

Laser Vision Correction: From LASIK to IntraLASIK

Dr Raymond Tah Kheng Soon

Consultant Ophthalmologist & Refractive Surgeon

Imagine a world without glasses or contact lenses: waking up in the morning and starting each new day without having to find your “eyes”; participating in your favorite sports free of the spectacles, and with no worries of the contact lenses mal-aligned, or falling-off..... Laser Vision Correction makes that world a reality today. Millions of people had undergone the procedure and are very pleased with the result of their decision.

There are a number of different laser vision correction techniques. One could divide them into 2 broad groups, namely:

- 1) LASIK (Laser In-situ Keratomileusis), and
- 2) Surface ablation techniques, which include PRK, LASEK and Epilasik.

In LASIK, the surgeon needs to create a thin flap through the corneal stroma prior to applying the laser to the cornea to correct the refractive errors of the eye. On the other hand, generally, surface ablation techniques involve the removal or lifting of the epithelial layer before applying the laser. However, the advantages of LASIK are well established. These include the significant reduction of post-operative pain/discomfort to the minimum, faster visual recovery, easier in titration of the refractive endpoint, better refractive power stability and predictability, and a lower incidence of corneal haze after the procedure. Because of these reasons, LASIK has emerged as the most popular method of Laser Vision Correction practiced worldwide.

While there are a lot of developments in the science and arts of LASIK, one important improvement is in the way the corneal flap is created. Traditionally, a mechanical handheld microkeratome, which is basically a motorized blade, is used to cut the LASIK flap. Flap creation with the microkeratome is responsible for the majority of the intraoperative complications during LASIK procedures. However, from the year 2000, a revolutionary method of creating the flap was introduced. Instead of using the microkeratome blade to cut the flap, an ultrafast computer-controlled femtosecond laser called IntraLase is used to create the flap. IntraLASIK is the name used for these LASIK procedures when the flap is made with this femtosecond laser.

IntraLASIK represents a very exciting advancement over both the traditional LASIK and the surface procedures because IntraLASIK procedure provides many of the advantages of both procedures while eliminating or minimizing the associated disadvantages. This IntraLase femtosecond laser can create a thin, uniform, planar corneal flap consistently without the risk of catastrophic sight-threatening complications of microkeratome, such as free flaps, globe penetration, buttonhole flaps, decentered flaps or incomplete cuts. It is well known that the microkeratome cuts a meniscus flap, and hence the possibility of buttonhole flap. In addition, because of the smoother stromal bed created by IntraLase FS laser, it offers superior visual results with better contrast sensitivity after the procedure.

The accuracy and predictability in flap thickness by IntraLase has also been outstanding. Error margin of this laser in flap thickness made is +/- 5 micrometer, whereas it is +/- 15 micrometer by microkeratome. This difference would become highly significant when we consider the 2 standard deviations of the laser error of 10 micrometer, compared with the 30 micrometer by the microkeratome. Particularly, in patients who have thinner cornea or those who are undergoing higher corrections, every micrometer of the corneal tissue is important. In order to avoid complications such as corneal ectasia, accuracy and predictability of the flap thickness is very crucial. The microkeratome that could potentially cut 30 or more micrometers deeper than intended

is clearly not acceptable for such patients.

Another major advantage of the IntraLASIK method is that it causes much less dry eye compared with the microkeratome method. Most of the patients after IntraLASIK stop using artificial tears at about 4 weeks or just use them on PRN basis. Only very rarely if there is any need of lacrimal punctal plugs or other pharmacologic therapy. Why is it so? This has again to do with the ability of the laser to create thin planar flap architecture. It preserves the corneal innervation much better as the amount of corneal nerve endings severed by the procedure is much less. Consequently, the physiologic neurological responses in preserving the natural corneal tear film returns to normal at a faster rate. This is further aided by the fact that there is less epithelial trauma in IntraLASIK procedures intraoperatively.

Is there any disadvantage with the IntraLASIK method? This procedure takes a couple of seconds longer to create the flap. On the other hand, it is also significantly more expensive as the cost of the laser machine and its running cost is about 10-12 times more than a microkeratome.

Capt. Steve Schallhorn, the Navy Program Manager for Refractive Surgery in the US army recently proclaimed during the ASCRS 2007 annual symposium in the prestigious Binkhorst Lecture that “Wavefront guided LASIK using the IntraLase Method represents the best-of-the-best and is a truly exciting advancement for critical Navy personnel whose sight is of utmost importance in their military duties.” On the other hand, Jeff Machat MD, the President of TLC- the largest provider of laser vision correction procedures in the world, said, “Within the next two years, if you are not using IntraLase you will be obsolete...”

In summary, why the use of IntraLase FS laser in LASIK? Highest level of safety with side effects minimized is the number one reason. Its precision and superior visual quality outcome make it a much more desirable method compared with the usual microkeratome.