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Editorial

Is Femto cataract surgery here to stay?

Cataract surgery is the most common surgery in medicine worldwide. The combined effects of an increasing life span, an increasingly aged population along with the increasing incidence of diabetes worldwide will result in a significant rise in cataract surgery over the coming decades. Cataract surgery has progressed significantly since the era of couching and intracapsular cataract extraction. Over time, there have been numerous advances in surgical techniques, instrumentation and intraocular lens (IOL) technology. These advances resulted in greater safety, efficacy and predictability of cataract surgery. For example, the introduction of foldable intraocular lens allowed surgeons to make smaller incisions. The introduction of phacoemulsification resulted in a significant increase in the success rates of cataract surgery. The introduction of aspheric intraocular lens resulted in better postoperative visual quality compared to conventional intraocular lenses. Each of these advances were met with initial skepticism but were eventually adopted by the majority of surgeons worldwide.

Currently, phacoemulsification is considered the gold standard for cataract surgery. However, over the last 5 years the femtosecond laser has been introduced for cataract surgery. Although the debate about this technology is spirited, the main issue remains – has femtosecond advanced cataract surgery to the next level similar to other innovations in cataract surgery?

Proponents of Femtosecond Laser Assisted Cataract Surgery (FLACS) have presented the possible benefits over manual techniques including, better corneal wound construction, less surgically induced astigmatism (SIA), better centration and circularity of the anterior capsulorrhexis. Most studies advocating FLACS conclude that these advantages may lead to better refractive outcomes, lower phacoemulsification times, less phacoemulsification energy and therefore less corneal endothelial cell loss.[1–3]

However, further evaluation of these claims is required to determine if they confer clinical advantages that translate to greater safety, efficacy and predictability compared to conventional cataract surgery. Any new medical device introduced into clinical and surgical practice must be compared to the current gold standard. When we examine the literature on the FLACS, there are numerous studies that do not concur with the list of advantages cited above. For example, Nagy et al.'s study concluded that there is no difference in postoperative surgically induced astigmatism and the induction of higher order aberrations between clear corneal incisions with the femtosecond laser versus manual techniques.[4] Abell et al. have documented a higher rate of anterior capsular tears in patients undergoing femtosecond laser treatment.[3] Additionally, Okada et al. reported that postoperative refraction at 1 year was unrelated to centration or circularity of the capsulorrhexis.[5] Taken together, these studies (and others) indicate that currently there the little clinical advantage in using a femtosecond laser for cataract surgery.

Postoperative corneal endothelial cell loss is a major risk that preoccupies the cataract surgeon. A recent study of long term postoperative endothelial cell loss reported no difference between FLACS and conventional phacoemulsification cataract surgery.[6]

The biggest challenge cited by surgeons is the financial aspect of femtosecond laser technology. A survey of 1047 cataract surgeons indicated that over 70% believed the cost of this technology was a limiting factor to adoption.[7] Other studies have found that FLACS is not cost effective to patients when compared to industry benchmarks and other medical interventions.[8] The additional time required for FLACS compared to conventional surgery further reduces adoption of this technology.

The Portland Veteran Affairs Medical Center performed an extensive literature review of over 400 studies using an evidence-based synthesis program (ESP) and concluded with the following statement:

> ''This systematic review found visual outcomes (corrected distance visual acuity) and Effective Phacoemulsification Time (EPT) to be similar in FLACS and conventional surgery, while quality of life and cost-effectiveness outcomes were not reported. The evidence for the relative benefit of FLACS was limited by reliance on small to moderately sized prospective cohort studies, nearly all of which had stated financial conflicts of interest. Adverse events unique to FLACS involved difficulties in laser docking or patient suitability for the procedure. Many patients were excluded from the Femtosecond Laser treatment groups for orbital, corneal, cataract density, or medical co-morbidities. Comparative adverse events in FLACS and conventional surgery were found to be similar for IOL positioning, corneal thickness, macular edema and residual refractive error. A few studies reported mixed results of the effect of surgical experience on the incidence of FLACS adverse events.[9]

Hence, in conclusion the cost of adopting FLACS overrides some of the notable advantages of this technology. Perhaps with continual development and future innovations, femtosecond laser technology will be more cost-effective allowing it to be an essential component of cataract surgery. Based on past experience of innovations in cataract surgery

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we believe industry and ophthalmologists will work together to ensure an effective solution to adoption of this technology.

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