



## Dislocation of implantable collamer lens following blunt trauma

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### ABSTRACT

**Purpose:** to present the signs, symptoms and management of two cases of traumatic dislocation of implantable collamer lens (ICL) after direct blunt trauma.

**Observations:** at presentation, we noted diffuse conjunctival hyperemia, and clear cornea in the right eye of the first patient. The anterior chamber showed +2 pigmented cells, a distorted, nasally peaked pupil with one-foot plate in front of the iris. The second case had a dislocation of the inferonasal footplate into the anterior chamber without endothelial touch.

**Conclusions and importance:** Dislocation of an implantable collamer lens (ICL) is rare but carries the risk of long-term complications, particularly after trauma. Ophthalmologists should identify dislocation and timely intervention can mitigate the risk of complications.

ICL dislocation can be vision threatening. Ophthalmologists should identify dislocation and timely intervention can mitigate the risk of complications.

### 1. Introduction

The implantable collamer lens (ICL, Staar Surgical AG, Nidau, Switzerland) is a widely used for moderate-to-high ametropia, especially for patients who do not want corneal refractive procedures or those with contraindications for corneal refractive surgery.<sup>1</sup> Over time, the ICL has undergone several design iterations and is a stable and promising alternative for these patients. The ICL is rectangular with flat plate haptics and single-piece design. This architecture allows the lens to maintain a stable, well-centered position in the posterior chamber.<sup>2</sup>

The hydrophilic material of the ICL is soft, flexible and biocompatible.<sup>3</sup> In high myopia, ICL can achieve refractive correction up to -21.0D and its implantation is potentially reversible.<sup>4</sup> In addition, ICL has shown excellent long term outcomes of visual quality, predictability, and effectiveness to correct moderate to moderate-to-high ametropia.<sup>1,5</sup> The earlier V4 ICL model was associated with some complications, including intraocular pressure elevation (due to pupillary block) and cataract formation. However, complications rarely occur after implantation of the more current V4c and V5 models.<sup>6</sup> Therefore, the volume of ICL surgery is progressively increasing. Moshirfar and colleagues noted that ICL dislocation is a rare but carries long-term complications, particularly after trauma.<sup>4,5</sup> However, very few case reports have described the effects of ocular blunt trauma on eyes with ICLs. We

present the signs, symptoms and management of two cases of late onset traumatic dislocation of ICL after direct blunt trauma to the eye.

### 2. Findings

#### 2.1. Case #1

On March 25th, 2021, a 27-year old medically healthy male presented to the Emergency Room of King Khaled Eye Specialist Hospital, Riyadh, Saudi Arabia, complaining of pain in the right eye, associated with photophobia and decreased vision, after receiving blunt ocular trauma from a fist three days earlier. Five years prior to presentation the patient had undergone bilateral ICL implantation for high myopia. The remainder of his ocular history was unremarkable.

Upon examination, the best-corrected visual acuity (BCVA) was 20/30 in both eyes. Intraocular pressure (IOP) was within normal limits bilaterally. Slit lamp examination of the right eye revealed diffuse conjunctival hyperemia, and a clear cornea. The anterior chamber showed +2 pigmented cells, distorted pupil that peaked nasally with one foot plate in front of the iris, no corneal touch, and a clear lens (Fig. 1a, b). Fundus examination was unremarkable. Ophthalmic examination of the left eye was unremarkable. Prior to the trauma his BCVA was 20/25 in the right eye.

