

Selective Capsulotomy With New Class Of Nd:YAG Laser

Ellex's Ultra Q Improves Therapeutic Outcomes and Safety

Harvey L. Carter III M.D.

Carter Eye Center, 7502 Greenville Avenue #700, Dallas, Texas 75231

Background

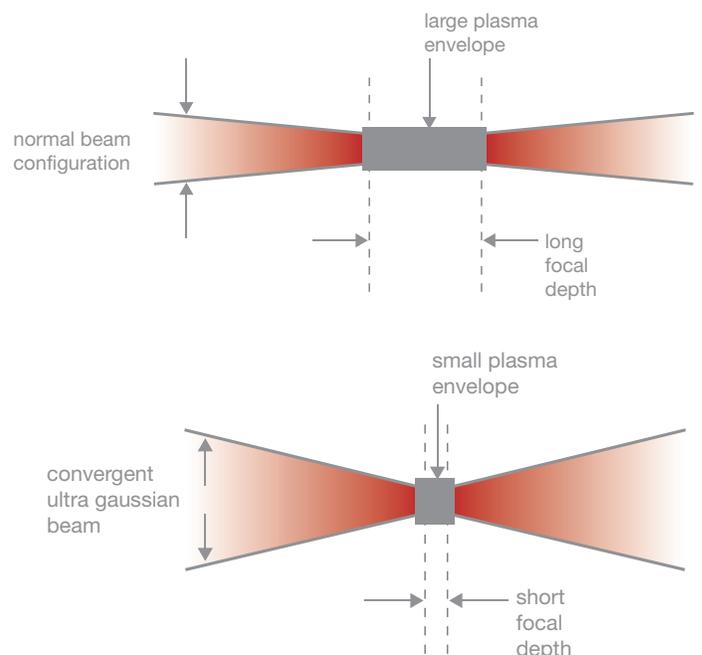
Good visual outcome is the all-important goal in cataract surgery. Barriers to excellent unaided distance acuity arise from both unwanted refractive error and posterior capsular opacification. New developments in Nd:YAG technology mean that unwanted refractive error can be addressed accurately and promptly post operatively – emmetropia can be achieved with a quick, painless, non-surgical procedure.

This same new technology also offers benefits over conventional Nd:YAG for capsulotomy procedures, with improved precision in capsule management. Similarly, laser peripheral iridotomy with this new laser will result in reduced size and more refined positioning of the iridotomy.

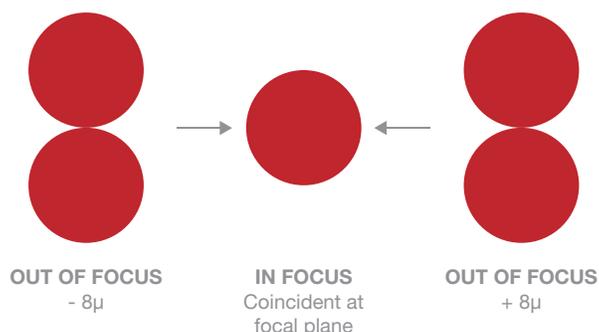


New Technology

The Ultra Q Photodisruptor (Ellex, www.ellex.com) offers the physician fine control of laser energy at the therapeutic site. The optimized laser energy profile is greatly improved over previous YAG laser designs. The higher peak pulse and shorter pulse duration, together with uniform beam characteristics mean that less energy is required to form plasma and the zone where the plasma forms is more localized with a shorter depth of focus. This provides more efficient cutting of tissue with less accumulative energy.



A unique aiming beam focusing system aids the physician in locating the precise treatment zone, with a tolerance range of ± 8 microns. The two-spot aiming beam is generated by splitting a single red diode laser beam via dual-reflective mirrors. This produces two spots, which when coincident at the focal plane, ensure the system is in focus.



Clinical Experience

At the Carter Eye Center in Texas the Ultra Q laser has been in use since June 2006. The author has designed a treatment protocol for the Crystalens IOL using the Ultra Q and excellent outcomes have been achieved. Dozens of patients have been treated, providing important preliminary clinical findings. The author will present case studies in the general session at the 2006 American Academy of Ophthalmology Conference.

