The Reality of Precision: Lasers in Ophthalmology

Throughout the past 20 years of my personal practice as a corneal surgeon, several leaps in technology have really changed the paradigm that I and many other surgeons were trained in back in the early 1990s. Femtosecond lasers have perhaps brought one of the hugest of these paradigm shifts. In 1999, I had my first exposure to the promising concept of using a laser to create a LASIK flap. It took several years before this idea became reality, with the IntraLase femtosecond laser (now Abbott Medical Optics Inc.) gaining US Food and Drug Administration (FDA) 510(k) approval for LASIK procedures. Of course, at the time, the procedure was not perfect; but the reality was that you were able to perform LASIK, the internationally preferred laser refractive surgery technique, without using a blade.

The constant clinical and patient pressure for shorter treatment times and better results did act as a catalyst for further evolution of femtosecond lasers. We have now seen several generations of the IntraLase femtosecond laser, as well as the integration of similar technologies from other femtosecond laser companies. The reality is that, over the past 5 years, we have seen an explosion of these technologies in the refractive surgery arena. Now, femtosecond LASIK is considered an alternative standard and the way of the future.

Parallel to the growth of its application in refractive surgery, we have seen numerous other applications for femtosecond-assisted surgery that are continuously evolving and quite interesting to the corneal surgeon. We have seen keratoplasty techniques ranging from Descemet stripping automated endothelial keratoplasty, to lamellar keratoplasty and deep lamellar keratoplasty, to penetrating keratoplasty, facilitated by the femtosecond laser. In these procedures where the femtosecond laser has completely replaced the use of a blade, surgeons are able to perform patterns of corneal separation (because they are not actually incisions) that are impossible to do with a blade or manually. Additionally, we have witnessed procedures like astigmatic keratotomy, radial keratotomy, and intrastromal corneal ring segment channel creation being preformed with a femtosecond laser, and in 2007 we introduced the concept of transferring the crosslinking procedure within the corneal stroma, both in ectasia and bullous keratopathy, via a femtosecond-created pocket.

It was only a matter of time before this concept of using a bladeless dissecting device for the anterior chamber was applicable to the most common procedure in human kind: cataract surgery. We have now seen a tremendous interest in femtosecond laser applications in cataract surgery over the past 2 years. I think that 2012 and 2013 will be the pivotal years where a broader base of clinicians will be utilizing this technology for cataract surgery. It appears to be currently mature to perform a timely and precise clear corneal incision, create a capsulorrhexis, and assist in lens fragmentation and dissection, with most femtosecond laser technologies using dynamic online anterior segment optical coherence tomography (OCT) to further refine the procedure. There is also possibility of this instrument being used in glaucoma procedures, either as a traditional trabeculectomy that can be visualized and designed with a femtosecond laser, or alternative therapies such as a femtosecond laser goniotomy. Many possible treatments are on the horizon, since the anterior chamber can be intraoperatively imaged with OCT.

So, in summary, we are seeing a continuous propagation of the potential indications and applications of femtosecond lasers in ophthalmology. This is an exciting time to experience the femtosecond laser as an eloquent device that will replace the use of the scalpel in its many applications in anterior segment surgery.

I am excited about this issue, and we have experts from across the world convey to us their valuable experience with using several applications of femtosecond lasers in, as I mentioned before, ever growing new applications and indications. Other articles in this cover focus explore excimer laser treatments, laser glaucoma surgery, and laser patterns for treatment in the posterior segment.

I would like to thank the authors of this issue, not only for their diligent work and their pioneering endeavors to broaden the spectrum of clinical applications of excimer and femtosecond lasers in ophthalmology, but also for the time they took to convey their experience through *Cataract & Refractive Surgery Today Europe*'s editorial mechanism to the everyday practicing ophthalmologists.

It is true that this issue of *Cataract & Refractive Surgery Today Europe* is my favorite publication of the month, and I can't wait to spend an evening with a cup of tea to gain access into the minds of all these outstanding colleagues. ■

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