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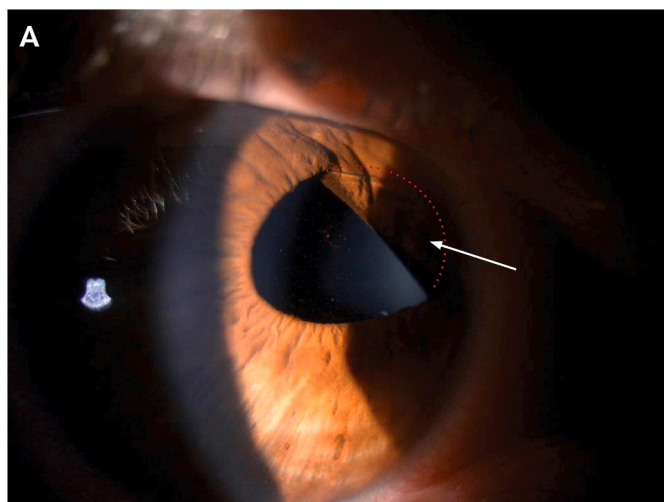
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**Fig. 1A.** Superior nasal footplate dislocated to the anterior chamber (arrow) and was a nasally peaked pupil.

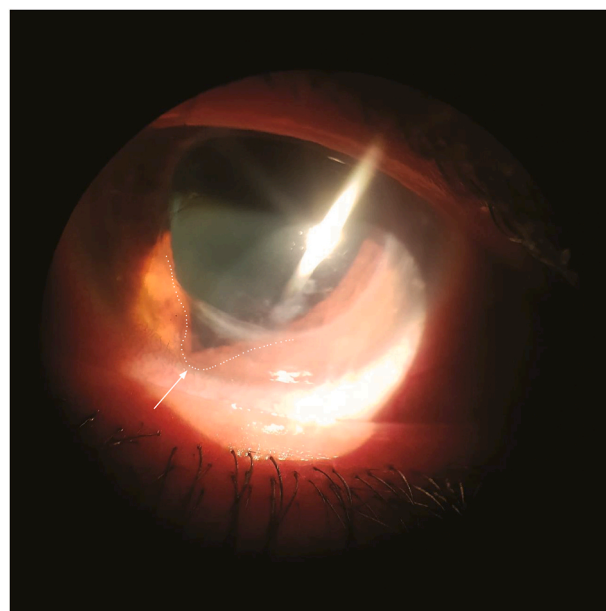
The patient agreed to surgical management. In the operating room, the corneal axis was manually marked with gentian violet at the slit lamp and the ICL was repositioned. On the first postoperative day, the visual acuity was 20/60 and IOP was 12 mmHg in the right eye. Postoperatively, the patient was prescribed topical antibiotics for one week and topical steroids on a tapered schedule over one month. Two Three weeks later, the visual acuity was 20/40 BCVA was 20/25.

**2.2. Case #2**

On May 1st 2018, a 29-year-old male presented to the Emergency Department at King Khaled Eye Specialist Hospital, Riyadh, Saudi Arabia, complaining of mild, painless blurring of vision in the left eye after sustaining blunt trauma from a football to the left side of his head 3 days before presentation.

Seven years before presentation, the patient had undergone unilateral ICL implantation in the left eye to correct myopic astigmatism after undergoing penetrating keratoplasty for keratoconus. Since then and prior to this emergency visit, he has been on regular follow-up and the graft remained clear with a stable ICL in position with BCVA of 20/25.

On examination, the BCVA of 20/30 in the left eye and IOP was within normal limits. The graft was sutureless and clear. The inferonasal footplate of ICL was dislocated into the anterior chamber without endothelial touch (Fig. 2). No secondary cataract or other complications were observed on slit lamp examination. Additionally, the graft was clear with a formed anterior chamber and round-shaped pupillary margin. Fundus examination was normal for the left eye. Ophthalmic examination of the right eye was unremarkable. The blurred vision was due to a shifted ICL axis secondary to the ICL dislocation.

