

Laser microkeratome may provide safer and more accurate flap creation

Sean Henahan
in Paris



Perry S. Binder

INITIAL experience with 1000 eyes suggests that all-laser refractive surgery with the IntraLase® system, provides good visual results and offers numerous advantages over surgery using conventional mechanical microkeratomes, reported Perry Binder MD at the XXII Congress of the ESCRS.

His study included 1000 consecutive LASIK flaps created with

Corneascan indicated that pre-operative corneal thickness and corneal power had no effect on achieved flap thickness. Some 73% of fellow eye flaps were within 15 microns of the first eye. The IntraLase reduced the standard deviation of flap thickness by nearly 50%. There were no decentred or irregular flaps, epithelial defects, or flap perforations.

"The IntraLase® eliminates the complications associated with mechanical flap creation as well as the effect of preoperative pachymetry and corneal power, so that there are no flap thickness surprises. After gaining experience during the learning curve, this permits the surgeon to operate on greater amounts of myopia without risking deep ablations," Dr Binder reported.

The operative technique, hardware and software were all adjusted during the study, based on Dr Binder's ongoing experiences. For example, after observing early postoperative inflammation in some patients, the energy levels were decreased, which resolved that problem. Increasing surgical experience also eliminated the problems with oedema

dilation. Eventually it became clear that it was the Neosynephrine (Phenylephrine HCL) that was being used to dilate the pupils that was interfering with the endothelial pump function. When the Neosynephrine was discontinued, the slipped flaps no longer occurred.

Dr Binder said that the original software also needed some adjustment. He worked with the IntraLase programmers to adjust the software so that the laser would create a pocket so that the gases could egress into another space and not go into the interface and interfere with tracking.

"That improved the situation. However, it still exists in some cases in which the interface bubbles that lie in the posterior stroma can interfere with tracking. You simply have to wait for that to clear before you continue."

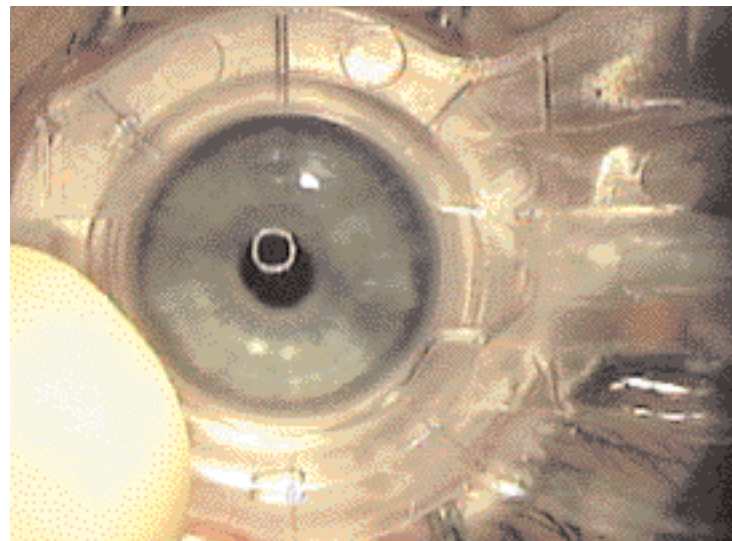
In the initial series, the mean flap thickness exceeded the intended amount by 20 to 30 microns. However, the range of thickness was smaller than would be seen with standard microkeratomes and standard deviation was more consistent. The software has since been adjusted, with a notable improvement in the results, he said.

"I now have a series of 200 eyes where 100 microns is the attempted and the mean is 103. With 110 microns attempted I'm getting a mean of 113, and with 120 microns it's 122. And the standard deviation is now exceedingly small, only +/- 10 microns. These results are absolutely spectacular."

Some IntraLase® investigators have recently reported cases of late onset photophobia. Dr Binder said he did see four cases of this problem. The patients came in weeks to months after surgery complaining of severe light sensitivity. On examination the patients had good vision, clear eyes and no signs of blepharitis, meibomitis or inflammation.

"The eyes looked fine, but the patients complained of significant light sensitivity. Clinically I made the diagnosis of irritation of the ciliary body. I treated with cycloplegics initially then with hourly steroids. The sensitivity clears up within days and the problem doesn't return. We're calling it transient light sensitivity."

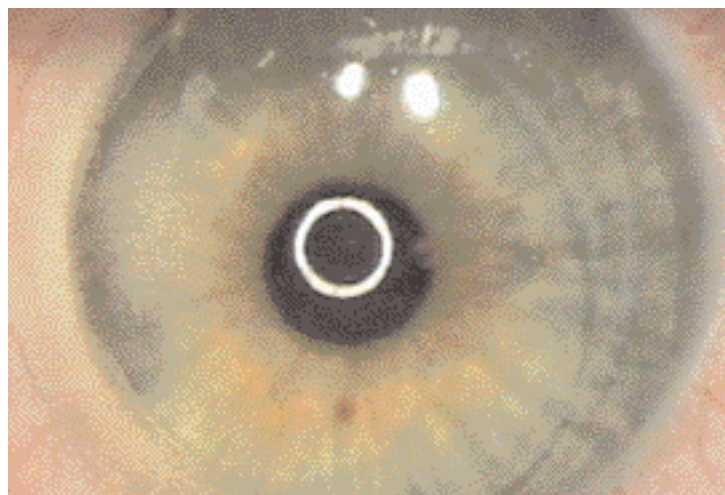
Dr Binder said it did not seem necessary to adjust nomograms when using the IntraLase®. He said his own experience with



The suction fixation ring is being affixed to the globe prior to docking with the IntraLase laser.

three platforms; the Alcon LADARVision system, the Visx S4 and the Allegretto laser support this conclusion. He also said colleagues using the Bausch and

machine in June 2002. After about three months we had converted completely to all-laser. I haven't touched a mechanical microkeratome since," he told *EuroTimes*.

