CASE REPORT

Long-term stability of intraocular lens optic capture after femtosecond laser capsulotomy in traumatic cataract with coexisting subluxation and posterior capsule dehiscence

Mathew Kurian Kummelil, MS, DNB, Luci Kaweri, MD, Amit Zope, DNB, Rohit Shetty, FRCS, PhD, Bhujang Shetty, MS

We report the long-term visual outcome and stability of intraocular lens (IOL) optic capture after femtosecond laser capsulotomy. A patient with a traumatic cataract and 3 clock hours of subluxation had femtosecond laser–assisted cataract surgery during which a clinically undetected posterior capsule dehiscence was noted on the integrated optical coherence tomography line scan. The laser created an appropriately sized, circular free-floating anterior capsulotomy centered on the capsular bag. Pneumodissection and lens fragmentation completed nucleus management with minimal additional zonular stress. Optic capture of the IOL by the capsulorhexis margin ensured the long-term stability and centration in this case of combined zonular dialysis and posterior capsule dehiscence.

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Blunt trauma to the eye can cause lenticular damage such as subluxation, dislocation, disruption of the lens capsule, zonular weakness, and cataract formation. Partial or total damage to the zonular fibers may occur and result in subluxation or total displacement of the lens. For better visual outcomes, it is important to know the preoperative high-risk situations and intraoperative warning signs. Total cataract or dense posterior subcapsular cataract makes complete preoperative evaluation difficult and therefore increases intraoperative challenges.

Although cataract surgery is generally safe and effective, the outcome, especially in challenging cases, is largely dependent on the surgeon’s experience and expertise. The most common intraoperative complication in traumatic cataracts is irregularity of the capsulotomy. Femtosecond laser–assisted cataract surgery offers advantages in complex cataracts such as traumatic and subluxated cataracts. We report a case of femtosecond laser–assisted cataract surgery in a traumatic cataract with coexisting subluxation and posterior capsule dehiscence.

CASE REPORT

A 45-year-old man presented to the hospital in May 2013 with a history of blunt trauma to the right eye from a shuttlecock during a game of badminton 6 months earlier. The corrected distance visual acuity was 6/24 in the right eye and 6/6 in the left eye. The cornea was clear. The iris had multiple sphincter tears, and the pupil was irregular. There was no iridodialysis. There was a dense posterior subcapsular cataract. Three clock hours of zonular dialysis were present between 2.30 and 5.30 through which a vitreous blob with iris pigment had prolapsed into the anterior chamber. Gonioscopy showed 2 clock hours of angle recession from 1 o’clock to 3 o’clock with peripheral anterior synechiae extending inferiorly from 3 o’clock to 7 o’clock. There was no evidence of a cycloidalysis cleft. The posterior segment did not show other sequelae of the blunt injury such as retinal dialysis or choroidal rupture. Prophylactic barrage laser was performed for superotemporal lattice in both eyes. As the reduction in visual acuity could be attributed to the dense posterior subcapsular cataract, cataract surgery was planned under guarded visual prognosis in view of the history of trauma and the presence of subluxation.

Cataract surgery was performed using the femtosecond laser (Lensx, Alcon Laboratories, Inc.). An eccentric 4.8 mm capsulotomy centered on the lens was created (Figure 1, A). A 2.8 mm temporal corneal incision and two 1.0 mm side ports 60 degrees from the main port were made. Nucleus fragmentation was done using the chop and cylinder technique with energy of 10 mJ (spot and layer separations 9 μm each). Energy used for capsulotomy, primary incision, and secondary incisions was 8.0 mJ, 6.5 mJ, and 6.0 mJ respectively (spot and layer separations 5 μm and 4 μm, respectively). The optical coherence tomography (OCT) line

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From Narayana Nethralaya Eye Hospital, Bangalore, India

Corresponding author: Mathew Kurian Kummelil, MS, DNB, Narayana Nethralaya Eye Hospital, 121/C Chord Road, Rajajinagar 1st R Block, Bangalore 560010, India.

E-mail: dr.mkurian@gmail.com.

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scan showed a nasal posterior capsule irregularity in the region of the zonular dialysis with associated anterior vitreous face disturbances suggestive of a preexisting posterior capsule dehiscence (Figure 1, B).

