Editorial



# Femtosecond laser assisted cataract surgery

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## Editorial

The femtosecond laser was first introduced in the field of Ophthalmology in 2001 as a method to create lamellar flaps for LASIK surgery.[1] This technology Utilizes a neodymium:glass 1053nm (near-infrared) wavelength light allowing focus at a 3mm spot size.[2] During treatment, plasma formation, cavitation, and tissue separation occurs by rapidly expanding free electrons and ionized molecules with minimal collateral tissue damage. Using spot settings close to each other, tissue planes can be created by overlapping these cavitation regions. There are different platforms of femtosecond lasers on the market, however, all platforms rely on accurate imaging via optical coherence tomography or ray-tracing reconstruction. In addition, all platforms require a patient-interface system which prevents patient movement, corneal folds, bubbles, or fog, while minimizing IOP pressure increase and subconjunctival hemorrhage. Two methods are currently in use that include contact applanation and liquid optics.

By creating cavitation on tissue planes, an anterior capsulorhexis can be performed to a highly accurate diameter, centration, and sphericity, and 360 degrees of symmetrical anterior capsule leaflet overlap. This results in less IOL tilt, less IOL decentration, less coma and visual aberrations, and a more stable effective lens position and refractive result.[3–6] This is particularly important when implanting toric, multifocal, or accomodative IOL's. A lens fragmentation pattern is chosen based on surgeon preference and the density of the nucleus and includes an image guided safety zone to protect the posterior capsule. This lens fragmentation has been demonstrated to lead to lower total phacoemulsification energy required for nucleus removal and less endothelial cell loss.[7,8] and potentially less subclinical macular edema.[9] Many surgeons believe that the corneal edema on post-operative day one is markedly reduced. Some surgeons have adopted an energy free, all laser technique due to the softening achieved.[10]

In addition the femtosecond laser can be used to create arcuate incisions, main corneal incisions, and paracentesis incisions. The arcuate incisions can be penetrating or intrastromal and the surgeon utilizes nomograms to determine the length, axis, and optical zone. A blunt instrument may be required to open either the arcuate incisions or the main/paracentesis incision.

Disadvantages of femtosecond laser assisted surgery are the added costs to the cataract surgery procedure, additional staffing requirements, and added length of time to complete the entire cataract removal. There is also a learning curve for the surgeon performing the procedure. Relative contraindications to femtosecond laser assisted cataract surgery include small pupil size, very shallow anterior chambers, tight palpebral fissure, advanced glaucoma, and uncooperative patients.

My experience with adopting this technology has been quite positive. Prior to utilizing this femtosecond laser technology, I was personally skeptical and felt that my 20 plus years of skill, training, expertise, and comfort with traditional phaco would make femto assisted surgery a gimic, marketing product, or unnecessary added expense. I had the belief that only inferior surgeons or beginners would require the use of this technology. I soon came to realize that my refractive results were much more predictable, corneal edema has been reduced, and dense nuclei can be removed with ease after the softening process. I am so impressed with of the refractive results, that only under limited circumstances will I implant a premium IOL without using femto assistance. The real litmus test is that I would perform this procedure on my closest relatives and when my time for surgery arrives, this is the technology I would prefer for myself.

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## Conflict of interest

The author declares no conflict of interest.

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