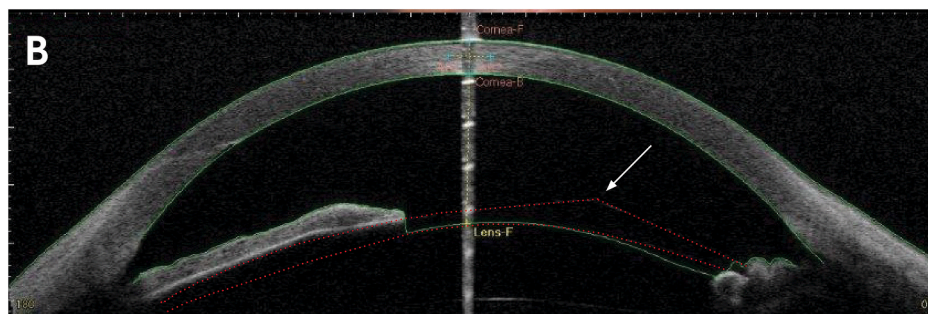


**Fig. 2.** Inferonasal dislocation of the footplate of the implantable collamer lens into the anterior chamber with associated peaking of the pupil.

The patient agreed to undergo surgical management. ICL repositioning in the left eye was performed under topical anesthesia with pupillary dilation on the day after presentation. The corneal axis was marked at the slit lamp to correct alignment of the ICL during repositioning. On the first postoperative day, the visual acuity was 20/50 and the IOP was 13 mmHg in the left eye. The patient was prescribed topical steroids that were tapered over one month and topical antibiotics for one week. At the four weeks follow up visit, the BCVA was 20/25 and the changes in endothelial cell counts are clinically insignificant (Fig. 3a, b). At 4 years follow up his VA is 20/20, the cornea remains clear and patient is asymptomatic.

**3. Discussion**

ICLs are a type of posterior chamber phakic intraocular lenses (pIOL). These lenses provide a more cosmetically appealing alternative to anterior chamber (AC) because they are less visible externally. Additionally, ICLs mitigate the risk of endothelial cell loss (ECL) because they are implanted further away from the cornea. They are a safer alternative to refractive lens exchange, which carries a risk of retinal detachment and the loss of accommodation.<sup>2</sup> A number of different pIOLs were introduced into the market prior to the ICL. However high rates of complications of these early pIOLs designs precluded routine use and many have been discontinued. For example, the Chiron Adatom pIOL was rectangular with a silicone plate IOL that was eventually



**Fig. 1B.** Optical coherence tomography showing irregularity in the iris surface secondary to implantable collamer lens dislocation.

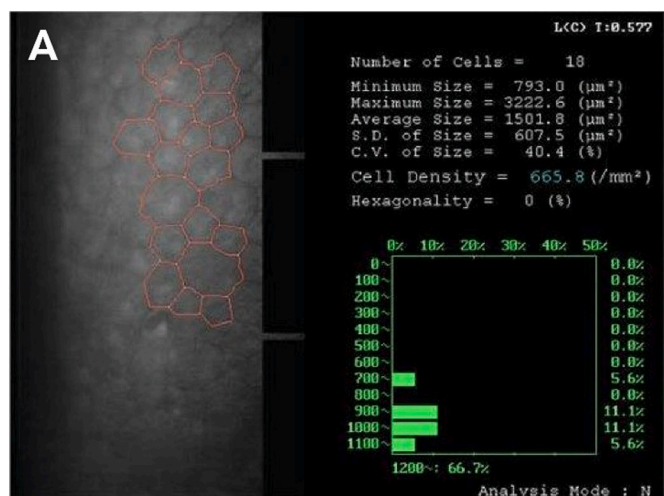


Fig. 3A. Specular microscopy at presentation.

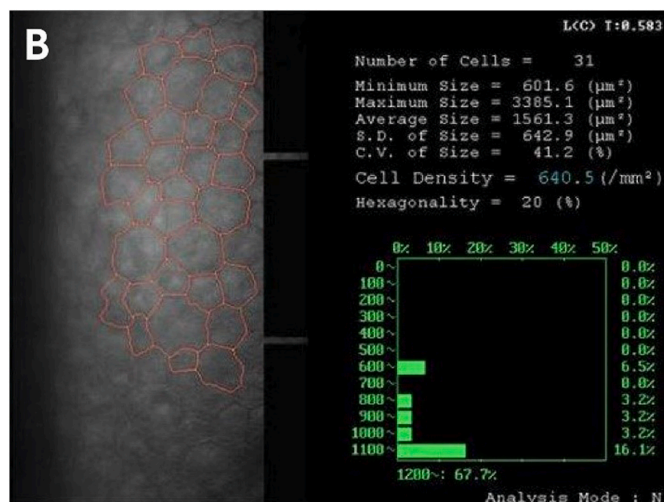


Fig. 3B. Specular microscopy 2 weeks after implantable collamer lens repositioning.

discontinued because of high rates of anterior chamber inflammation and cataracts.

