

Corneal Transplant Using a Femtosecond Laser

The Intralase FS laser may be used for a variety of refractive and corneal surgeries.

BY LAURA SUAREZ, MANAGING EDITOR, CATARACT & REFRACTIVE SURGERY TODAY EUROPE

A new version of the IntraLase 30 kHz femtosecond laser (60 kHz FS laser; Intralase Corp, Irvine, Calif) opens the door for a wider range of corneal and refractive surgery applications.¹ Introduced at the 2006 American Society of Cataract and Refractive Surgery meeting in San Francisco, the updates to the laser allow surgeons to create a variety of different cuts to suit the corneal procedure they are performing.

Pioneering this technology in Europe is Lucio Buratto, MD, from Milan, Italy. In March, Dr. Buratto performed the first European cases of penetrating keratoplasty (PKP) with the Intralase laser, as part of a six-site clinical evaluation of the new software.² In addition to flap creation for LASIK surgery, surgeons may use the laser for intrastromal incisions with ring implantation, anterior and posterior lamellar keratoplasty, corneal pockets for inlays as well as preparation of donor tissue for corneal transplants. To achieve this variety of corneal procedures, Intralase developed software that creates a variety of different corneal cuts including full thickness, anterior side cuts, ring cuts, lamellar cuts and posterior side cuts.

In his evaluation of the laser, Dr. Buratto performed corneal surgery on seven eyes (seven patients). Of the patients, five were keratoconus patients, and two had bullous keratopathy. The new software was used to create a penetrating cut in a *top hat* configuration. In five patients, donor corneas of 9 mm posterior and 7 mm anterior were used, while in two patients, donor corneas of 7 mm posterior and 9 mm anterior were used. A mirror-penetrating cut was then made in each patient's eye, and the donor cornea was fitted into place.

PRODUCE PROPER SHAPE

During the 2006 Winter European Society of Cataract and Refractive Surgeons annual meeting in Monte Carlo, Dr. Buratto spoke with *Cataract & Refractive Surgery Today Europe* about his experience with the Intralase laser. Over a

1-year period, he performed 14 keratoplasties with the original Intralase laser. He has also used the technology to treat corneal scars and keratoconus. These procedures are often free in Italian public hospitals; therefore Dr. Buratto has not performed a large number of cases with the FS laser. Collaboration with local hospitals, however, will increase his use of the Intralase FS.

As of March, he is performing regular procedures with the laser. "The more procedures I do, the better results I am having," he said, adding that the Intralase laser has the ability to go through opacities and create a thin graft for cornea transplant. When *CRSToday Europe* caught up with Dr. Buratto in April, he said that his results with the laser are superb. Previous-generation Intralase lasers did not allow surgeons to produce the proper shape and cut for grafts, but the latest model has corrected this problem and now offers the biomechanical advantage of optimally shaped incisions.

"The advantage of the Intralase FS is that you can decide exactly the shape, the diameter and the thickness of the cut," he said.

"In the past, one major problem during lamellar keratoplasties was the inability to obtain a smooth surface. Without a smooth surface, you cannot provide a patient with good quality vision. Now [with the FS laser], we can create better surfaces and give better results to patients."

USED FOR CORNEAL TRANSPLANT

During corneal transplant preparation, the Intralase laser—instead of a trephine (a microkeratome is not used to create the cut in PKP)—creates a contoured full-thickness corneal resection (top hat configuration) versus the straight vertical cut traditionally used in a full-thickness keratoplasty. Top hat configurations, although they create modified-shaped tissue, were often hard to perform with a trephine. By using the laser, corneal surgeons can facilitate top hat configura-

tion with more precision and possibly less room for error.

The logic of a stepped-edged keratoplasty using the Intralase laser is to create faster healing times due to better sealing and transplanted tissue stability. According to William Culbertson, MD, professor of ophthalmology and corneal surgery at Bascom Palmer Eye Institute, Miami, patients may experience quicker vision recovery and less astigmatism due to the creation of a corneal lip on the edge of the donor graft.² The procedure time to create the graft with this software is about 15 seconds. Intralase expects to launch this technique globally by the fall.

FUTURE USE

According to the Intralase news release,¹ 52% of refractive surgeons featured in *Cataract & Refractive Surgery Today's 50 Most Influential Ophthalmologists* use the Intralase method for LASIK surgery. "I see a big future use of this laser," Dr. Buratto said. Whereas surgeons needed to use expensive instruments and devices—all of which were surgeon-dependent—to perform LASIK and other refractive surgeries before the FS laser, this need is now eliminated. "If the surgeon knows and can use the instruments very well, the surgeon can do a good job. But, with the Intralase laser, which is not surgeon-dependent, you position the machine and you cut the cornea. You can cut both sides, and instead of being completely vertical, [the laser] creates an angulated cut."

Creating vertical cuts with the laser allows for easier suturing on a complementary surface, Dr. Buratto said. "Theoretically, you should see a better result because you need to use fewer sutures."

No long-term data are available on the Intralase laser and its use in corneal transplantation. Advocates of this technology, including Dr. Buratto, believe that using the laser rather than a corneal trephine will improve the results in PKP. ■

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1. Intralase launches 4th generation laser as blade-free LASIK gains momentum with LASIK luminaries. Company news release. March 16, 2006. Available at www.intralase.com.

2. Intralase announces first use of FS laser for advanced corneal transplant surgery. Company news release. January 26, 2006. Available at www.intralase.com.