of a major problem may prevent implantation of the IOL into the eye.

These injector systems usually consist of an injector and a cartridge [6]. First, the foldable IOL to be implanted is placed into the cartridge. Subsequently, in the injector system, the plunger pushes the folded

Electronic supplementary material The online version of this article (https://doi.org/10.1007/s10792-018-1047-3) contains supplementary material, which is available to authorized users.

Y. Koçluk · E. Alyamaç Sukgen · B. Kasım (✉)
Department of Ophthalmology, Adana Numune Training and Research Hospital, 01220 Yüreğir, Adana, Turkey
e-mail: burcukasim@gmail.com

O. Saygılı
Department of Ophthalmology, Gaziantep University School of Medicine, Gaziantep, Turkey

optic through the cartridge and the IOL is implanted into the eye through a small corneoscleral incision. In some cases, the IOL optics or haptics can be seen to jam and tear in the cartridge, but this may vary according to the production technology of the injector system. In practice, it is not uncommon for the posterior haptic to be trapped between the plunger and the cartridge, although there have not been many reports of this complication. In such a case, it is necessary to recover the incarcerated haptic. However, forceful withdrawal may cause tearing which could possibly prevent implantation of the IOL into the eye.

This current study aimed to present a practical and easy surgical intervention for a posterior haptic trapped between the cartridge and plunger during IOL implantation in the course of cataract surgery.

Materials and methods

This retrospective clinical study was conducted in the ophthalmology clinic of a tertiary care center between January 2014 and April 2017. The records of patients underwent cataract surgery with phacoemulsification were examined. Throughout this period, of the 1420 phacoemulsification surgeries done by the same surgeon (YK), the complication of posterior haptic incarceration during one-piece foldable IOL implantation was detected in 36 cases. In 11 (30.6%) of the 36 (Group 1) cases, force was used to pull out the incarcerated posterior haptic in order to achieve recovery. In 25 (69.4%) cases (Group 2), the haptic was recovered by a different technique which involved using an MVR knife to cut the cartridge tip from the bottom up parallel to the trapped haptic in order to recover the haptic undamaged. Informed consent was procured from all patients for the surgeries, and the approval of the hospital Ethics Committee was obtained. We attest that we have obtained appropriate permissions and paid any required fees for use of copyright protected materials.

Surgical cases with IOL complications other than haptic incarceration were excluded from the study. In addition, cases involving complications other than those of single-piece foldable IOL implantation were also excluded.

Surgical technique

Surgery was performed by the same experienced surgeon (YK) using topical or general anesthesia. In all cases, standard phacoemulsification procedures were performed prior to the IOL implantation via a 2.8 mm self-sealing clear cornealimbal incision at 12 o'clock, between those at 9 and 2 o'clock for paracentesis. Phacoemulsification (Alcon Infiniti vision system) was performed with the "stop and chop" technique defined by Koch et al. [7], and a foldable IOL was inserted in the capsular bag. Three different IOLs were used in this study (Ocuva Aspheric Hydrophilic Acrylic, Vsy Biotechnology, The Netherlands; Optima Aspheric Hydrophilic Acrylic, Med'c, India; Sensar AAB00 Hydrophobic Acrylic, AMO, USA). Either the AcriJet injector and cartridge system (Vsy Biotechnology, The Netherlands) or the Optima injector and cartridge system was used for the implantation of the hydrophilic IOLs. The Sensar One series ultra DK7786 injector and cartridge system (Abbott Medical Optics, USA) was used for the implantation of the hydrophobic IOLs.

Almost all of the insertion of the IOL into the cartridge was performed by an experienced surgical nurse, except when an inexperienced nurse was attended to the surgery, where this process was done by the surgeon himself (YK). For insertion, an ophthalmic viscoelastic device (sodium hyaluronate 1.4%) was applied to the tip point and to both sides of the inner portion of the injector cartridge. The IOLs were loaded according to the company's instructions for use. The posterior haptic was folded carefully onto the optic. Using gentle pressure on the inserter plunger, the IOLs were injected into the eye. A new, unused injector and cartridge system was used for each case.

Techniques for the recovery of the haptic

It was determined that the posterior haptic of the IOL was trapped between the cartridge and the plunger in the 36 cases included in the study. In all cases, the anterior haptic and optic were positioned in the anterior capsule, while all or a significant portion of the posterior haptic was trapped outside the eye. Two techniques were used to recover the haptic.

