

Complete Anterior Dislocation of Capsular Tension Ring-Intraocular Lens Complex

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Abstract

Purpose: We report a rare case of complete anterior dislocation of the capsular tension ring (CTR)-intraocular lens (IOL) complex spontaneously.

Methods: Case report.

Results: The patient was initially treated conservatively because she was unwilling to receive operation. However, surgical treatment was eventually performed when the implant attached to her cornea and caused endothelial decompensation. From an outpatient department review several months later, it was found that her corneal edema and visual acuity improved.

Conclusion: The possibility of CTR-IOL anterior dislocation should be mentioned to the patient before mydriatic examination. Surgical options should be taken early especially once complications such as uveitis, glaucoma, macular edema and corneal endothelium decompensation happen.

Keywords Capsular tension ring; Intraocular lens; Anterior dislocation; Blunt injury; Endothelial decompensation

Abbreviations CTR: Capsular Tension Ring; IOL: Intraocular Lens; CDVA: Corrected Distance Visual Acuity; AC: Anterior Chamber; PMMA: Polymethylmethacrylate

Introduction

A capsular tension ring (CTR) is designed to be implanted into the capsular bag and to stabilize both the capsule and stress of zonules in cases of severe bag/lens instability during cataract surgery. CTRs work by imparting a centrifugal force to the equator of the capsular bag. This force is equalized throughout the entire zonular-capsular apparatus, thereby transmitting the tension from intact and normal zonules to those areas of zonule laxity or absence [1].

Intraocular lens (IOL) dislocation is an uncommon complication of cataract surgery with the incidence reported between 0.2% and 3% [2-5]. Dislocation of the CTR is even less seen in the literature. We present a rare case of traumatic anterior dislocation of CTR-IOL complex with eventual surgical treatment.

Materials and Methods

Case report

A 74-year-old female had retinal detachment in her left eye and became blind for many years. She received phacoemulsification and

IOL implantation in her right eye due to cataract 13 years ago. Zonular instability with phacodonesis was noted intraoperatively. Therefore, the CTR was inserted at the same time. Postoperative visual acuity (VA) showed 20/30 in the right eye without immediate complications and the patient was satisfied. Traced her history in detail, she claimed that she accidentally fell down and had a blunt injury of her right frontal horn region (but not in her right eye directly) on the same day as, and just after she finished, her routine annual eye examination of indirect ophthalmoscopy. Blurred vision was her complaint at the time of examination, with her corrected distance visual acuity (CDVA) being 20/50 in the right eye. Slit-lamp examination showed anterior dislocation of CTR-IOL complex in the anterior chamber.

Intraocular pressure was measured 11 mmHg and there was scant anterior chamber (AC) reaction. The patient was initially treated conservatively because she was unwilling to receive operation. Her visual acuity (VA) revealed relatively stable without immediate complications. After three times of outpatient department (OPD) reviews, the patient lost follow-up for a period of time. However, there was a progressive decline in her VA later. Corneal endothelial decompensation due to attachment of CTR-IOL complex was noted 8 months later at our OPD review (Figure 1). Her CDVA decreased to only hand movement.

She was admitted and received surgery for the removal of dislocated CTR-IOL complex with scleral fixation IOL implantation (Figure 2). Her corneal edema subsided and her CDVA improved to 20/100 six months after this surgery.

