

Ophthalmology Times

Flying spot laser safely treats myopic astigmatism

Treatment provides effective, predictable correction even when eye-tracking system not employed

By CHERYL GUTTMAN

Reviewed by Aleksandar Stojanovic, MD

BOSTON—A 200-Hz flying spot excimer laser (The LaserSight LSX) provides safe, effective, and predictable correction of compound myopic astigmatism, even when used without its eye-tracking mode, said Aleksandar Stojanovic, MD, at the annual meeting of the American Society of Cataract and Refractive Surgery.

He presented results from 6 months of follow-up in 110 LASIK-treated eyes and 12-month outcomes of 87 PRK-treated eyes that, overall, showed very low residual SE, UCVA of 20/40 or better in nearly all eyes, no BCVA losses of 2 lines or greater, and only minimal haze.

“In the quest for smoother ablations and to meet recent demand for more complex ablation patterns, excimer laser technology has evolved from hardware-driven, broad-beam, low-frequency sys-



tems to software-driven, small-beam, high-frequency devices,” explained Dr. Stojanovic, who is a private practitioner at the SynsLaser Clinic, Tromsø, Norway.

Eye-tracking a necessity?

“Our results using this small-beam, high-frequency excimer laser to treat compound myopic astigmatism compare favorably with published outcomes of both broad- and small-beam lasers, including the small-beam flying spot lasers employing 100-Hz repetition rate and eye tracking,” he said. “In a way, they dispel the perception that eye-tracking is a prerequisite whenever using small-beam flying spot technology.

“I think that the eye-tracking tech-

nology is of greater importance when treating hyperopia and hyperopic astigmatism, and that is going to be an absolute necessity when we start doing customized ablation,” he said.

Dr. Stojanovic and his colleague Tore Nitter, MD, have used the 200-Hz flying spot excimer laser to correct compound myopic astigmatism via LASIK in 130 eyes and PRK in 110 eyes. Excluded from the outcome analyses were 11 (8.5%) LASIK eyes and eight (7.4%) PRK eyes that underwent enhancement for residual SEs ranging from -0.75 to -2 D.

LASIK, PRK indications

Preoperative refractive data reflected the tendency to perform LASIK in eyes with moderate to higher myopia and to use PRK to correct low myopia. Preoperative mean SE in the LASIK eyes was -5.35 D with a range of -1.13 to -11.88 D. Baseline mean cylinder ranged from zero to -5 D and averaged -1.07 D.

In the PRK eyes, preoperative mean SE was -4.72 D and ranged from -1 to -15.5 D. Cylinder ranged up to -4 D and averaged -0.95 D. In around 20% of eyes in both groups, preoperative cylinder was -2 D or higher.

Early follow-up showed a tendency to slight initial overcorrection in the PRK eyes with regression during the first postoperative month and stability thereafter. The initial corrections were closer to the target in the LASIK eyes, and the results were also very stable during the first 6 months of follow-up.

In the LASIK eyes at 6 months, mean SE was -0.11 D; 83% of eyes were within 0.5 D of intended correction, and 97% were within 1 D. The 12-month data from the PRK eyes showed a mean SE of

Figure 1

Postoperative LASIK, PRK results with the LaserSight LSX			
LASIK patients (n = 110)		PRK patients (n = 87)	
Preop mean SE	Postop mean SE at 6 months	Preop mean SE	Postop mean SE at 12 months
-5.35 D	-0.11 D	-4.72 D	-0.02 D
Preop mean cylinder	Postop mean cylinder at 6 months	Preop mean cylinder	Postop mean cylinder at 12 months
-1.07 D	0.04 ± 0.31 D	-0.95 D	0.02 ± 0.37 D

-0.02 D, with 77% of eyes within 0.5 D of intended correction and 98% within 1 D of target.

Good predictability

"Looking at our results on scattergrams showed that both procedures demonstrated excellent predictability across the entire range of attempted corrections," Dr. Stojanovic said. "However, with PRK, the clustering around the zero line was particularly tight for low myopic corrections, up to -3 D, and was even better than that achieved with LASIK."

The treatments were also very accurate in correcting cylinder. Mean magnitude of error at last follow-up was 0.04 ± 0.31 D (-0.96 to +0.85 D) for LASIK and 0.02 ± 0.37 D (-1.44 to +0.72 D) for PRK. Mean angle of error was $1.6^\circ \pm 10.8^\circ$ (-42.5° to +37.5°) for LASIK and $1.32^\circ \pm 19.87^\circ$ (-40° to +42.5°) for PRK. While vector analysis showed a relatively high standard deviation and wide range for the angle of error, Dr. Stojanovic noted that finding is accounted for by the imprecision of correcting very small amounts of astigmatism.

"Our results showed small induced

cylinders occurring at random angles," Dr. Stojanovic said. "A re-analysis excluding eyes treated for 0.5 D or less of astigmatism would show greater accuracy for the angle of error."

UCVA results were analyzed for 64 LASIK eyes and 54 PRK eyes that were targeted for emmetropia and had a preoperative BCVA of at least 20/20. Almost 80% of eyes in both treatment groups achieved UCVA of 20/20 or better at the last follow-up and all eyes but one in each group had UCVA of 20/40 or better.

Safety was excellent in both PRK and LASIK eyes. Safety index calculations that divided mean postoperative logMAR BCVA by mean preoperative logMAR BCVA yielded results of 1.07 for LASIK and 1.1 for PRK. For PRK, haze peaked early at 1 to 2 months postoperatively, and maximum ratings did not exceed 1+. At 12 months, the mean haze score was 0.09 and no eye had a rating greater than 1.

Role of vitamin C

"Haze has been a very minor problem in eyes treated by PRK with this laser," he

said. "That may be explained by the very smooth ablations achieved with this technology, but our treatment of PRK patients with oral vitamin C may also play a role in minimizing UV-induced changes contributing to haze."

His medication regimen for PRK patients includes oral vitamin C at a dose of 500 mg twice daily begun 1 week before surgery, continued for 2 weeks postoperatively, and restarted any time during the first year after PRK when the patient will have increased outdoor exposure to UV radiation.

"This use of vitamin C is based on research showing that vitamin C protects against UV-induced corneal damage in rabbit eyes," Dr. Stojanovic said. "Its potential for clinical benefit is based on impression, but I am now analyzing data to define the value of this vitamin supplementation better."

Neither Dr. Stojanovic nor Dr. Nitter has any financial interest in the LaserSight LSX excimer laser.

Dr. Stojanovic has been elected to the medical advisory board of LaserSight. ♠

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Note: LaserScan LSX Eximer Laser with EyeTracker for the indication of LASIK is considered an investigational device (IDE) in the U.S.

Caution: Investigational Device, limited by the United States Law to investigational use.