In the first technique, the haptic was forcibly pulled out using a forceps (Group 1). In the event of a haptic

tear, the optic part in the anterior capsule was excised with the aid of suitable micro-scissors and a new IOL was implanted.

For the second technique, Fig. 1 presents the steps employed in 26 cases (Group 2), demonstrating the recovery of an incarcerated posterior haptic encountered during hydrophilic IOL implantation. Upon seeing that the posterior haptic was trapped, the plunger was not released, and the injector system was kept compressed. The cartridge tip was removed from the cornealimbal incision. With the other hand, using an MVR knife, the tip of the cartridge was cut vertically from bottom to top parallel to the trapped haptic. At this stage, care was taken not to cut the haptic. The opening up of the cartridge tip was seen to automatically release the haptic. Implantation was then performed by intraocular insertion of the IOL into the capsule with the posterior haptic intact.

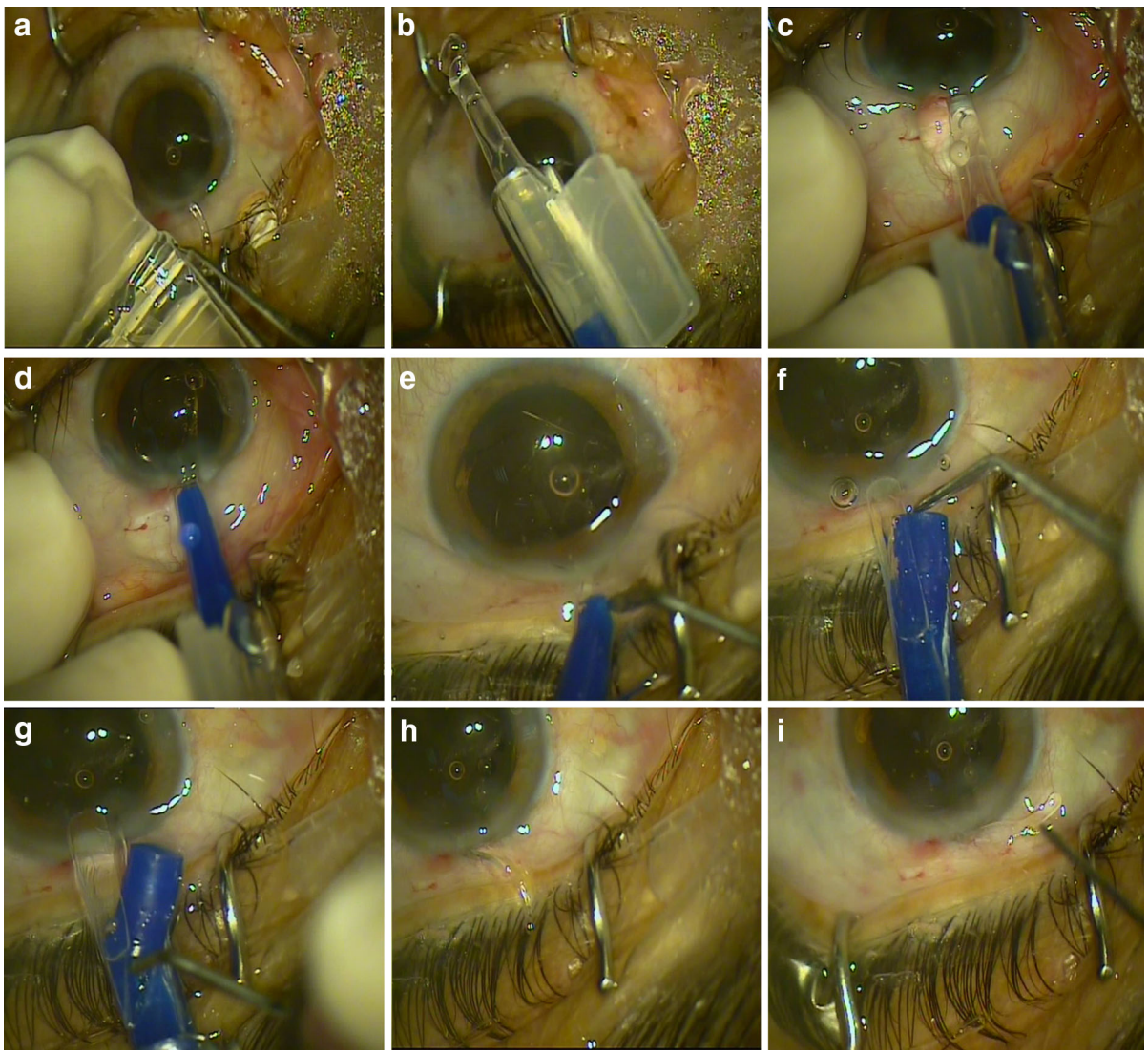

Fig. 1 Surgical technique for incarcerated posterior haptic of a hydrophilic intraocular lens (IOL): **a** insertion of IOL into the cartridge; **b** view of the folded IOL in the cartridge when the injector plunger is pushed; **c** injection of the IOL into the eye; **d** trapping of the posterior haptic between the injector cartridge and plunger, with IOL optic in the anterior capsule; **e** cutting of the cartridge from bottom to top using an MVR knife with care not to cut the haptic; **f** release of the trapped haptic; **g** recovery of the haptic; **h**, **i** intact and undamaged posterior haptic

Statistical analysis

Data analysis was performed using the Statistical Package for Social Sciences for Windows software (SPSS version 16.0, SPSS Inc., Chicago, USA). The normality distribution of the variables was tested. The descriptive statistics of the normally distributed continuous variables were expressed as mean ± standard deviation. The normally distributed variables were compared between the groups, using a Student's *t* test. Categorical variables were presented as frequency (%) and compared between the groups using the Chi-square test or Fisher's exact test. Differences with a p value of < 0.05 were considered statistically significant.

Results

The present study included 36 eyes of 36 patients who underwent cataract surgery with the complication of haptic incarceration with a rate of 2.5% (36/1420) in 3 years. The mean age of the cases was 63.18 ± 8.96 years in Group 1 and 66.0 ± 12.86 years in Group 2 ($p = 0.709$). The groups were similar regarding laterality ($p = 0.936$).

In Group 1, 5 (45.5%) of the inserted IOLs were Optima Hydrophilic Acrylic and 6 (54.5%) were Ocuva Hydrophilic Acrylic. In Group 2, 10 (40.0%) of the inserted IOLs were Optima Hydrophilic Acrylic, 8 (32.0%) were Ocuva Hydrophilic Acrylic, and 7 (28.0%) were Sensar Hydrophobic Acrylic. The groups were not statistically different regarding the IOL materials used ($p = 0.127$). The power of the IOLs ranged between 16 and 23 diopters, and no statistical difference was found between the groups ($p = 0.627$).