After the posterior capsule dehiscence was detected, the surgical plan was modified to include appropriate retinal support if needed. Intraoperatively, a Slade spatula was used to open the femtosecond incisions. The capsulotomy was complete and centered on the capsular bag. Pneumodissection following femtosecond nucleus fragmentation allowed nucleus mobilization without hydrodissection, which was not appropriate given the potential posterior capsule dehiscence. The nucleus was separated along the femtosecond cleavage planes and aspirated with the phacoemulsification probe with minimal posterior capsule and zonular stress. During irrigation/aspiration, the preexisting posterior capsule rupture became visible. A heavy molecular weight ophthalmic viscosurgical device (sodium chondroitin sulfate 4.0%–sodium hyaluronate 3.0%, Viscoat) was injected to

Figure 1. Intraoperative image captured during femtosecond laser surgery. A: Inferonasal (blue arrows) zonule dialysis, an eccentric capsulorhexis of 4.5 mm diameter (pink circle) centered on the lens and not on the pupil, cylinder and chop mode used to divide the nucleus (yellow circles and sextant pattern), 2.8 mm main temporal incision (yellow wedge), and two 1.0 mm side ports (orange wedges). B: Anterior segment OCT image showing a line scan of the eye suggestive of nasal zonular dialysis (blue arrow). The posterior capsule shows irregularity suggestive of preexisting posterior capsule dehiscence (orange arrows). An anterior hyaloid face disturbance is also seen (green arrows).

Figure 2. Retroilluminated (left) and normal (right) postoperative slitlamp images of the eye operated on for traumatic subluxated cataract. The 3-piece IOL is placed in the sulcus (blue arrows) with the optic captured in the bag. A posterior capsule rupture is seen in the nasal half (orange arrows). An area of zonular loss is seen in the inferonasal quadrant (white arrows).
tamponade the vitreous and complete cortical aspiration. Anterior vitrectomy was done to remove the vitreous from the anterior chamber and capsular bag. Because of the large posterior capsule tear, centering the bag with a capsular tension ring (CTR) and in-the-bag implantation of an intraocular lens (IOL) was deferred. A large-optic 3-piece IOL (Acrysof MA60AC, Alcon Laboratories, Inc.) was placed in the sulcus with the optic captured in the capsular bag to ensure long-term centration and stability of the IOL (Video 1, available at http://jcrsjournal.org).

One month postoperatively the uncorrected distance visual acuity was 6/6 in both eyes. With a near addition of +2.5 diopters, the corrected near visual acuity was N6. These have been stable for 3 years. Figure 2 is a postoperative slitlamp photograph of a centered, optic-captured IOL in situ.

DISCUSSION
Zonular dialysis after blunt ocular trauma is caused by the change in the globe’s configuration at the time of the blunt injury. However, posterior capsule rupture following blunt trauma appears rarely,7 and combined zonular dialysis and injury. However, posterior capsule rupture following blunt has been described in patients with subluxated traumatic mature cataracts.8,9 In our case, the line scan of the anterior disruption.4 Femtosecond laser technique in cases with anticipated weak zonular apparatus was described in 1998.13 As in this case, the line scan OCT of the femtosecond laser system documented clinically undetected prior posterior capsule damage that is invaluable in planning and executing an appropriate surgical technique that avoids complications.14

A CTR and in-the-bag placement of an IOL should be avoided in cases of large posterior capsule tears. In our case, the posterior capsule tear occupied a large nasal area, so converting it to a regular continuous posterior capsulotomy was not possible. Also, the margins of the tear had started to fibrose, preventing further extension. The femtosecond laser provides an appropriately sized, round capsulotomy centered on the capsular bag that enables optic capture of the IOL in cases with posterior capsule tear.15 A similar case that used the femtosecond laser and optic capture for a cataract that developed after neodymium:YAG vitreolysis has been reported.16 As our capsulorhexis was of adequate size and zonular weakness was of a nonprogressive nature involving only 3 clock hours, we also placed a large-optic IOL in the sulcus with the optic captured in the capsular bag. The centration and stability of the IOL was confirmed on the operating table and has been sustained for 3 years.

In conclusion, the integrated anterior segment OCT detected the coexisting posterior capsule dehiscence, the femtosecond laser created an eccentric capsulorhexis centered on the lens and enabled subsequent optic capture of the IOL, pneumodissection prevented hydro procedures, and laser fragmentation enabled nucleus management with minimal additional stress on the already compromised zonular fibers of the subluxated crystalline lens. This modern technology offers effective techniques to tackle the challenges associated with complex cataract surgeries and thereby ensure optimal refractive outcomes.

REFERENCES
FEMTOSECOND LASER–ASSISTED CATARACT SURGERY IN TRAUMATIC CATARACT


DISCLOSURES

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