

Laser Refractive Surgery – Expanding Horizons

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Refractive surgery is now a well-established sub specialty of the ophthalmology.

It is for the ophthalmologists to add it in his skills for the sake of eliminating

the suffering of millions of visually handicapped persons. The W.H.O. estimates that there are 1 billion people have some form of

preventable visual impairment with refractive error and cataract as leading causes. The condition is much worse in developing countries.

Even many ophthalmologists are not aware about the latest development in the field of refractive surgery.

The Lasik vision correction changes the life for the better at much younger age, with health, economic and occupational benefits that occur over life.

We are fortunate to have availability of variety of refractive procedures in our armamentarium, of which we can select the optimum procedure for our patients. Getting most of the available options, we have to keep in mind the possibilities and limitations of each procedure.

Where we stand today

There have been tremendous developments in refractive surgeries, but very few patients may be unhappy. A range of futuristic innovations is coming down the pipeline. The focus has shifted from just visual acuity to the best quality of vision.

Healthy skepticism is a must when assessing new technologies, ensuring our enthusiasm is based on sound scientific evidence.

THE WAR OF FLAPS

The laser refractive surgery started with surface ablation – PRK. It was much superior to radial keratotomy. It was followed by Lasik, in 1990 by Pillakaris and Burrato. The technique dominated laser refractive surgery for long time and is still most popular. The pain, scarring and delayed healing, common with PRK was not there.

But Lasik has still some problems, though not common, likely flap striae, button holing, partial flap, debris, epithelial

ingrowth, DLK, late trauma, ectasia etc.

There has been lot of improvements in technique developed over the time.

The FemtoLasik has further improved the safety of procedure. The flaps are thinner, planer and with better-fit properties due to new angulation of side cut. The customization of flaps is possible in regard to size, thickness, side cuts and hinge position.

This was followed by SMILE, in 2006 It is all femtosecond procedure. The problem of flap related complications is not there. The biomechanical strength is supposedly better than Lasik. But it has some limitation. The hypermetropia correction and customized treatments are not possible at present.

With improvement in flying spot excimer spot technology, epithelial mapping, mitomycin C and optimized removal of epithelium, surface ablation(ASA) is gaining popularity. The upper limit of treatment is now up to 10 diopter of myopia. The recovery, predictability and stability of correction is much better now.

BETTER DIAGNOSTICS

Imaging techniques for assessing the structure and function of the cornea and anterior segment are crucial for diagnosing and treating a wide variety of refractive errors and giving information of other abnormalities of eye.

A lot of newer technologies had made the laser vision correction more precise, and safer than ever. The anterior surface of cornea can be measured by placido disc based topography.

The Pentacam and Galilei utilizes the Scheimpflug image, which is a cross-sectional image showing the cornea, anterior chamber, iris, and lens.

AS –OCT is helpful to know the health of cornea and to measure the residual stromal bed beneath a LASIK flap when determining whether or not there is sufficient stroma remaining to perform a flap lift and enhancement

Aberrometer is used to measure refractive aberrations of the eye. The iTrace system combines corneal topography with wavefront aberrometry.

The biomechanics of the cornea evaluated by spectral analysis of waveforms from Ocular Response Analyzer and Corvis-ST

LASERS

From broad beam excimer laser, we have now moved to flying spot high-speed excimer lasers. It is complimented by very active multi dimensional eye tracking giving us precise treatment pattern. Online Pachymetry, attached slit lamp has given added advantage. The profile of laser treatment has improved alot over the years.

TREATMENT CAPABILITIES

The aim of refractive surgery is optimum visual quality and not just good visual acuity. Now we have a wide array of laser refractive treatment. The wavefront optimized treatment, wavefront guided treatment, topography guided treatment like Contoura Vision, Custom Q treatment, SMILE, advance surface ablation – StreamLight and SmartSurface, given us a capability

to provide real personalized treatment to each eye undergoing laser vision correction.

ASA is one of the most effective tools in the surgical armamentarium of refractive surgeon. It is still underutilized, but is very promising and exciting with superior results

SMILE and ASA provides flap less treatment, Contoura vision is the most personalized vision correction system.

The laser refractive surgery is also being commonly used to treat refractive surprises following cataract surgery and in selective cases of amblyopia management in children.

I am sure that refractive surgery will continue to evolve and from corned ablative procedure, we will move on corned additive procedures. The future of refractive surgery is very bright.

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