In Group 1, with the forcefully applied pulling operation, tears in the trapped part of the posterior haptic were seen in all cases (100%). The amount of tearing varied depending on the trapped part of the haptic. In one case (9.09%), tearing in only 1/3 of the end portion was observed, and the IOL implantation procedure was continued. However, in this case, postoperative IOL subluxation was noted along with complaints of glare in the dark. Therefore, IOL exchange was carried out in the first week postoperatively. In the other 10 cases, the optic and anterior haptic were explanted from the anterior capsule and a new IOL implanted.

In Group 2, as in the described method, the haptic was recovered by cutting the tip of the cartridge vertically in an upward direction. In all 25 cases, the procedure was successful. No tears or accidental cutting occurred in the haptic in any of the cases. The surgery was completed with the implantation of the same IOL. In all cases of Group 2, IOL centralization in the capsular bag was achieved and no postoperative complications were seen at follow ups. When compared with Group 1 cases, the difference in the success achieved in Group 2 was statistically significant ($p < 0.001$).

One of the intraocular lens brands (Ocuva) was newly experienced at this period of time. Even though a higher rate of complication was seen in this brand, that difference was not statistically significant ($p = 0.127$).

Discussion

Foldable IOL implantation is an important step in cataract surgery with phacoemulsification. A smooth IOL implantation will increase the success of the surgery, while problems encountered during IOL implantation will influence visual acuity. Explantation of the IOL followed by exchange surgery may be needed in the early or late postoperative period [8–10].

There have been numerous reports of late IOL explantation and exchange after cataract surgery [8–10]. However, there is an insufficient number of articles and papers about IOL exchange and intraoperative implantation problems.

By using the IOL placement techniques presented by the manufacturers for their own IOL cartridge and injector systems, possible complications can be reduced. Different lens brands were used in the present study. The IOL was placed in the cartridge and injected into the eye following the manufacturer's recommendations. Nevertheless, posterior haptic incarceration due to initial placement errors and undesirable maneuvers like releasing and re-pressing the plunger during injection were seen in cases in the present study. In Group 2, with the presented technique, recovery of the incarcerated haptic was successful in all cases.