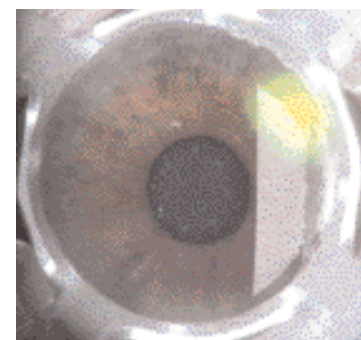


Gas bubbles remain in the peripheral cornea nasal to the hinge.

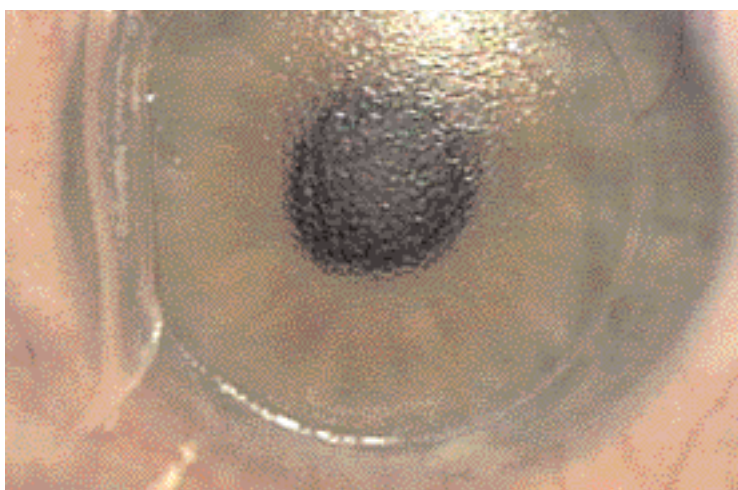
Lomb and Nidek platforms had reported that nomogram adjustment was not required when using the IntraLase®.

Overall, Dr Binder said the IntraLase was capable of producing predictable flaps without the negative effects associated with mechanical microkeratomes, including epithelial defects and abrasions, decentred flaps and buttonholes. The series also confirms that the IntraLase is not affected by pre-operative corneal thickness and that initial corneal curvature does not affect the achieved diameter or thickness.

He acknowledged that the primary potential downside with IntraLase was the cost, noting that this was the main objection his European colleagues raised. He



25% Ablation: View through the IntraLase microscope after one fourth of the laser ablation has been completed.



The flap has been lifted 10 minutes after the IntraLase ablation. Note the uniform dryness to the smooth interface.

the IntraLase® between June 2002 and November 2003. The first 400 cases were done with the 10 kHz version of the system and the remainder with the 15 kHz engine. The intended flap diameter was 9.0 mm in all cases, with a nasal or superior hinge; a 30 to 65 degree side cut angle and a 60 degree hinge angle.

Subtraction ultrasound pachymetry with the Storz 50 MHz

that occurred in some of the early cases.

"Surgeons will find that lifting these flaps is a little bit different. The flap doesn't lift up like a bladed microkeratome flap; you have to do some dissection," he explained.

There were also problems early on with slipped flaps. An analysis showed that this was happening primarily on the LADARVision platform. One difference was that LADAR patients required pupil

pointed out that while it does cost more per procedure, those costs were offset by a lower enhancement rates, freedom from microkeratome-related complications and good patient acceptance.

The IntraLase® System- comprised of the Intralase FS femtosecond laser surgical system and IntraLASIK software- utilizes a neodymium glass laser whose beam can be focused at any depth in the cornea in any pattern under software control. The laser attached to eye by means of a

suction applanation cone system. It focuses its energy a fixed distance below the glass that is touching the cornea.

Primarily used to make LASIK flaps, it has 510K approval in US and the CE mark in Europe. Since selling its first system in 2002 it has grabbed 12% of the LASIK market in the US.

Lucio Buratto MD was the first European ophthalmologist to perform the IntraLASIK procedure in Europe this March at the Video Refrattiva congress in Milan. Dr

Binder assisted in the first of his two cases, creating the flap with the intralase and then turning the operation over to Dr. Buratto, who then performed the excimer laser ablation. The IntraLase® system is also being used to perform lamellar keratoplasty, to make channels for intracorneal implants, and is being investigated for glaucoma treatment.

While IntraLase® was the first to market the femtosecond laser for cutting LASIK flaps, other companies are now also develop-

ing femtosecond lasers for ophthalmic surgery. The 20/10 Perfect Vision company based in Heidelberg, Germany, is now marketing the Femtec system for performing LASIK flaps, lamellar keratoplasty and intrastromal procedures. In addition, Joseph Colin MD in France is working with David Taboul MD PhD to develop a femtosecond laser system.

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