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Lasersoft solid-state laser advances refractive surgery, surgeons say

The system offers more fluence stability and precision than excimer lasers.

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NAPLES – The Lasersoft solid-state laser is a safe, stable, more compact and less costly alternative to gas-operated excimer lasers for refractive surgery, according to two surgeons speaking here.

“The advances of refractive surgery in the last 3 years are comparable to those of cataract surgery between 1975 and 1995. In this scenario, the solid-state laser has made a further step forward, summing up all the main achievements of the latest laser technology, with quite a few additional advantages,” said Matteo Piovella, MD, at Naples ’04 Joint Meeting.

The Lasersoft, a diode-pumped UV laser, uses a solid-state laser crystal as the laser medium and nonlinear crystals for frequency conversion instead of the high voltage gas discharge of excimer lasers, he said.

“The very first impression you have is that of an unusual, relaxing silence throughout the treatment. There is no sudden noise as the laser starts, and therefore no sudden patient movement. Surgery is carried out in a quiet, patient-reassuring environment,” Dr. Piovella said.

The continuous-wave diode pumping gives stable fluence and beam pointing, which results in a very precise rate of ablation, he said. Fluence is not disturbed by the instability of gas discharge, and the ablation is carried out in a smooth, homogeneous manner.

Another advantage of the no-gas approach is that the machine is less expensive to operate and maintain, he said.

A small spot

The Lasersoft has a small spot size (0.25 mm), four times smaller than those of excimer lasers (0.80 mm to 1.00 mm). To compensate for the small size of the spot, the repetition rate is as high as 1 kHz, compared to the 50-Hz to 400-Hz rates of excimer lasers.

According to Lucio Buratto, MD, who operated during the live surgery session of the meeting, the eyetracker used by the Lasersoft is “strikingly precise.” The high speed of the spot necessitates a fast, high-quality eyetracker, he said.

According to Dr. Piovella, the small spot size and the Gaussian beam spot distribution fit today’s requirements for effective custom ablation. This is because the laser can perform precise, fine work on the corneal surface with “submillimetric precision” and has a wide range of possible variations, he said.

“It is like an artisan forging the pewter with a fine hammer rather than with a large hammer, to obtain accuracy and precision of details,” Dr. Piovella said.

The precise structuring capability of the system allows for the correction of corneal microirregularities, thus reducing higher-order aberrations, he said.

The ablation algorithm is adapted to preserve the strongly aspherical profile of the normal cornea, with minimal induction of spherical aberration, he added.

“The result is a very smooth, homogeneous corneal surface,” Dr. Buratto said. “The very gentle, consistent impact of the laser doesn’t produce heat on the cornea, nor edema on the tissues.”

An additional advantage of the solid-state laser beam is that ablation is not affected by dehydration of the eye or humidity changes in the surgery room, he said. “You can carry out your ablation also with 200 µm of water or balanced salt solution on the cornea.”

The only drawback of the laser is that ablation time is slightly longer than with excimer lasers, due to the smaller spot size, Dr. Buratto said.

“Repetition rate has not yet compensated for the increased number of spots that are necessary to ablate a given surface. However, within a few months the laser will be available with a repetition rate of 2 kHz,” he said.

Preliminary results

Dr. Piovella presented the preliminary results of the Lasersoft on 28 eyes of 22 patients and said the results are comparable with those of excimer lasers.

The mean age of patients was 37 years. Fourteen eyes were treated with LASIK and 14 with PRK. Mean preoperative spherical equivalent was –2.53 D, ranging between –8 D and +2.88 D.

“Postoperatively, all eyes were within 0.27 D of attempted correction, and results were stable at 6 months,” Dr. Piovella said.

He concluded that the system is safe and effective for the correction of myopia, hyperopia and astigmatism.

“We are now waiting for an aberrometric link to this laser, which will soon be produced by one of the many manufacturers of aberrometers who are interested in the versatility of the system,” he said.

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- Dr. Piovella has no direct financial interest in the products mentioned in this article, nor is he a paid consultant for any companies mentioned. *Ocular Surgery News* was unable to confirm whether Dr. Buratto has a direct financial interest in the products mentioned in this article or if he is a paid consultant for any companies mentioned.
- Katana Technologies GmbH, maker of the Lasersoft system, can be reached at Albert-Einstein-Ring 7, 14532 Kleinmachnow, Germany; +49-0-30-217-33-8250; fax: +49-0-30-217-33-8252; e-mail: info@katanalaser.com; Web site: www.katanalaser.com.
- The 9th Annual Joint Meeting of *Ocular Surgery News*, the Italian Association of Cataract and Refractive Surgery and International Society of Refractive Surgery was held 20-22 May in Naples. For information on future meetings, e-mail: meetingregistration@slackinc.com or call +1-856-848-1000.

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