A Descemet's membrane tear due to defects in the injector and cartridge was mentioned in one study, where it was reported that while removing the injector system, the anteriorly bevelled end of the cartridge broke away from the tip [11]. Damage to IOLs including marks or scratches, stress fractures, cracks and tear lines can result from their passage through various injector systems [2, 12]. In this study, no other complications were detected other than posterior haptic incarceration.

There are few reports dealing with incarcerated haptics and ways to manage them during IOL implantation. The lack of coverage of this complication should not mean that it is rarely encountered. The complication of haptic incarceration may become increasingly more apparent, especially as new IOL brands and injector systems are introduced. Complications related to technical problems may increase during the familiarization and learning period of a new material or device. The use of three different lens materials, one being newly experienced, during the period of the present study may explain why this complication was seen slightly more often. At the same time, the risk of complications can also increase when the placement of the IOL into the cartridge is not carried out under a microscope.

Even if posterior haptic incarceration is rare, recovery of the haptic is important because endothelial cells can be damaged during an IOL exchange. With the easy and simple method presented in this study, trapped haptics can be recovered and the surgery can be completed successfully using the same IOL. In this study, the problems that caused the haptic incarcerations could not be fully clarified and failure to observe possible damage to the endothelial cells during the intervention was a further limitation.

In conclusion, in cataract surgery, for various reasons, posterior haptic incarceration may be observed during IOL implantation. This complication can be corrected by the simple and easy method of cutting the cartridge tip vertically from the bottom upwards. Thus, the cost of a new lens is saved and the possibility of corneal endothelial damage during an IOL exchange is avoided.

Funding This research did not receive any specific grant from funding agencies in the public, commercial or not-for-profit sectors.

Compliance with ethical standards

Conflict of interest Yusuf Koçluk, Emine Alyamaç Sukgen, Burcu Kasım and Oğuzhan Saygılı declare that they have no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the study.

References

1. Ouchi M (2012) Effect of intraocular lens insertion speed on surgical wound structure. J Cataract Refract Surg 38:1771–1776
2. Milazzo S, Turut P, Blin H (1996) Alterations to the AcrySof intraocular lens during folding. J Cataract Refract Surg 22:1351–1354
3. Vrabec MP, Syverud JC, Burgess CJ (1996) Forceps-induced scratching of a foldable acrylic intraocular lens [letter]. Arch Ophthalmol 114:777
4. Pfister DR (1995) Stress fractures after folding an acrylic intraocular lens. Am J Ophthalmol 121:572–574
5. Carlson KH, Johnson DW (1995) Cracking of acrylic intraocular lenses during capsular bag insertion. Ophthalmic Surg Lasers 26:572–573
6. Kleinmann G, Apple DJ (2007) Evaluation of a new soft tipped injector for the implantation of foldable intraocular lenses. Br J Ophthalmol 9:1070–1072
7. Koch PS, Katzen LE (1994) Stop and chop phacoemulsification. J Cataract Refract Surg 20:566–570
8. Chai F, Ma B, Yang XG, Li J, Chu MF (2017) A pilot study of intraocular lens explantation in 69 eyes in Chinese patients. Int J Ophthalmol 10:579
9. Oltulu R, Erşan İ, Şatırtav G, Donbaloglu M, Kerimoğlu H, Özkağnıcı A (2015) Intraocular lens explantation or exchange: indications, postoperative interventions, and outcomes. Arq Bras Oftalmol 78:154–157
10. Fernández-Buenaga R, Alio JL, Pérez-Ardoy AL, Larrosa-Quesada A, Pinilla-Cortés L, Barraquer R, Alio JL 2nd, Muñoz-Negrete FJ (2013) Late in-the-bag intraocular lens dislocation requiring explantation: risk factors and outcomes. Eye 27:795–802
11. Biswas P, Sengupta S, Paul A, Kochgaway L, Biswas S (2012) Descemet's tear due to injector cartridge tip deformity. Indian J Ophthalmol 60:218–220
12. Kohnen T, Magdowski G, Koch DD (1996) Scanning electron microscopic analysis of foldable acrylic and hydrogel intraocular lenses. J Cataract Refract Surg 22:1342–1350