Laser cataract surgery: What’s the hype all about?
Melissa Barnett, O.D.

Femtosecond lasers in cataract surgery aim to assist or replace various aspects of manual cataract surgery. These include helping create the initial surgical incision in the cornea, creating the capsulotomy and helping the initial fragmentation of the lens. In addition, the femtosecond laser may also produce incisions within the peripheral cornea to aid the correction of pre-existing astigmatism.

The femtosecond laser pulses divide material at the molecular level without the transfer of heat or impact to the surrounding tissues. The laser pulses every femtosecond; that is one quadrillionth of a second! Each pulse forms a microscopic bubble. The effect of photodisruption occurs only at the focal point of the beam, such as the cornea or lens, and tissue outside of the defined area is unaffected. A complete incision in the cornea or lens is achieved by placing thousands of laser pulses next to each other. The laser pulses are connected to form a corneal flap, corneas incision, AK incisions, capsulorhexis or to phakoemulsify a crystalline lens.

In cataract surgery, the advantages of femtosecond laser include:

- More precise capsulorhexis
- More accurate intraocular lens positioning (The size, shape and positioning of the capsulorhexis is a key determinant for effective IOL positioning.)
- Better IOL performance
- Better outcomes

Laser assisted lens fragmentation with femtosecond laser increases the ease of nucleus disassembly. This allows for:

- Reduced phaco energy and time
- Reduced corneal trauma and endothelial cell loss
- Reduced risk of capsular tears
- Faster visual recovery

Femtosecond laser can produce more precise limbal relaxing incisions.

- Uniform depth (no ripples)
- Precise, reproducible arc shape, arc length, and diameter

Studies indicate that laser-assisted cataract surgery can:

- Increase precision and reproducibility of the anterior capsulotomy.
- Reduce effective phacoemulsification time. This means less macular edema and less corneal swelling.
- Reduce anterior chamber inflammation post-operatively.
- Potentially lessen surgically-induced endothelial cell damage compared to conventional cataract surgery.
- Improve predictability of IOL power calculation.
- Lead to more stable refractive results.
- Result in less IOL tilt and decentration.
- Create a more precise, accurate, reproducible and strong capsulotomy.

Relative Contraindications for Laser-Assisted Cataract Surgery

- Small pupils
- Corneal opacities
- Small eyes or deep set orbits
- Redundant conjunctiva
- Poor patient cooperation
- Tremors or dementia

In conclusion, although traditional cataract surgery is very effective and successful, laser cataract surgery can provide better outcomes after cataract surgery.

References


Dr. Barnett is a principal optometrist at the UC Davis Medical Center in Sacramento, where she performs primary and medical eye examinations and fits contact lenses, including specialty lenses, in addition to teaching optics and contact lenses to ophthalmology residents. She lectures and has been published on topics including dry eye, anterior segment disease, contact lenses, corneal collagen cross-linking and creating a healthy balance between work and home life for women in optometry. She is also a spokesperson for the California Optometric Association and has appeared on several television shows. In her spare time she enjoys cooking, yoga and spending time with her husband, Todd Erickson, O.D., and two sons, Alex, 6, and Drew, 4.

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