The efficacy and predictability of the current pIOLs have been previously reported. Phakic IOLs are commonly used as an alternative to laser refractive surgery due to advantages such as leaving the cornea untouched; inducing fewer higher order aberrations, resulting in better optical and visual quality and it is a reversible procedure. Additionally, refractive corrections up to  $-21.0$  D are possible and accommodation is preserved. The ICL is an extremely thin intraocular lens with four plate haptics that is implanted in the ciliary sulcus. The ICL is the only marketed posterior chamber intraocular lens approved by the United States Food and Drug Administration.<sup>2</sup> ICL has undergone four iterations of design modification. The design allows the lens to maintain stable centered fixation in the posterior chamber.

ICL dislocation is quite rare, but it is a vision-threatening complication.<sup>5</sup> To the best of our knowledge, this is the first report in Saudi Arabia to document cases of ICL dislocation. Table 1 presents the small number of similar cases reported in the literature. In our two cases, ICL dislocation occurred as a result of sudden direct blunt trauma to the eyes. Visual disturbances were the main complaints in both cases. The first case complained of pain in his right eye, associated with photophobia and decreased vision after receiving a fist to his right eye, while

the second case complained of painless mild, blurry vision after a football hit his left eye.

A previous case report demonstrated ICL dislocation is quite rare, but it is a vision-threatening complication.<sup>5</sup> Kong et al. assumed that direct trauma to the head constitutes a key factor that causes ICL dislocation.<sup>3</sup> Others have posited that increased pupil diameter, especially at night, may be considered a predisposing risk factor facilitating traumatic dislocation.<sup>6</sup> However, this risk factor was not present in our cases as both occurred during daylight hours.

Both the patients in our report were males, aged 27 and 29 years old. Moshirfar et al. noted that young males are most vulnerable to ICL dislocation.<sup>4</sup> Our findings concur with this insight and three other studies that reported similar cases aged 26, 33, and 39 years.<sup>7-9</sup> In these studies, 2 of the 3 patients complained of blurry vision.<sup>7,8</sup> In one case the inferonasal footplate was dislocated, in another case the inferotemporal footplate was dislocated, and in the third the two temporal footplates were dislocated.<sup>8-10</sup>

In the current report, at presentation, we noted diffuse conjunctival hyperemia, and clear cornea in the right eye of the first patient. The anterior chamber showed  $+2$  pigmented cells, a distorted, nasally peaked pupil with one-foot plate in front of the iris. The second case had a dislocation of the inferonasal footplate into the anterior chamber without endothelial touch.

A thorough examination to recognize and diagnose ICL dislocation as early as possible can reduce the risk of complications, such as endothelial damage or corneal decompensation.<sup>5</sup> Timely intervention can address vision-threatening complications and reduce the risk of permanent vision loss. Patients with ICL should be educated about the need for examination after ocular trauma and aware of precaution during sport activities and emphasizes the importance of wearing eye protection.

Both our patients were managed surgically, with excellent outcomes. The first case underwent ICL repositioning and vision increased from 20/60 preoperatively to 20/40 at two weeks postoperatively. The second case also had uneventful repositioning of the dislocated ICL the day after presentation. Due to a history of keratoplasty in this patient, long-term follow up is warranted for signs of endothelial loss and dysfunction.

Previous literature indicates that ICL repositioning of the dislocated ICL within one week of presentation is common.<sup>7-9</sup> Most patients had good visual outcomes and no significant complications following ICL repositioning surgery.<sup>8</sup> Kong et al. emphasized that repositioning should be performed within a week, indicating the importance of early repositioning to achieve good outcomes.