With the Crystalens' new square edge design, the prior problems with the "Z" contraction syndrome have essentially been eliminated. But capsular contraction syndrome (CCS) continues, albeit in a milder form. The Ultra Q has been used for selective treatment of both the anterior and posterior capsules allowing refinement of refractive outcomes following IOL surgery. The precise focus and accuracy of the laser plasma allows careful, slow and accurate refractive status alteration. Both spherical and astigmatic error can be corrected by manipulation of the optic position within the capsule using the laser. In some old "Z" posterior CCS cases up to five diopters of cylinder have been resolved. For anterior CCS cases, the results show a return of lost accommodation and/or reduction in hyperopic shift of up to $1\frac{1}{2}$ diopters. In summary, our experience has shown that proper management of the capsule(s) using the Ultra Q has ended the need for further surgical repositioning of any AIOL.

When performing a capsulotomy procedure, it is possible to "nibble" along the capsule opening(s) with exquisite control to gently and precisely open it. Treatment with the Ultra Q is so refined it can be compared to use of a sniper's rifle verses a shotgun with older conventional YAG lasers. Gone are the days when the physician blew all the capsule away; with today's presbyopic IOL's we need to be able to precisely manage the lens capsule(s). Additionally, the focusing precision of the laser's small plasma envelope means that the risk of lens pitting – even with soft lens materials – is reduced. Further, the hazard of vitreous prolapse also decreases with smaller and more controlled capsular openings.

For refractive error management involving Implantable Collamer Lenses, peripheral iridectomies are required several days prior to refractive surgery. The Ultra Q allows small, precisely located iridectomies, 3 clock hours apart.

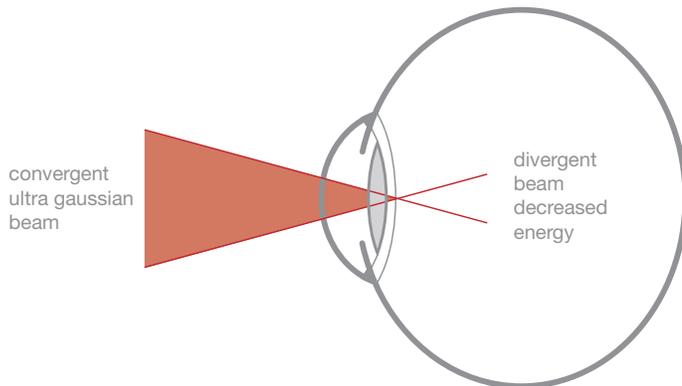
Selective Capsulotomy Techniques for CCS

Treatment strategies are divided into anterior capsule contraction syndrome (ACCS) and posterior capsule contraction syndrome (PCCS) techniques. For ACCS, treatment is applied to the fibrotic contracted areas of the anterior capsule, in order to release the tension on the capsule and lens. One to three Ultra Q applications on each side of the lens, 90 degrees away from the long axis of the AIOL, are usually enough to decompress and relieve the capsule contraction symmetrically. Treatment over the lens plate haptics should be avoided, to prevent asymmetrical anterior lens vaulting.¹

For PCCS, treatment is directed toward the posterior capsule behind the anteriorly vaulted or titled haptic, between the hinge and where the polymide haptics are stacked into the plate haptic. Furthermore, a small centrally located posterior capsulotomy is frequently added. The aim is to relieve tension created by the fibrosed contracted capsule. A selective posterior capsulotomy should be positioned behind the plate haptic as peripheral as possible; a small opening should be made using the lowest power possible at the location between the hinge and the point where the polymide haptics are stacked into the plate haptic. A central capsulotomy may also be necessary, but the peripheral and central capsulotomies should not connect, in order to avoid posterior lens vaulting.¹

Safety Considerations

An aspect that should not be overlooked is the improved safety margin provided by this laser. The fine focus combined with a small plasma envelope and reduced power settings mean that the amount of energy passing into the posterior chamber is minimized, thereby lowering the risk of damage behind the therapeutic region.²



The improved focus precision and accurate plasma placement reduce the potential for inappropriate localization of laser energy proximal to the IOL, thereby avoiding lens pitting. This is a particular requirement in multifocal IOLs and lenses with diffractive optics, since any damage along the visual axis can degrade visual outcome.³

Similarly, smaller and more accurate placement of iridotomies, will decrease risk of patients complaining of visual disturbances.⁴

References

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ellex.com

Worldwide

82 Gilbert Street
Adelaide, SA
5000 AUSTRALIA
+61 8 8104 5200

USA

7138 Shady Oak Road
Minneapolis, MN
55344 USA
1 800 824 7444

Japan

4-3-7 Miyahara 4F
Yodogawa-ku Osaka
532-0003 JAPAN
+81 6 6396 2250

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