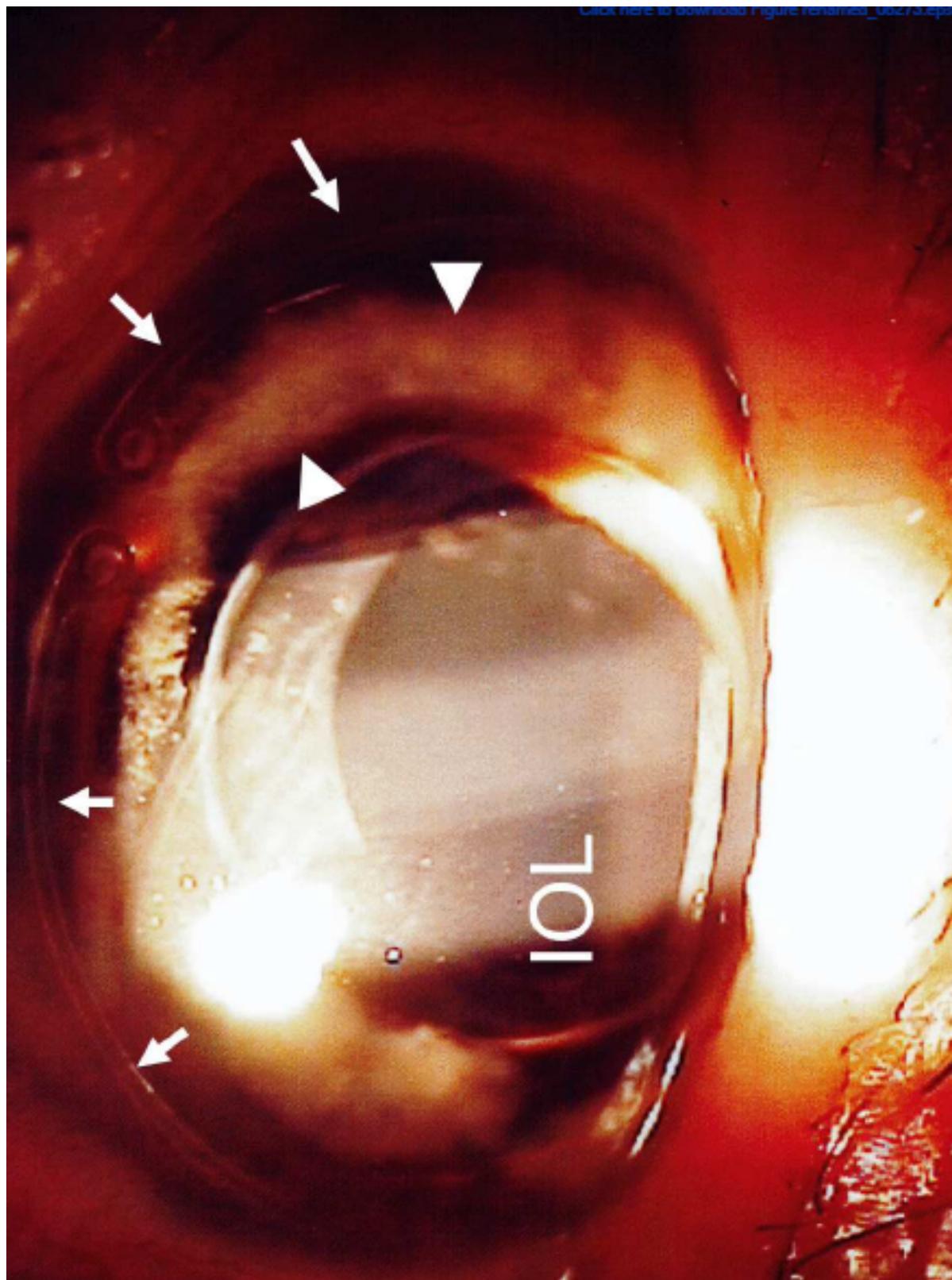


Figure 1: Anterior dislocation of CTR (arrow)-IOL complex with corneal endothelial attachment and decompensation (arrowhead).

Results and Discussion

The capsular tension ring is a closed silicone ring, called an “equator ring”, designed to maintain the circular contour of the capsular bag during cataract surgery, which was first described by Hara and coauthors in rabbits eyes in 1991 [6]. However, this design did not adapt to different capsular bag size. In 1993, Leger and Witschel introduced the first iteration of the modern open-ringed polymethylmethacrylate (PMMA) CTR and demonstrated its placement in a human eye during cataract surgery [7]. Nagamoto et al. subsequently showed that 12.5 mm PMMA ring could fit into the

capsular bag and provide adaptability for surgical maneuvers. Patients with weak, broken, or missing zonules, and bag/lens instability that was either suspected or observed during cataract extraction are indicated for CTR implantation. Pseudoexfoliation syndrome is by far the most common of these conditions. Nevertheless, this syndrome is quite rare in Asian population. Other conditions include uveitis, Marfan syndrome, homocystinuria, advanced or mature cataract, post-traumatic cataract, microspherophakia, iatrogenic or traumatic zonular laxity, retinitis pigmentosa, and eyes that have previously undergone vitrectomy or filtering surgery (Table 1) [8].