#### 4. Conclusion

This report of two cases indicates that ICL dislocation is a rare, vision threatening complication. However, it can be readily addressed with timely intervention. Timely diagnosis and early management are key to successful outcomes. Long-term studies are needed to assess the stability and the possible cataract formation in patients with pIOLs with a history of blunt trauma.

#### 5. Authorship

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

#### 6. Patient consent

Written consent to publish potentially identifying information, such as details or the case and photographs, was obtained from the patients.

#### Statement of ethics

The study was approved by the Institutional Research Board (1918-



**Table 1**  
Comparison for the reported cases.

Cases	Age/eye	Trauma history	Initial Visual acuity	Description of dislocation	Associated finding	Treatment	Timing After implantation	Post op VA	Endothelial status
our 1st case <sup>a</sup>	27y/OD	Trauma by Fist	20/30	One foot plate of ICL displaced to the AC	Traumatic iritis	Repositioned	5 years	20/40	NA
our 2nd case <sup>a</sup>	29y/OS	Trauma by football	20/30	One foot plate of ICL displaced to the AC	None	Repositioned	7 years	20/20	Insignificant changes.
Espinosa-Matter 2012 <sup>(9)</sup>	39 y/OD	Non specified blunt trauma	20/60	One foot plate of the ICL displaced to the AC with endothelial touch	IOP 30	Repositioned	6 years	20/40	Significant decrease of the ECC, required DSAEK
Schmitz et al., 2012 <sup>(8)</sup>	26y/OS	Fist	20/30	Two foot plates of ICL displaced to AC.	None	Repositioned	6 months	20/20	NA
Kong et al., 2010 <sup>(3)</sup>	30y/OD	Occipital injury	20/200	One foot plate displaced to AC	None	Repositioned	4 months	20/20	NA
Song et al., 2005 <sup>(10)</sup>	33y/OS	Non specified blunt trauma	NA	Two foot plat of ICL displaced to AC.	Medial orbital wall fracture.	Repositioned	10 months	20/20	Normal
Kaufer et al., 2005 <sup>(11)</sup>	30y/OD	Spontaneous	CF	Two inferior foot plates subluxated to vitreous because of zonular dehiscence	zonular dehiscence	Explanted	5 years	NA	NA

<sup>a</sup> Current case report by Alsugayhi et al. OD right eye; OS left eye; NA not available; ICL implantable contact lens; AC anterior chamber; IOP intraocular pressure; ECC endothelial cell count; DSAEK Descemet's Stripping Automated Endothelial Keratoplasty.

CR) at King Khaled Eye Specialist Hospital. The tenets of the Declaration of Helsinki were followed at each step of the study. Written consent to publish potentially identifying information, such as details or the case and photographs, was obtained from the patients.

#### Data availability statement

All data generated or analyzed during this study are included in this published article.

#### Funding

No funding was received for this work.

#### Intellectual property

We confirm that we have given due consideration to the protection of intellectual property associated with this work and that there are no impediments to publication, including the timing of publication, with respect to intellectual property. In so doing we confirm that we have followed the regulations of our institutions concerning intellectual property.

#### Research ethics

We further confirm that any aspect of the work covered in this manuscript that has involved human patients has been conducted with the ethical approval of all relevant

Bodies and that such approvals are acknowledged within the manuscript.

IRB approval was obtained (required for studies and series of 3 or more cases).

Written consent to publish potentially identifying information, such as details or the case and photographs, was obtained from the patient(s) or their legal guardian(s).

#### Authorship

The International Committee of Medical Journal Editors (ICMJE) recommends that authorship be based on the following four criteria:

1. Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND
2. Drafting the work or revising it critically for important intellectual content; AND
3. Final approval of the version to be published; AND
4. Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

#### Declaration of competing interest

No conflict of interest exists.

#### Acknowledgement

This manuscript does not include any non-author contributors to acknowledge.

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