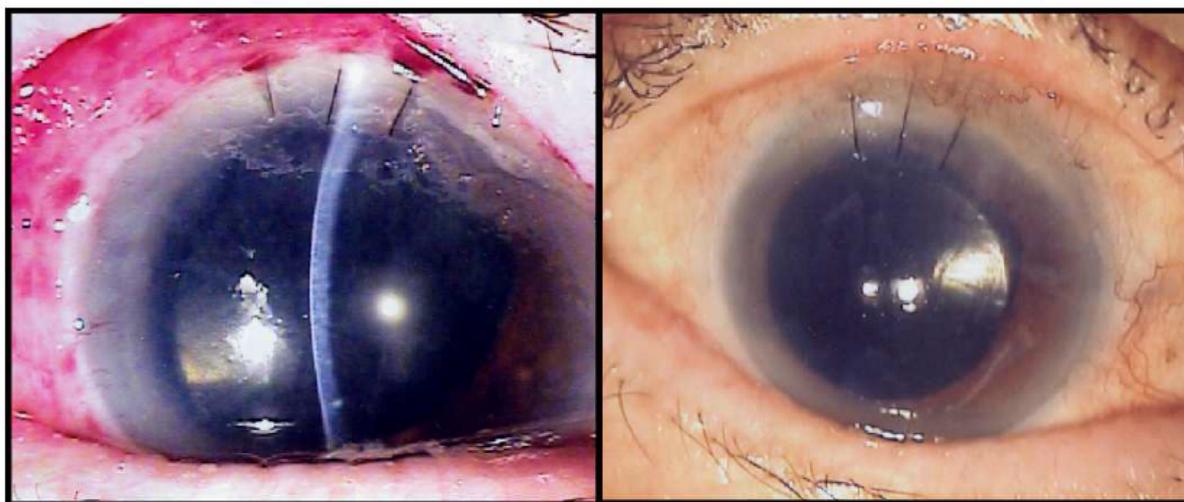


Figure 2: Slit-lamp photographs of the right eye. Left: Postoperative day 1. Her corneal edema was still noted but improved. Right: Two months after IOL repositioning with scleral fixation. The IOL was central in position and cornea became clear.

Zonular dehiscence	Traumatic
	Iatrogenic
Zonular weakness	Pseudoexfoliation syndrome
	Marfan syndrome
	Microspherophakia
	Idiopathic
Ectopic lens	Weill-Marchesani syndrome
Others	High myopia
	Uveitis
	Homocystinuria
	Advanced or mature cataract
	Retinitis pigmentosa
	Previous vitrectomy or filtering surgery

Table 1: Indications of capsular tension ring.

Because the CTRs are recent inventions within the last 3 decades and their purpose is to stabilize the zonules and capsule, few cases of

CTR subluxation/dislocation have been reported. There was a 23-case series of in-the-bag CTR and IOL subluxation or dislocation reported in 2012, composed of 10 with subluxation and 13 with dislocation into the posterior segment. Fourteen of these cases were implanted by the same surgeon (Tobias Neuhann, MD), so the rate of CTR subluxation/dislocation by this surgeon was calculated in 0.76% (total 1828 CTRs during 1998 to 2004) [9]. To our knowledge, there were only been 2 cases of CTR displacement into AC, and no anterior dislocation of the entire CTR-IOL complex has ever been reported. One of the reported cases revealed the part of CTR and eyelet anterior displaced into the AC without apparent traumatic episode. The device was approaching, but not occluding, the iridocorneal angle and did not attach the corneal endothelium; the patient was treated conservatively because of normal IOP and clear cornea [10]. The other CTR displacement case showed that two eyelets of the CTR anterior displaced into the AC, seated in the iridocorneal angle against the trabecular meshwork 3 weeks after the cataract surgery. No traumatic history had been traced. Because AC reaction and elevated IOP to 30 mmHg were found, removal of the CTR was performed [11].

In our case, the patient had just received dilated indirect ophthalmoscopy and suffered a blunt injury of her right frontal horn region (but not in her right eye directly) on the same day. Mydriatic status indicated weakness supporting force of the anterior side of the IOL. Conservative treatment was given initially because she was unwilling to receive operation. There were no immediate complications such as AC reaction, hyphema, glaucoma, cystoid

macular edema or corneal edema. However, the CTR-IOL complex attached to the corneal endothelium and endothelial decompensation developed 8 months later during OPD review. It was also noted that her VA progressively declined from 20/50 to hand movement and the patient eventually decided to receive the surgery.

Scleral fixation IOL implantation is familiar to us. Hoffman technique and retropupillary Artisan IOL fixation are also good alternative choices [12]. There would be a great concern in angle-supported ACIOL or traditional AC Artisan IOL, because the risk of endothelial counts loss persisted. Corneal endothelial cells do not proliferate after birth, and the cells density decreased naturally as aging. Anterior dislocated CRT-IOL complex represents a great risk to evolve into endothelial decompensation due to attachment. Even though the anterior chamber complex (or device designed for placement in AC) did not touch to the corneal endothelium directly, a shallow AC depth condition could also raise a greater risk of endothelial decompensation. This concept should be emphasized to the patient.

In conclusion, CTR is a relatively new device that has been used in the last two decades to improve the capsule stability and decrease the lens/IOL dislocation rate. It works well, but dislocation of the CTR can still happen even without directly traumatic episode. Although it is most often contusion injury that usually causes posterior dislocation of the implant, the possibility of CTR-IOL anterior dislocation should be mentioned to the patient before mydriatic examination. Conservative treatment is a temporary choice if immediate complications have not yet occurred but it may eventually fail in a great chance. Surgical options should be taken early especially once complications such as uveitis, glaucoma, macular edema and corneal endothelium decompensation happen, especially in patients with shallow AC regardless whether it is touching the corneal endothelium or not.

Consent

Written informed consent was obtained from the patient for publication of this Case report and any accompanying images. A copy of the written consent is available for review by the Editor of this journal.

Disclosure

None of the authors has a financial or proprietary interest in any material or method mentioned.

Author's Contributions

THW identified and managed the case initially; THW and SYC followed the patient at the out-patient department, drafted the manuscript, and revised the manuscript. All authors read and approved the final manuscript.

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